



Foundations Frameworks

Approach to Emergent Airway Management

FOUNDATIONS
of Emergency Medicine

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1. Oxygenation:

- a. Avoiding hypoxia is critical for successful management of emergent airways. Prolonged hypoxia during intubation attempts can lead to cardiac arrest.
- b. Pre-oxygenation: the more adequately one can pre-oxygenate a patient, the longer the patient will maintain a normal oxygen saturation once they become apneic from paralysis. Every airway becomes challenging when the patient's oxygen saturation falls below 90% ten seconds into an intubation attempt.
 - i. Techniques for pre-oxygenation:
 1. *BVM with PEEP*: use to oxygenate patient who is severely ill, actively dying, hypoxic (aka 'Crash Airway')
 - a. This is a vital oxygenation technique for any patient who is severely hypoxic and obtunded/not protecting their airway. Clinicians should use two-person BVM technique when able.
 2. *Nasal Cannula (NC) and Non-Rebreather (NRB)*
 - a. If the patient isn't severely hypoxic or altered (doesn't need to be bagged), then NC + NRB is the standard technique for pre-oxygenation. Delivers >90% FiO₂ when used in combination. NC should be set at 15 liters per minute. Help keep oropharynx open with jaw thrust.
 3. *CPAP/BiPAP*:
 - a. If the patient is saturating <95% despite NC+NRB, they will likely need PPV. Patients may not tolerate the mask, consider ketamine to help pre-oxygenate in alerted/agitated hypoxic patients.

2. Hemodynamic Stabilization:

- a. The second major cause of cardiac arrest during intubation is hypotension. Intubation typically lowers a patient's blood pressure in two ways:
 - i. PPV decreases venous return to the heart and thus preload
 - ii. Sedation causes the loss of sympathetic tone
- b. To help prevent hypotension during induction, optimize blood pressure prior to intubation. Rapid IV/IO access should be obtained and fluids/peripheral pressors administered as needed.
- c. Fluids and vasopressors are good for the majority of patients, but not everyone (massive PE or cardiogenic shock). Try to determine if patient in obvious obstructive/cardiogenic shock prior to intubation (warm/well perfused vs cold/clammy, bedside cardiac US, hx of CHF).
- d. Consider using 'push-dose pressors' or have a norepinephrine drip prepared prior to intubation attempt
 - i. Push-dose epinephrine: 5-20 mcg/min
 - ii. Push-dose phenylephrine: 50-200 mcg/min

3. Preparation:

- a. SOAP ME mnemonic:
 - i. S: Suction (set up 2 for UGIB/trauma)
 - ii. O: Oxygenation: everything needed to oxygenate a patient
 1. BVM + PEEP valve
 2. Nasal cannula/NRB
 3. Oral/nasal airways

4. Oxygen tanks as needed
- iii. A: Airway Equipment:
 1. ET tubes (expected size and one size below)
 2. Mac/Miller: 3 and 4
 3. Glidescope + stylet (or other videoscope)
 4. LMA
 5. Bougie: good when video lens covered in blood/fluid, good in angioedema or when vocal cords are obscured, helpful when placing ET tube during cricothyroidotomy
 6. Scalpel
- iv. Pharmacy: induction agent (ketamine/etomidate for hypotensive patients, propofol for seizures/brain injury/severe HTN) and paralytic (rocuronium for hyperkalemic, undifferentiated patients)

4. Airway Plan:

- a. Verbalize an 'Airway Plan' for every intubation. Difficult airways can be very challenging to predict, with some data showing only 10% of difficult airways are accurately predicted. Consider awake intubations in patients with anticipated difficult airways (angioedema, Ludwig's angina). The emergent nature of ED intubations makes every airway a 'difficult airway' – always have a plan in place and be ready to progress to a surgical airway if needed.
- b. Airway Plan:
 - i. First attempt: DL, VL
 - ii. Second attempt: DL w/ bougie, VL
 - iii. Third attempt: VL, new operator
 1. In between attempts, consider re-oxygenating/pre-oxygenating with BVM w/ PEEP valve or LMA
 - iv. Can't Intubate -> Must Oxygenate
 1. BVM w/ PEEP valve
 2. LMA
- c. Can't Intubate, Can't Ventilate (aka: Can't Oxygenate): clinicians must be prepared to perform a surgical airway (Cricothyroidotomy) with every ED intubation attempt. Cricothyroidotomy is a necessary step in airway management in 1 of 5,000 intubations in the OR, with some studies estimating that 1 in 100 ED intubations requiring a surgical airway (study spanned 1997-2002 however, before the advent of video laryngoscopy)

5. Post Intubation:

- a. Confirm ET tube placement
 - i. Combination of the following: see tube go through vocal cords, ET tube condensation, B/L breath sounds, end tidal CO₂ (both colorimetric and continuous ETCO₂), chest XR.
- b. Post Intubation Sedation
 - i. Start by using fentanyl (bolus 1 mcg/kg followed by gtt at 1 mcg/kg/hr) for pain and anxiolysis (also relatively hemodynamically stable), and then add propofol (0.3 mg/kg/hr -> gtt at 10-30 mg/hr) as needed for light sedation. Try to avoid blousing propofol (will drop blood pressure) and don't give benzodiazepines (often used when patients are too hypotensive for propofol but can lead to worse clinical outcomes).
- c. Post Intubation Ventilator Settings: make sure to match patient's pre-intubation minute ventilation to avoid causing worsening acidosis. If patient is acidotic and with high minute ventilation prior to intubation, use ARDSnet tidal volumes (6-8 cc/kg) with high respiratory rates (20 bpm and up) to help compensate for metabolic acidosis.

References

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