Generalized vaccinia in an active duty service member: one of the many faces of smallpox vaccine-related cutaneous adverse reactions

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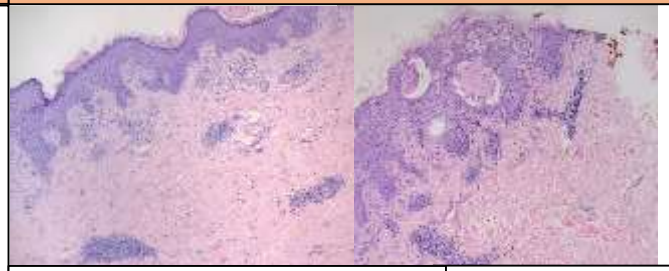
Case Presentation

A 21-year-old active duty male without history of skin disease presented with new onset pruritic, vesicular rash on the bilateral upper and lower extremities, trunk, and anogenital area beginning 1 week after pre-deployment smallpox vaccination to the left deltoid. Review of systems was significant for mild headache and malaise. Physical exam revealed coalescing annular, erythematous papules and plaques in multiple body locations. The patient was admitted to the hospital for several days for control of rash-associated pain and pruritus. Punch biopsy of rash on the right trunk was obtained, and swab from the left shoulder was positive for vaccinia virus by PCR. The rash distribution and positive vaccinia culture away from the inoculation site yielded a diagnosis of generalized vaccinia. The patient recovered without complications over the next few weeks with supportive care. If the patient were immunosuppressed or systemically ill, vaccinia immune globulin or a systemic antiviral would have been considered.

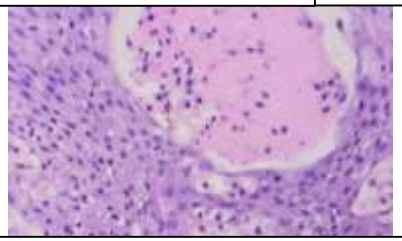
Clinical Images

Histopathology



H&E, 100x: dermal hypersensitivity-like reaction pattern

H&E, 100x: vesicular spongiotic dermatitis



H&E, 200x: spongiotic vesicles with mixed inflammation including eosinophils and Langerhans cells

Discussion

-In the 1800s, it was discovered that immunity to variola (smallpox) virus could be conferred by vaccination with live vaccinia (cowpox) virus. ACAM2000 is currently the only licensed smallpox vaccine in the U.S. It is administered as a single dose by the percutaneous route via the multiple puncture technique.
-Of note, the smallpox vaccine has the greatest risk for life-threatening adverse events compared to any other currently used vaccine. Although the smallpox case-fatality rate approaches 30%, routine vaccination against smallpox in the U.S. was ceased in 1972 when the risk of adverse events outweighed the risk of viral exposure. Since that time, only certain at-risk individuals are immunized, such as military members deploying to specific areas.

Discussion, cont'd

-Some contraindications to vaccination of a potential vaccinee as well as their household contacts include those who are pregnant or have a history of atopic dermatitis or immunosuppression (transplant patients, cancer).
-The most serious adverse reactions to vaccination include death, encephalitis, progressive vaccinia, fetal vaccinia, and eczema vaccinatum. More self-limited complications include fever, rash, generalized vaccinia, and accidental inoculation.
-Cutaneous adverse reactions to smallpox vaccine:
1) Progressive vaccinia- usually in immunocompromised; rare, severe, often fatal; inoculation site fails to heal, and secondary "metastatic" vaccinia lesions develop
2) Eczema vaccinatum- localized or systemic spread with history of atopic dermatitis; can be fatal; patients often systemically ill (fever, lymphadenopathy)
3) Generalized vaccinia- disseminated rash (vesicular or pustular); culture evidence and exclusion of other causes of rash; benign, self-limited in immunocompetent
4) Autoinoculation- transfer via hands/fomites; face (eyes/nose/mouth), anogenital
5) Robust take- "vaccinial cellulitis;" vaccine reaction >3 inches; peaks in 6-12 days
-In addition to supportive care, treatment of cutaneous adverse reactions is recommended in cases of eczema vaccinatum, progressive vaccinia, severe generalized vaccinia, ocular autoinoculation (not isolated keratitis), and infection in individuals with extensive barrier-compromising skin conditions. This includes:
1) Vaccinia immune globulin (VIGIV)- first line; must obtain from the CDC
2) Antivirals- +/- VIGIV; second line; not FDA-approved; includes cidofovir (risk of renal toxicity), brincidofovir, and tecovirimat (less side effects)

References

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3. Cono, Joanne, et al. "Smallpox Vaccination and Adverse Reactions: Guidance for Clinicians." *Recommendations and Reports*, Centers for Disease Control and Prevention, 21 Feb. 2003, www.cdc.gov/mmwr/preview/mmwrhtml/rr5204a1.htm.
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