EMET ED Airway Management

Risk Assessment

Objectives

1. You will know the indications for intubation.
2. You will understand risk assessment for airway management.
3. You will be able to define various difficult and failed airway scenarios.
4. You will understand the importance of pre-oxygenation.
5. You will understand the importance of planning for difficult airways.

Tube or not tube?

- To be, or not to be- that is the question: Whether 'tis nobler in the mind to suffer the slings and arrows of outrageous fortune or to take arms against a sea of troubles, and by opposing end them.

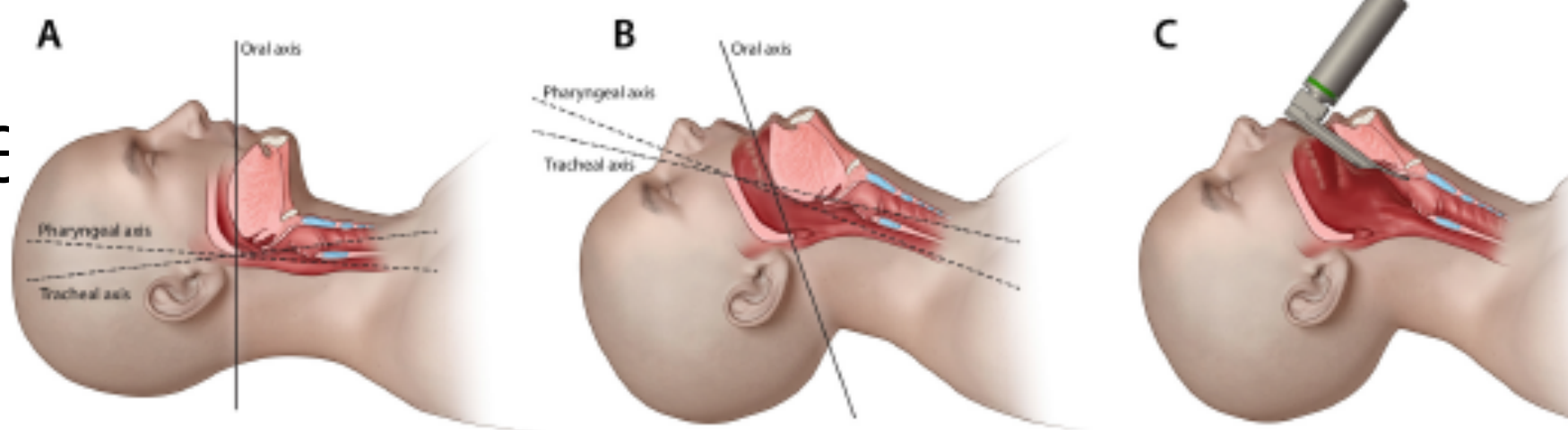
Tube

- **Obtain and maintain** the airway – functional vs. pathologic obstruction
- **Correct** abnormalities of gas exchange – oxygenation, ventilation
- **Protect** the airway
- **Secure** the airway early in the face of predicted clinical deterioration
- Management of the **combative** patient
- *n.b. Successful airway management may occur without intubation but successful intubation will not occur without successful airway management.*

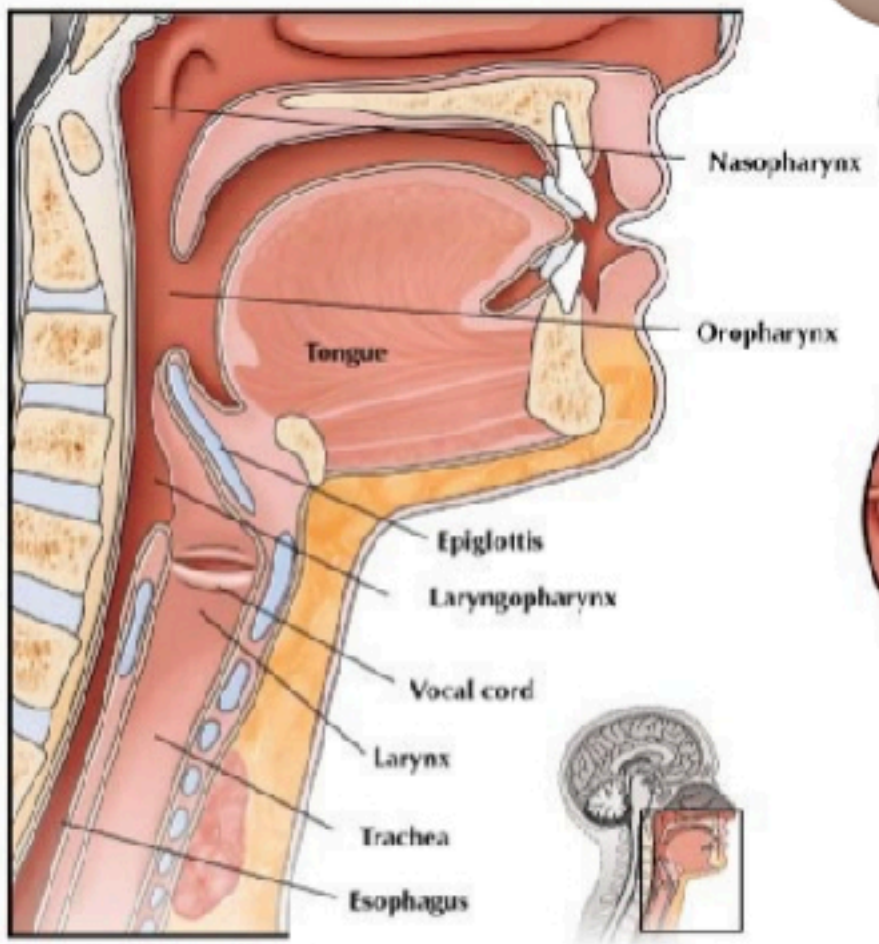
Urgency

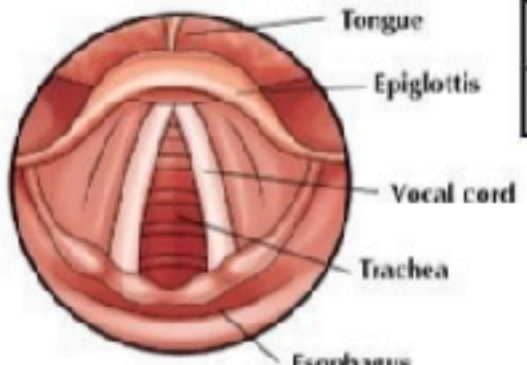
Operator experience, Patient factors

Risk assessme



OF THE LARYNX

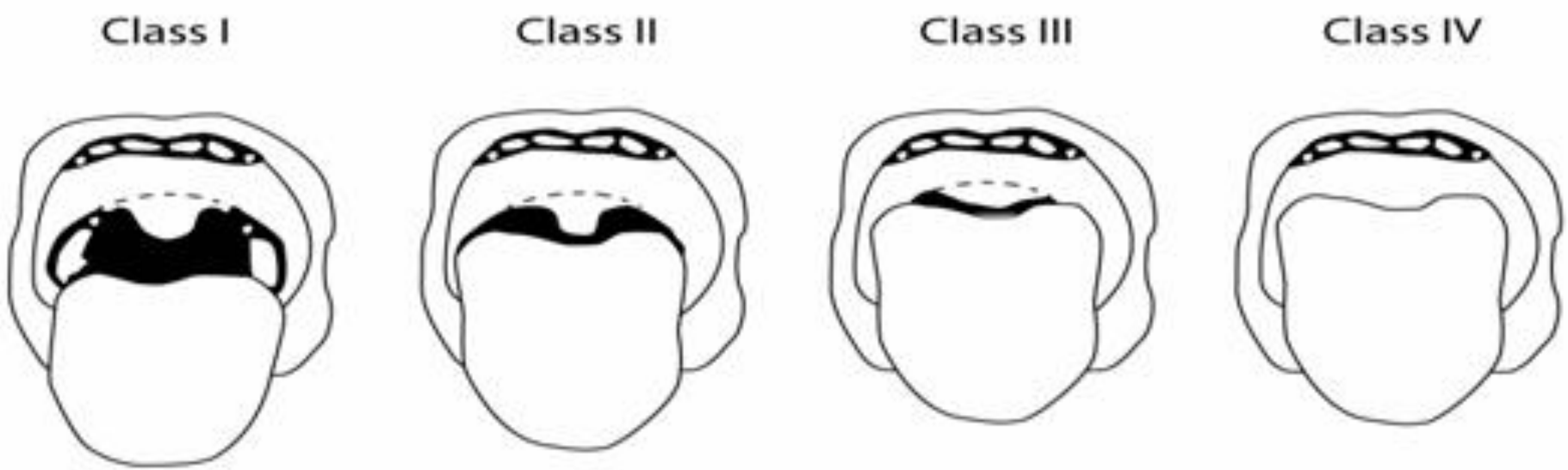




LARYNGOSCOPIC VIEW

L	Look externally (gestalt)
E	Evaluate 3-3-2 rule
M	Mallampati scale
O	Obstruction/Obesity
N	Neck mobility

A.


