



# Airway Management in a Patient with Trauma Associated Cervical Anterolisthesis



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## Learning Objectives:

- Emphasize the importance of planning ahead for a difficult airway
- Discuss tools and strategies recommended by ASA difficult airway guidelines
- Review available evidence supporting the ASA guidelines and the use of difficult airway algorithms

## Introduction:

The difficult airway is defined by the ASA as, “The clinical situation in which a conventionally trained anesthesiologist experiences difficulty with mask ventilation of the upper airway, difficulty with tracheal intubation, or both.”<sup>3</sup> According to them, a difficult airway represents “... a complex interaction between patient factors, the clinical setting, and the skills of the practitioner.”<sup>3</sup> Recognized societies and independent authors have published guidelines and algorithms to assist the anesthesiologist with managing difficult airway situations. These guidelines emphasize a proactive strategy, including anticipating a difficult airway and forming a management plan.

## Case Presentation:

- 69 yo F fell down a flight of stairs, brought to trauma bay
- GCS 8, BP labile, and she called out for help in an impending sense of doom
- Lost pulse in PEA, received chest compressions, epinephrine
- Regained pulses with a sinus rhythm, GCS 6
- Given IV ketamine and rocuronium for intubation

**Airway Exam:** Thin elderly patient, partially edentulous, no visible neck deformity, in C collar, uncooperative, altered MS.

### Airway Management:

1. ED resident via VL, poor view, unable to intubate. Easily mask ventilated.
2. CA3 via VL, grade 2B view, unable to intubate. Easily mask ventilated.
3. Same CA3 via VL + bougie, grade 2B view, unable to intubate. **Increased difficulty with mask ventilation.**
4. Anesthesiology staff via DL + bougie, grade 2B view, unable to intubate. Received cricothyroidotomy.