Class I
Class II
Class III
Class IV

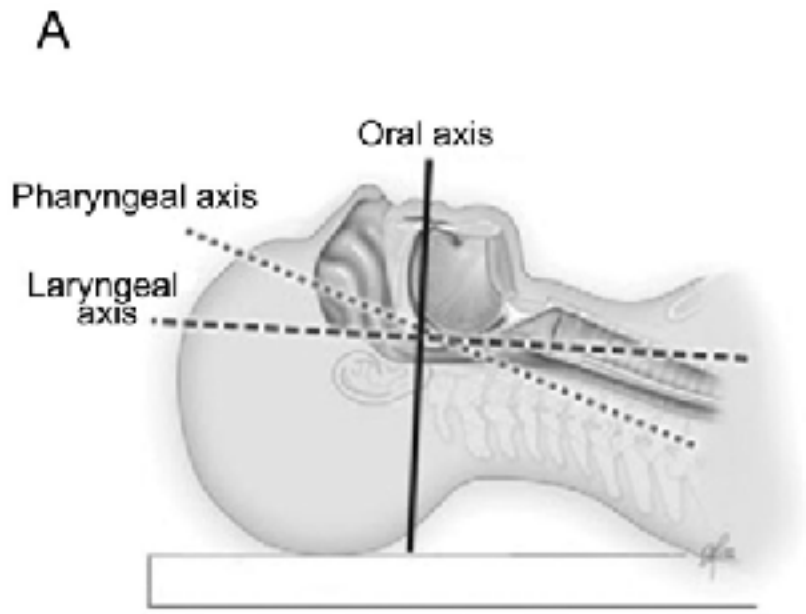
B.

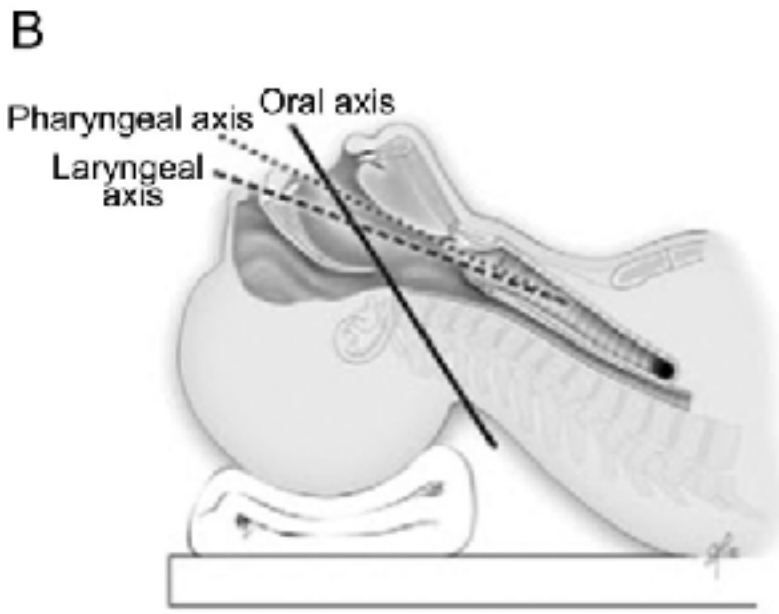

Grade I
Grade II
Grade III
Grade IV

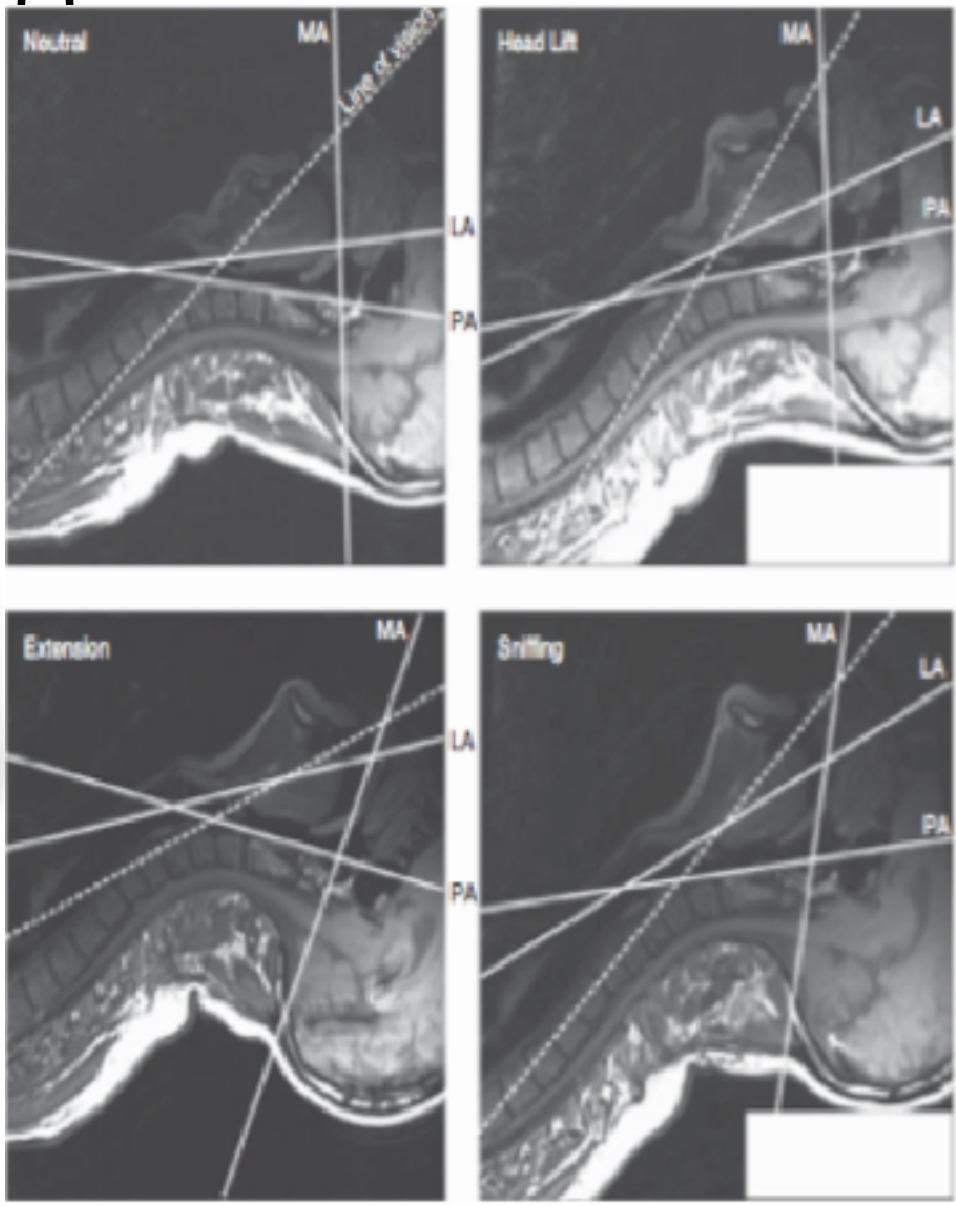
Risk Assessment

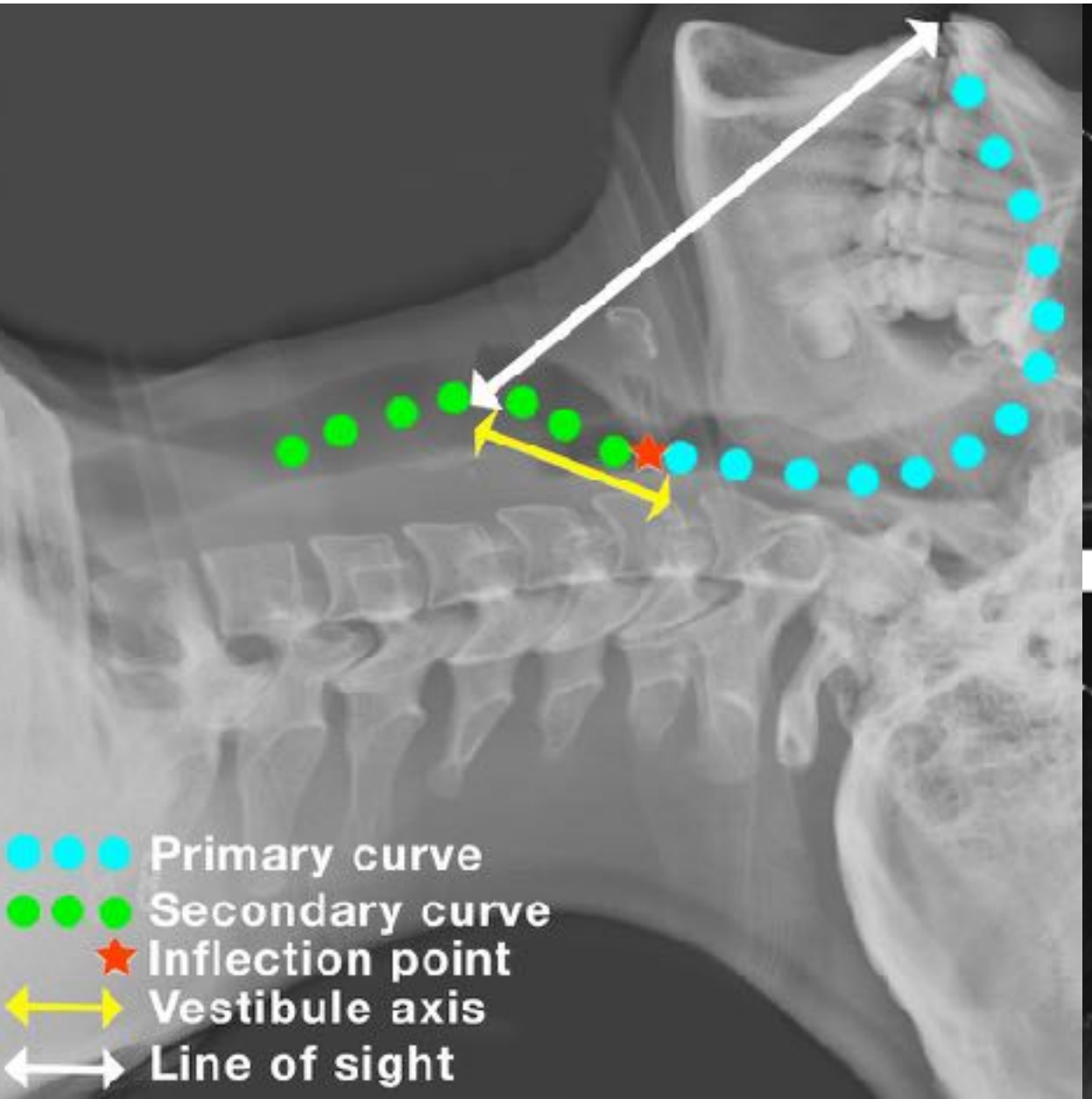
- A sound three-dimensional appreciation of the oropharynx and laryngeal inlet is critical for optimal laryngoscopy.
- Assessment of the anatomy is the basis for the clinical decision to proceed with a rapid sequence intubation, an awake intubation or a primary surgical airway.
- Difficulty **may** be anticipated and needs to include the risk of failed BMV, failed extraglottic ventilation and failed cricothyrotomy, as well as failed intubation.
- Anatomic risk prediction often fails.