Pic 1: Patient Neck CT

## Reviewing ASA Difficult Airway Algorithm:

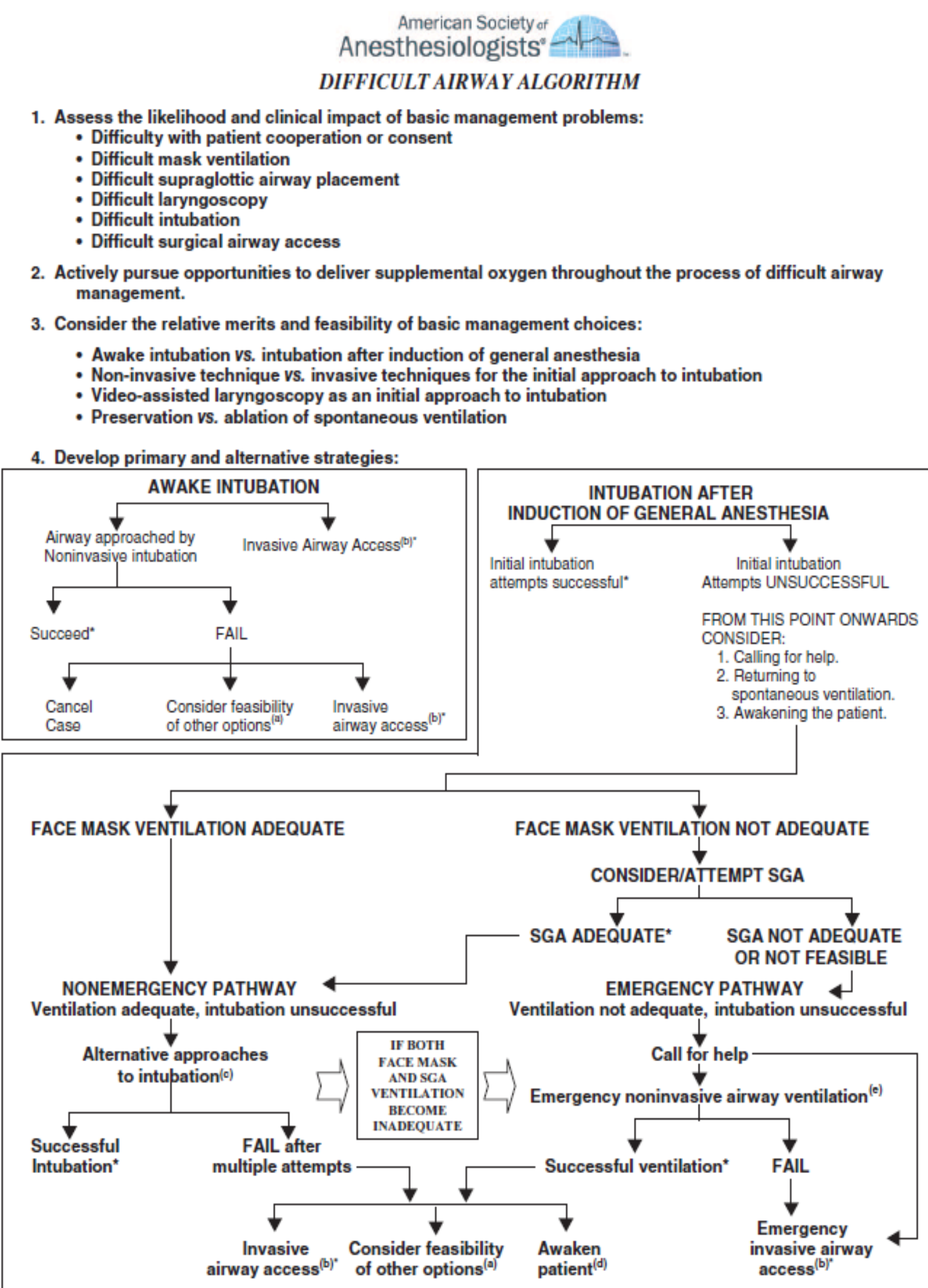


Fig 1<sup>3</sup>

Most common predictors of difficult intubation:

Question	#	%
Indicate any predictors of difficult tracheal intubation (whether known/recognized at the time or not) or factors that contributed to difficult airway management		
Airway obstruction from any cause <sup>1</sup>	31	30%
Past history of difficult intubation	21	21%
Mallampati grade 3–4	19	19%
Limited cervical spine extension	16	16%
Limited mouth opening	13	13%
Secretions/blood in airway	12	12%
Short neck	10	10%
Swollen tongue	6	6%
Short thyromental distance	6	6%
Thick or bull neck	6	6%
History of neck irradiation	5	5%
Pre-eclampsia	2	2%
Prominent teeth	1	1%

Table 3<sup>2</sup>

### Next, choose a primary management strategy:

- VL associated with higher frequency of success in patients with predicted difficult airway (A-1)

### First step, evaluate the patient:

Predictors of Difficult Mask Ventilation

Predictor	β Coefficient	Standard Error	p-value	Adjusted odds ratio (95% Confidence Interval)
Age≥47	0.677	0.205	0.001	1.97 (1.32, 2.94)
BMI≥35	0.737	0.222	0.001	2.09 (1.35, 3.23)
NeckCirc≥40	0.931	0.239	<0.001	2.54 (1.59, 4.05)
HxDiffIntub	1.536	0.692	0.026	4.65 (1.20, 18.02)
FacHair	0.849	0.251	<0.001	2.34 (1.43, 3.83)
Short Neck	0.631	0.291	0.030	1.88 (1.06, 3.32)
ObsSA	0.503	0.223	0.023	1.65 (1.07, 2.56)

Table 1<sup>1</sup>

### Combining predictors

Number of risk factors	Total patients	Patients with DMV n (%)	Odds Ratio (95% Confidence Interval)
0	337	7 (2.1)	Reference
1	559	36 (6.4)	3.25 (1.43, 7.38)
2	410	57 (13.9)	7.61 (3.42, 16.93)
3	93	24 (25.8)	16.40 (6.79, 39.57)

Table 2<sup>1</sup>

- Awake fiberoptic intubation is successful in 88 – 100% of difficult airway patients (B-3)
- Fiberoptic-guided intubation successful in 87 – 100% of difficult airway patients (B-3)

### Have backup management strategies:

- Intubation stylets or tube-changers resulted in successful intubation in 78 – 100% of difficult airway patients (B-3)
- Successful rescue ventilation achieved in 94% of patients who could not be mask ventilated or intubated (B-3)<sup>3</sup>

### Navigate emergency vs nonemergency pathways:

Many airway guidelines exist, how effective are they in practice?

- 38 published guidelines, 14 by recognized societies, 24 by independent authors
- Weak evidence supporting guidelines
- Limited data analyzing use and effectiveness<sup>4</sup>

## Discussion/Conclusion:

- Successfully managing a difficult airway begins with preparation, including anticipation, knowing tools and strategies available, and forming a plan.
- Given the weak evidence supporting airway guidelines, perhaps the “best” guideline is the one that works best for the individual anesthesiologist.
- Our patient began on the nonemergency path of the ASA algorithm but moved toward the emergency path, and ultimately a cricothyroidotomy.

### Was a surgical airway inevitable?

- Her limited airway exam could not fully predict her difficult airway
- Multiple providers with increasing experience attempted intubation
- The patient was mask ventilated between attempts
- **Different VL and DL blades were not attempted to improve view**
- **No attempt was made to ventilate through a supraglottic airway device.**
- This case helped the authors analyze their practice and better prepare for managing future difficult airways.

### References:

1. Difficult mask ventilation in general surgical population: observation of risk factors and predictors” Cattano et al. F1000 Research, 2014 Aug; <https://dx.doi.org/10.12688%2Ff1000research.513.1>.
2. Management of difficult tracheal intubation: a closed claims analysis Joffe et al. Anesthesiology. 2019 Oct; 131(4): 818–829.
3. American Society of Anesthesiologists: Practice guidelines for management of the difficult airway: An updated report. Anesthesiology 2003; 98:1269–1277.
4. Difficult airway management algorithms: a directed review. Elderman et al. Anaesthesia. 2019 Sep;74(9):1175-1185.