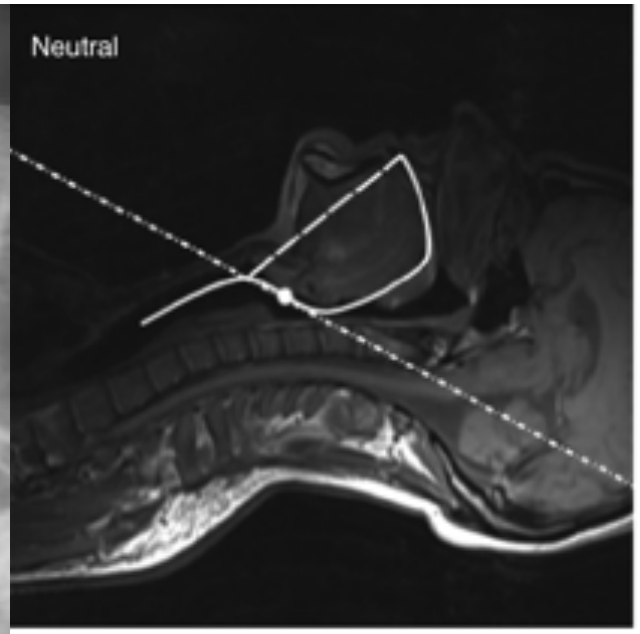
Greenland's MRI Study 2010

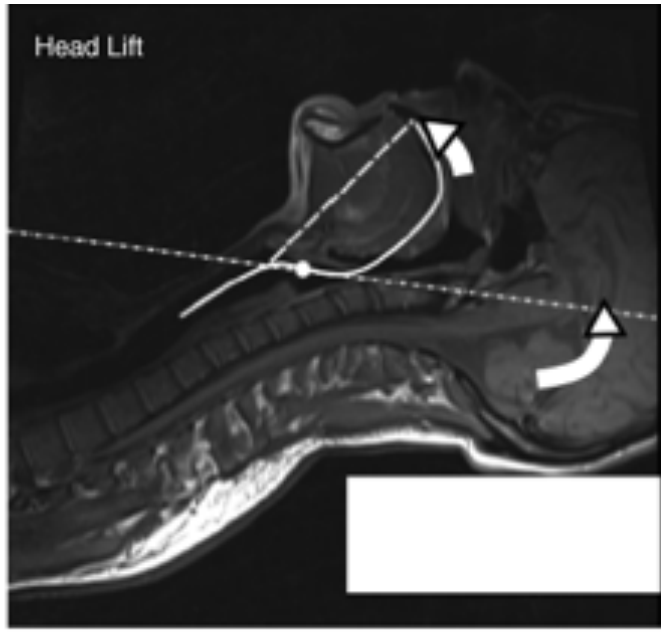


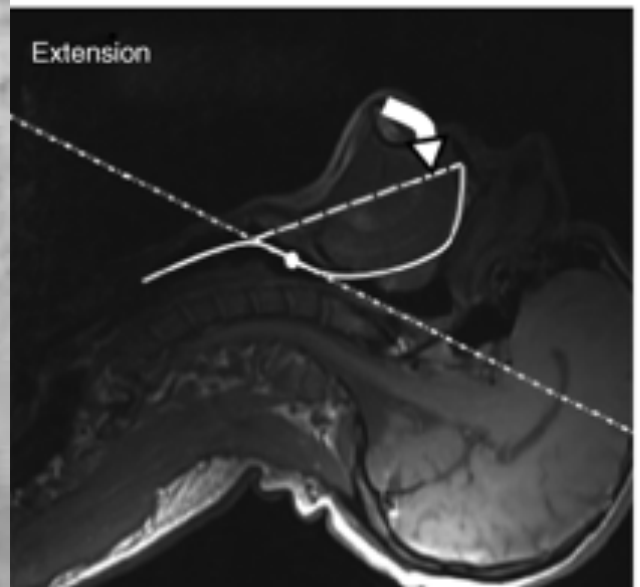


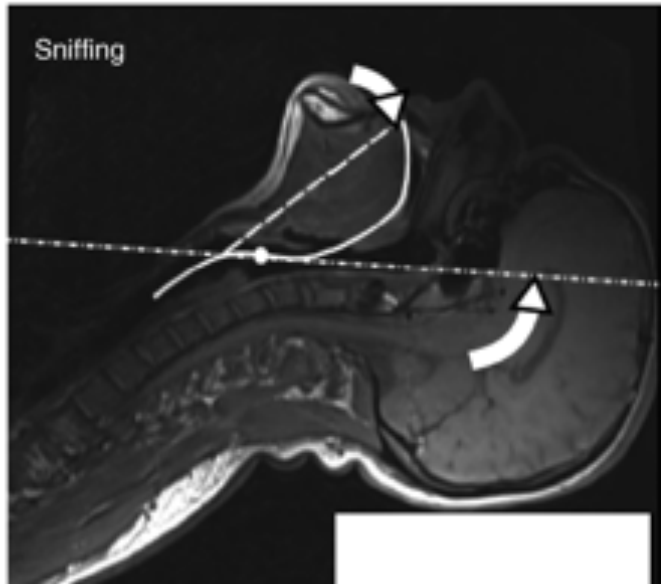



Primary curve
Secondary curve
Inflection point
Vestibule axis
Line of sight

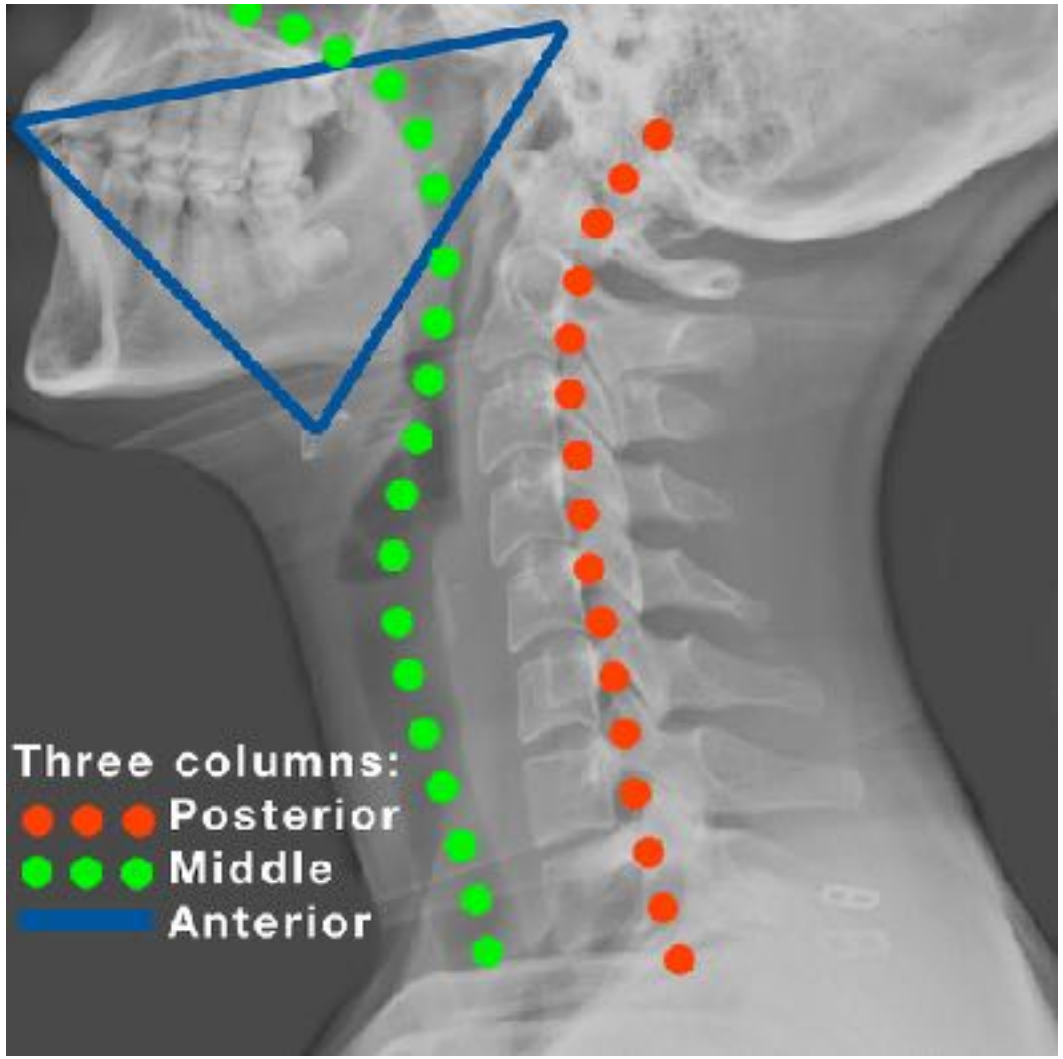

Neutral


Head Lift


Extension


Sniffing

Greenland's 3 Column Model



Greenland's three-column model[4]

Column	Pathology	Assessment	Device
Posterior	Rheumatoid arthritis Ankylosis In-line stabilisation	Range of movement of occipito-atlanto-axial complex	McCoy LMA + FOB + Aintree ILMA Standard blade videolaryngoscopy
Middle (air passage)	Foreign body Epiglottitis Tumour Lingual tonsil	History and examination CT/MRI Nasopharyngoscopy	Macintosh Standard blade videolaryngoscopy LMA + FOB + Aintree NOT ILMA (fixed curve)
Anterior	Decreased volume • micrognathia Decreased compliance • infection • haemorrhage • radiotherapy Buck teeth (relative micrognathia) Large tongue	Thyromental distance TMJ-TMJ distance TMJ-incisor distance Overbite Mallampati score	Straight blade • narrow, better displacement of tissues) • lifts epiglottis (which is harder to deploy via hyoepiglottic ligament in cases of decreased compliance LMA + FOB + Aintree Standard blade videolaryngoscopy NOT McCoy (hard to deploy hyoepiglottic ligament) NOT ILMA (has a fixed curve)

Greenland

- Optimum view
  - Neck flexion to 35 degrees
  - Face plane extension to 15 degrees
  - (usually achieved by using a pillow to align tragus with sternum)

The Difficult Airway

- The definition of the difficult airway varies in different literature sources. The emergency medicine literature generally considers the difficult airway in three dimensions: difficult mask ventilation, difficult intubation and difficult cricothyroidotomy, by experienced personnel.
- The risk of complications increases with repeated or prolonged attempts, making expedient first attempt success the goal for airway management in these patients.

Failed Airway

- A failed airway exists when there is a failure on the part of the operator to effect gas exchange in a patient that cannot do so on their own.
- In the clinical arena, this most often occurs when there is an inability to intubate the patient's trachea (even after only a single failed attempt) and an inability to ventilate the patient adequately with a bag and mask to maintain oxyhemoglobin saturations above 90 percent. This is the "can't intubate, can't oxygenate" (CICO) type of failed airway.

National Emergency Airway Register

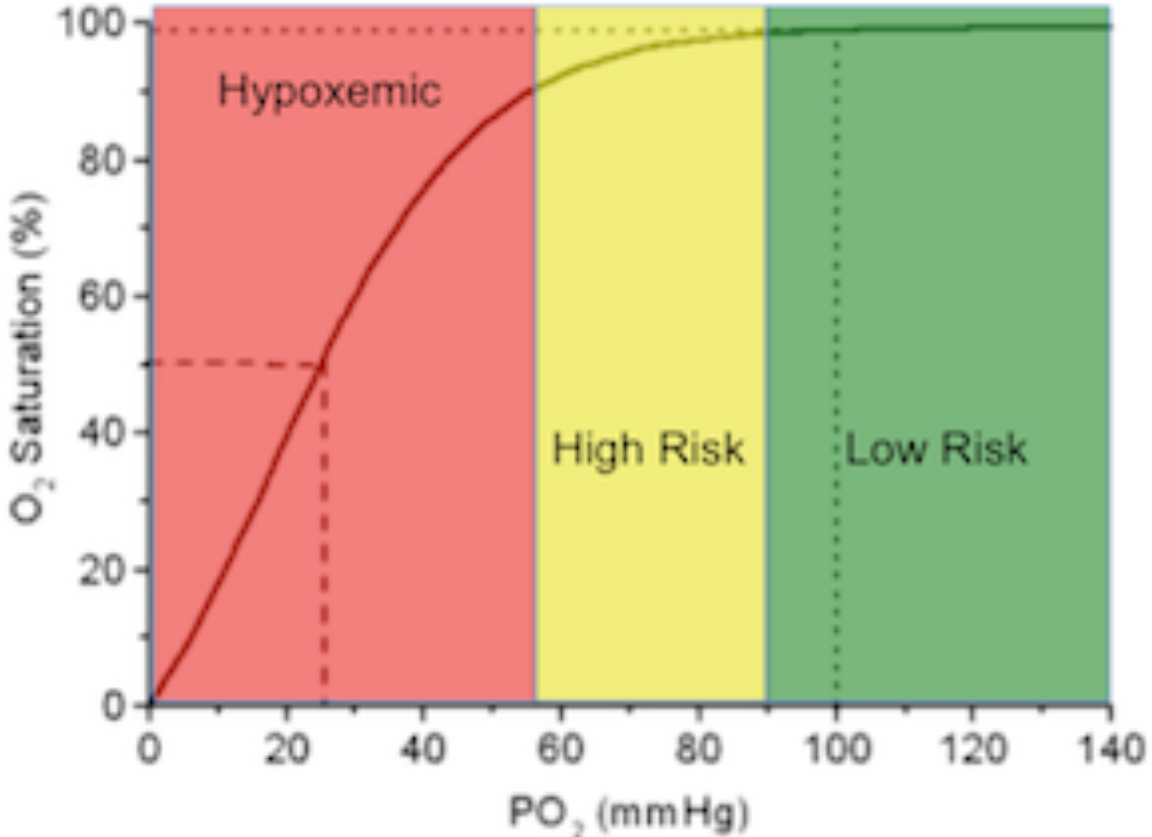
- In 2014, NEAR reported data on 17,583 emergency intubations of patients aged 15 years or older from 2002 to 2012.
- Direct laryngoscopy was used in 84% of first attempts. Video laryngoscopy use increased from less than 1% in the first 3 years to 27% in the last 3 years.
- The first-attempt intubation success rate was 83% (95% CI 83% to 84%) and was higher in the last 3 years than in the first 3 (86% versus 80%; risk difference 6.2%; 95% CI 4.2% to 7.8%).
- The airway was successfully secured in 99.4% of encounters (95% CI 99.3% to 99.6%).

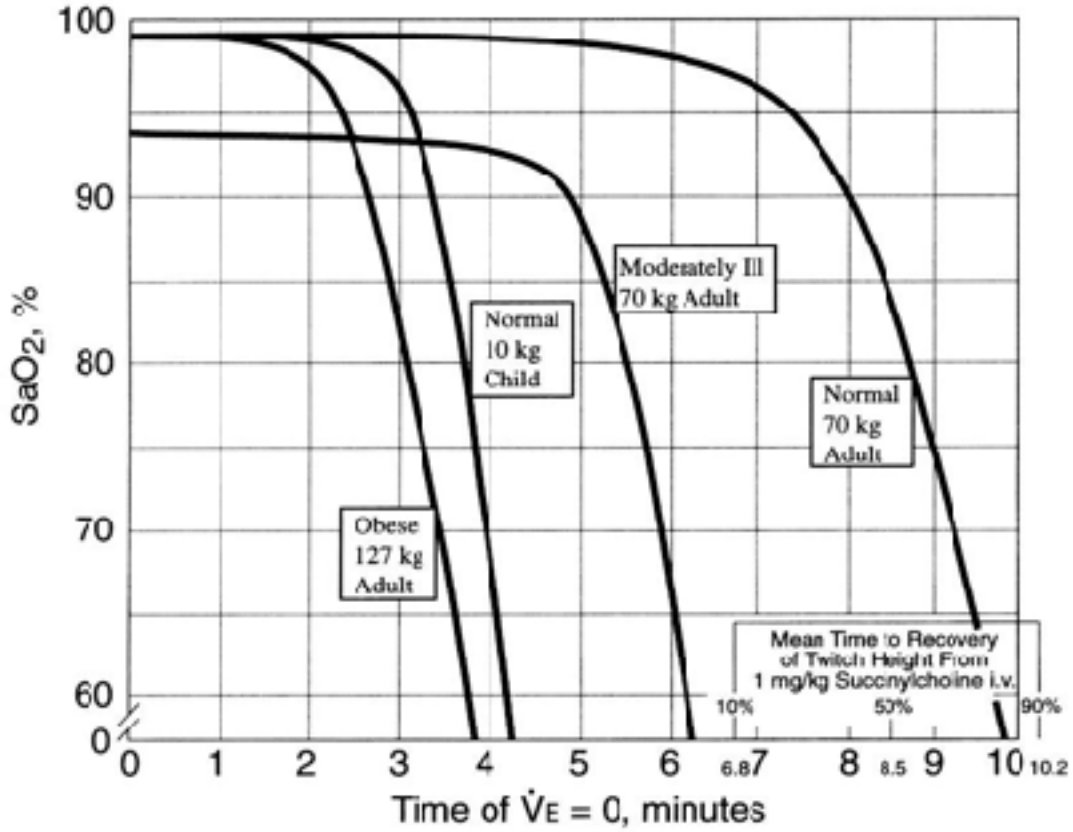
Hypoxia Risk

- Oxygen desaturation is the most common complication, occurring in 19–70% of intubations.
- Oxygen desaturation is the most common reason for an aborted first attempt at intubation, which increases the risk of further complications.
- Optimization of preoxygenation is essential to prolong time to desaturation and thus improve the likelihood of first attempt success.

Hypoxia Risk

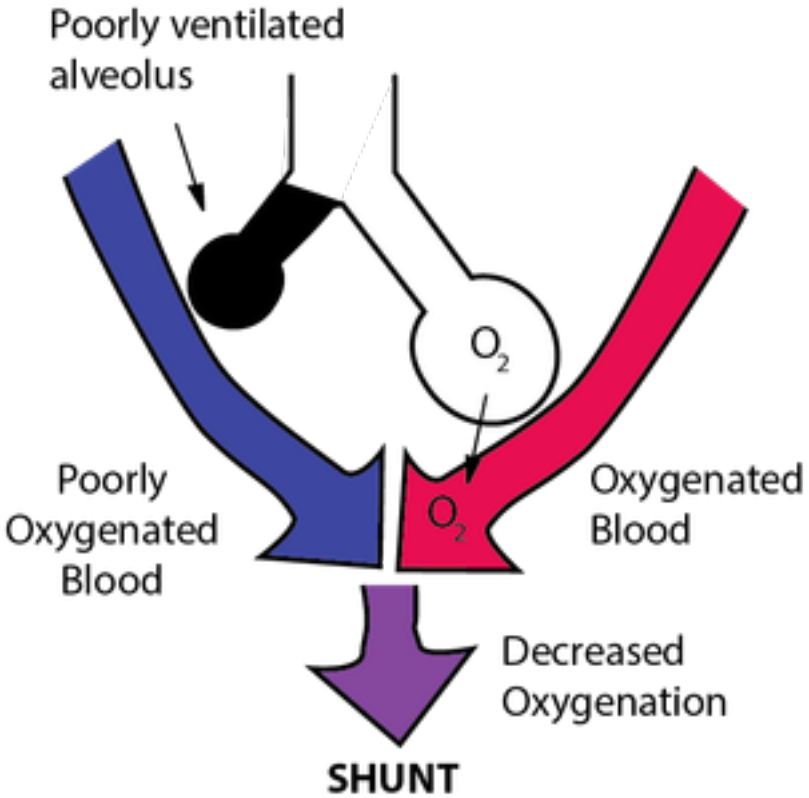
- Many of the patients requiring intubation are at high risk of hypoxia, lung injury, profound hypotension and, ultimately, cardiac arrest

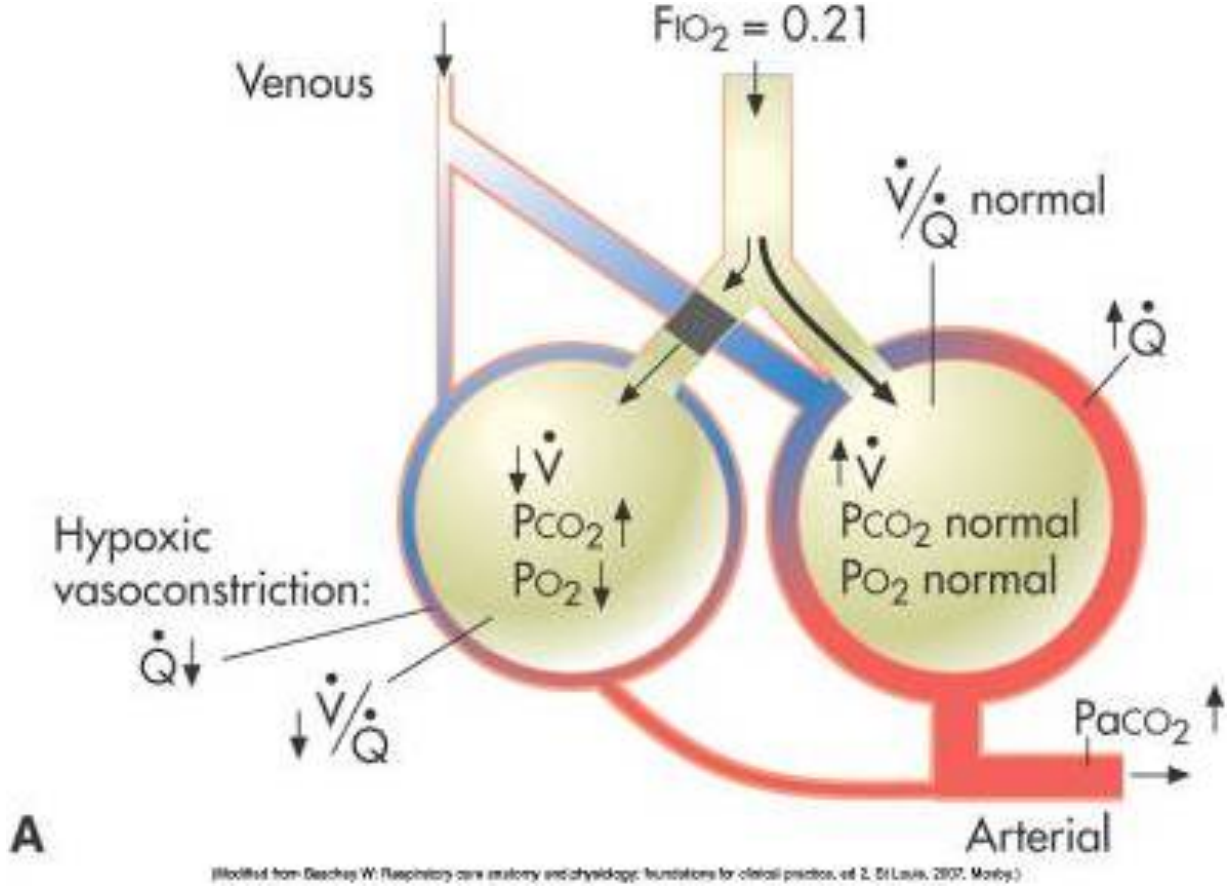




Hypoxia Risk

Low V/Q unit: Hypoxia and hypercapnia on room air (0.21) causes pulmonary vasoconstriction which directs blood to alveolus with better ventilation.





Preintubation Oxygen Saturation Optimization

- Pre-intubation optimization may not be possible for critically ill patients, who frequently require intubation unexpectedly with little time for assessment and preparation.
- Critically ill patients usually have significant physiologic derangements adding another layer of difficulty to airway management.
- Lack of time, high oxygen requirement, shunt physiology, and lack of patient cooperation all complicate adequate preparation. These factors can increase the risk of complications during intubation.

Preintubation Optimization

- Preoxygenation with NIV, or with positive pressure on the ventilator via a tight fitting facemask, with the addition of supplemental oxygen delivered during the intubation through a nasal cannula may attenuate desaturation in patients with severe hypoxaemia.
- Delayed Sequence Intubation in which procedural sedation is performed to facilitate mask tolerance and improve preoxygenation before laryngoscopy may be useful.

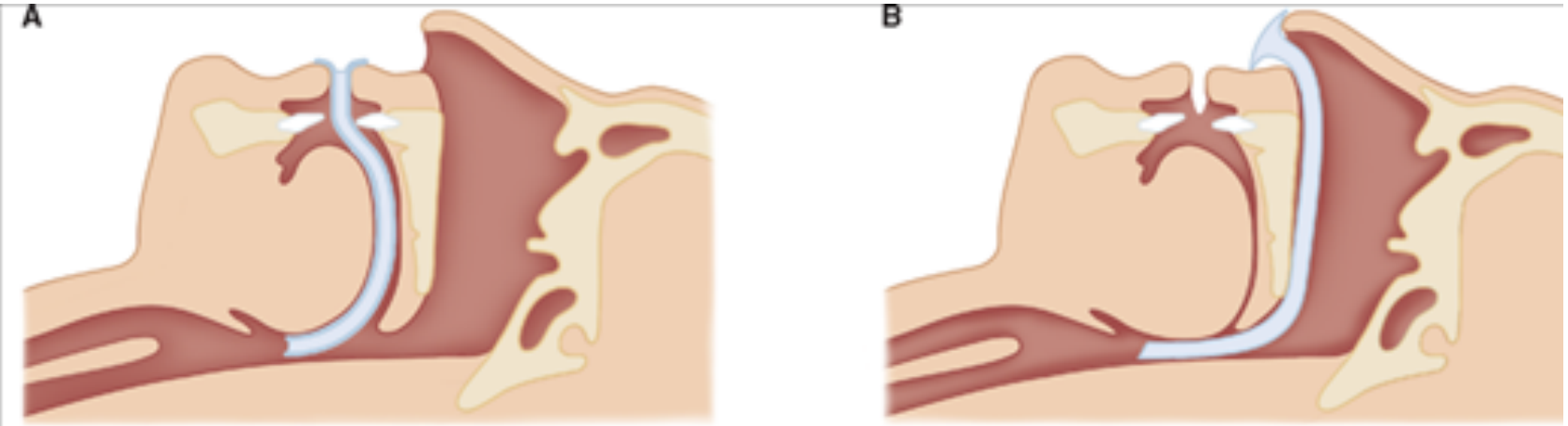
Difficult BVM

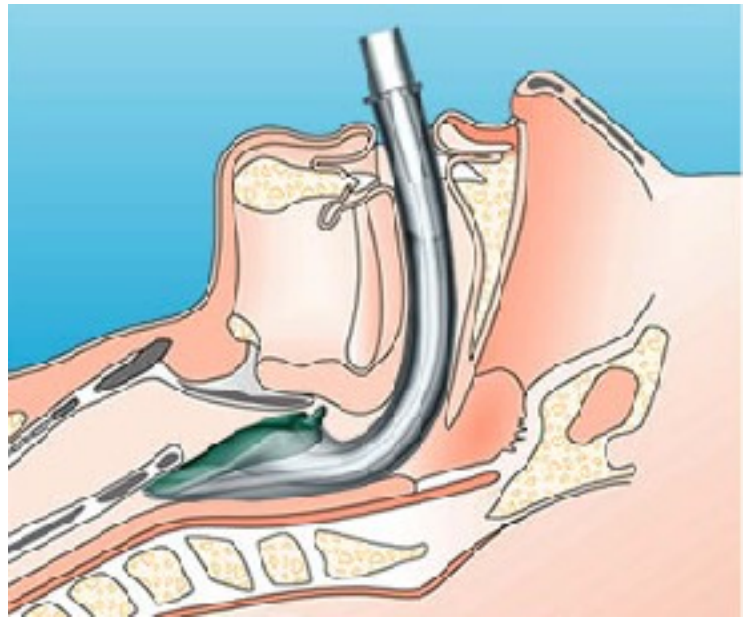
- Difficult bag- mask ventilation may preclude adequate pre-oxygenation and correction of hypoxia between intubation attempts.
- The difficult bag-mask ventilation scenario may preclude paralysis with neuromuscular blocking agents (awake intubation) but it does not imply difficulty in intubation.
- It is the “unable to ventilate and unable to intubate” scenario that is considered the true

M	Mask seal
O	Obesity/Obstruction
A	Aged (> 55 years)
N	No teeth
S	Stiff lungs

Difficult BVM

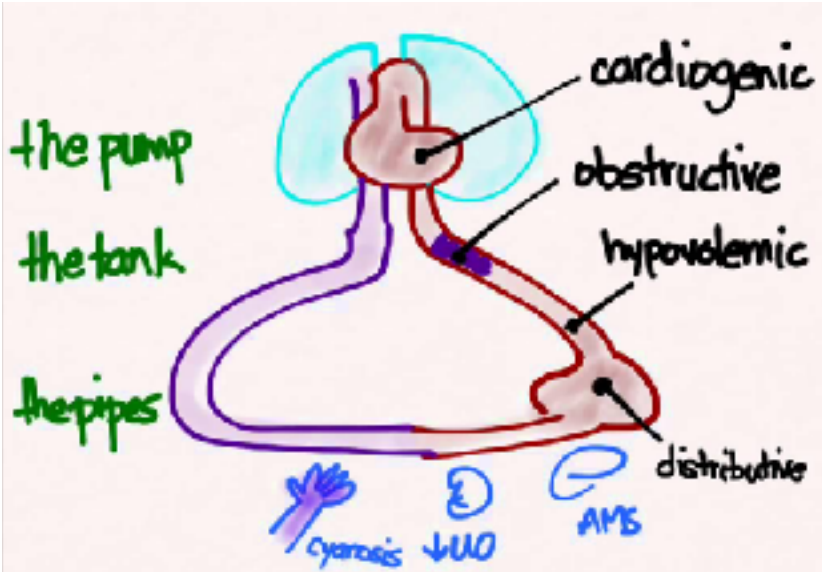
- If there is predicted difficulty of ventilation, consider having a nasal and oral airway handy as well as backup devices for ventilation if two-hand BVM fails.
- There is a role for the use of supraglottic devices in some of these cases especially in the obese, elderly and edentulous and for those with difficult mask fit.





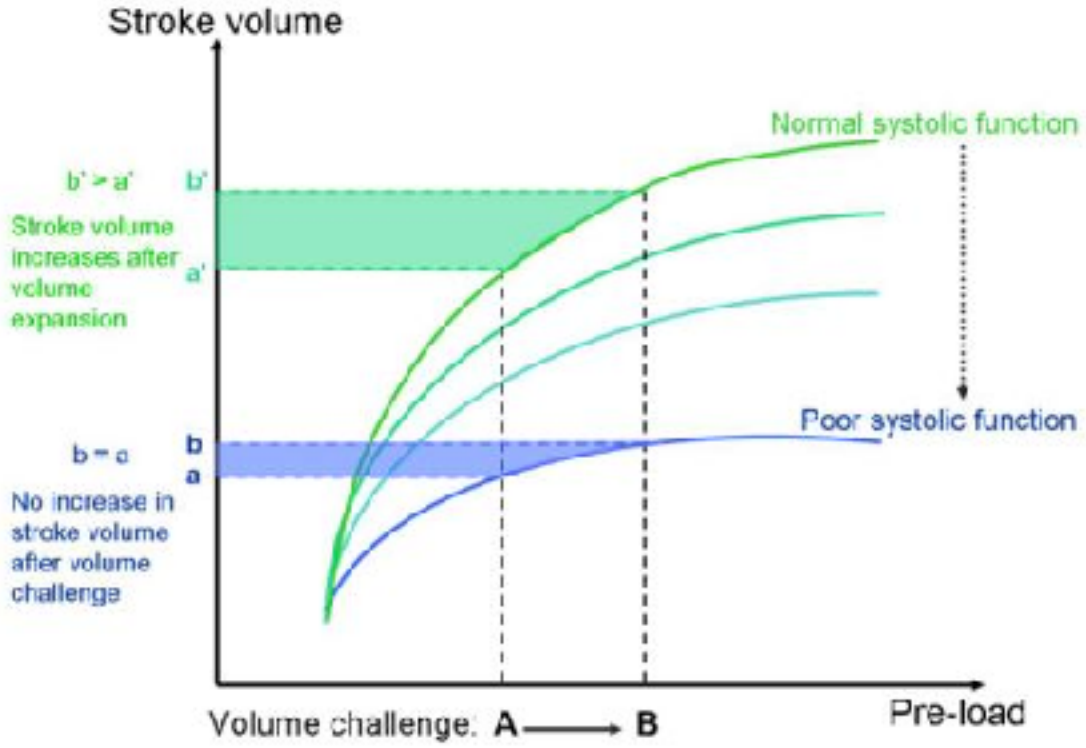
Hypotension Risk

- Inadequate ventilation will cause hypercapnoea, which can exacerbate metabolic acidosis.
- Patients with significant metabolic acidosis require a high minute ventilation.
- Metabolic acidosis may negatively affect cardiac inotropy and systemic response to catecholamines.



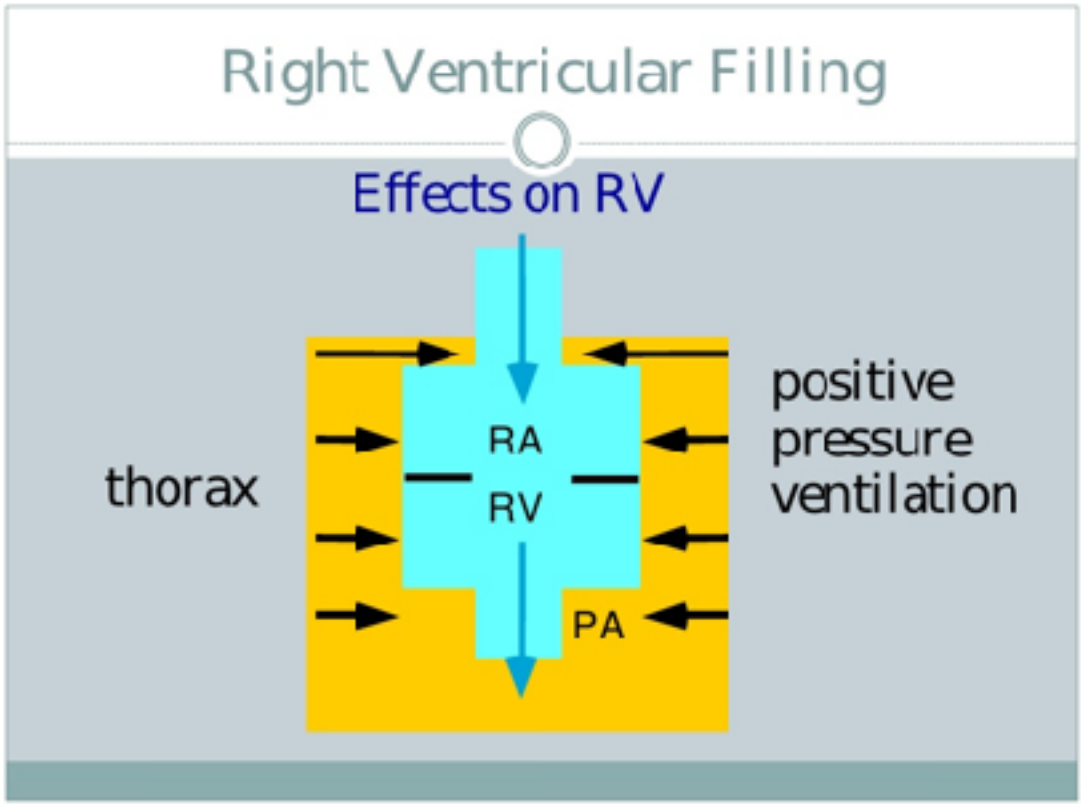
Hypotension Risk

- Hypotensive and hypoxic patients are at high risk of hemodynamic collapse and cardiac arrest.
- While pre-treating fluid responsive patients with IV fluid boluses may improve post-intubation blood pressures those patients with diastolic dysfunction may not respond positively to IV fluids.



Hypotension Risk

- Positive pressure ventilation decreases SVR.
- Drugs used in RSI can interfere with hemodynamic compensation and increase the risk of profound hypotension.



RSI

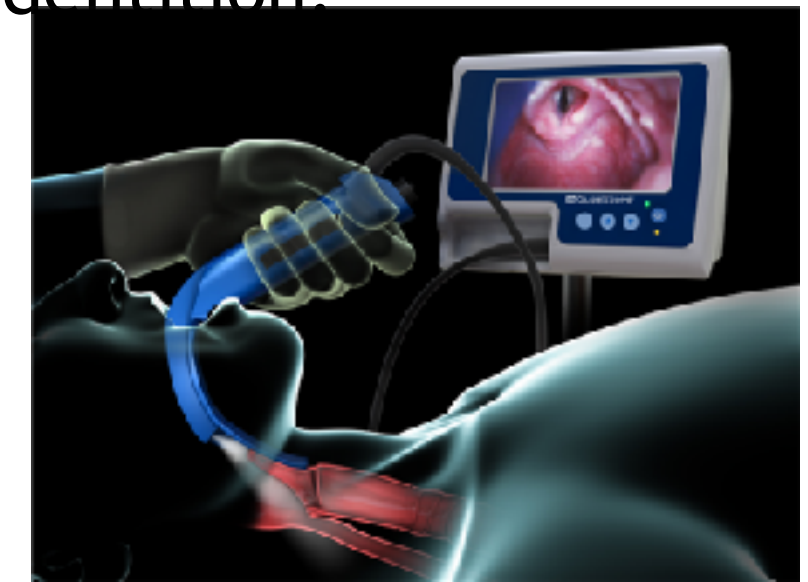
- The use of a neuromuscular blocking agents, either in rapid sequence or delayed sequence after the sedative agent, has been shown to improve first attempt success regardless of the choice of induction agent, neuromuscular blocking agents (succinylcholine vs rocuronium) or route of administration (i.v. vs intraosseous).
- Neuromuscular blocking agents not only improve grade of view and overall intubating conditions but they also improve BVM ventilation and decrease vomiting, especially when combined with a 20 degree headup or ramped position.
- Paralysis is likely necessary for supraglottic device placement.

RSI Drugs

- While appropriate fluid resuscitation is the mainstay of preventing post intubation hypotension, the proper selection of pharmacological adjuncts for airway management is also important to prevent cardiovascular collapse.
- Medications used in airway management should facilitate optimal conditions to place the tracheal tube, while ensuring patient comfort and minimizing adverse haemodynamic effects.
- Lower doses may be required in critically ill patients based on the haemodynamic profile of the patient, although under-dosing also risks inadequate effects and adverse outcomes such as patient discomfort.

Plan B

- If a difficult intubation is predicted, and you are forced to act now, then be prepared with a Bougie and consider video laryngoscopy as well as prepping the neck for surgical airway.
- Video laryngoscopy shows promise in overcoming difficulties due to anterior larynx, neck immobility, obesity and incomplete frontal dentition.



Plan C = CICO

- Try supraglottic device
- Prepare to “cut the neck”

Difficult EGD RODS

R - Restricted mouth opening

O - Obstruction : Obstruction at the level of larynx or below EGD will not pass this obstruction

D - Disrupted or distorted airway : Fail to “seat & seal”

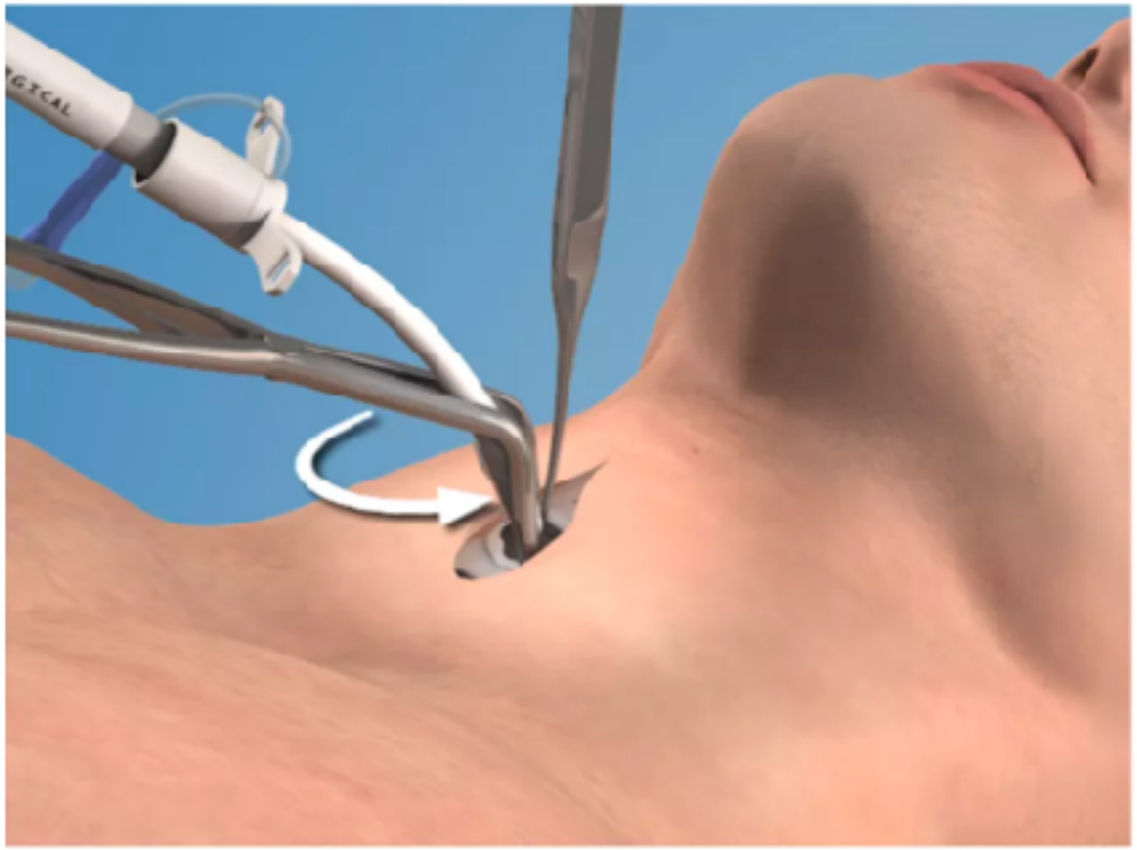
S - Stiff lungs or cervical spine: Ventilation difficult due to airway resistance, poor lungs compliance and difficult insertion due to limited neck movements.

Difficult Cricothyrotomy

- The incidence of difficult surgical airways is unknown.

(SHORT)

- **S**urgery or Disrupted Airway
- **H**ematoma
- **O**bese or Access Problems
- **R**adiation
- **T**umor



Summary

1. There are defined indications and risks associate with emergent airway management.
2. Some risks can be anticipated, others not.
3. It is essential to have plans to deal with various difficult airway scenarios in all patients.
4. Optimised preoxygenation is essential to safe airway management.
5. Hypotension is common in the post intubation period.