

OMD Podcast The Physiologically Difficult Airway

Summary Points:

- What is A Physiologically Difficult Airway
- Why Intubation Can Make Critical Illness Worse
- Identifying A Physiologically Difficult Airway
- It's About Preparing the Patient
- It's About Preparing the Plan
- Close Monitoring During the Attempt
- Multiple Intubation Attempts
- The Rapid Airway Algorithm
- Post-Intubation Hypos



• What is a Physiologically Difficult Airway?

- We often hear of and focus on anatomic difficulty; however, we encounter the physiologically difficult airway much more frequently and it can be much more deadly
- Critically ill patients may have severe metabolic derangements that increase the risk of intubation and may limit your ability to preoxygenate or maintain blood pressure
- This can include:
 - Hypoxia
 - Hypercarbia
 - Acidosis
 - Hypotension
- When present, these derangements are referred to as the “physiologically difficult airway”
- Intubation is a harsh procedure that stresses the body, and intubation drugs (sedatives and paralytics separately or together) can compound these stressors
 - Critically ill patients are not in a good place to survive intubation.
- These physiological derangements increase the risk of complications from intubation including:
 - Transient hypoxia and hypotension
 - Persistent hypoxia and hypotension
 - Cardiovascular collapse
 - Cardiac arrest/death
- These may occur even with first attempt success
- Think of the HOP Killers:
 - Hypotension
 - Oxygen (Hypoxia)
 - pH (acidosis)
 - All these factors independently increase these risks many-fold
 - When multiple killers are present simultaneously, they aren't just additive they are synergistic, this massively increases the risk of arrest

• Why Intubation Can Make Critical Illness Worse?

- Intubation can worsen each of the derangements that the HOP killers represent

- You are asking a patient to hold their breath while you intubate
- Critical aspects of intubation that contribute to making ill patients code:
 - Apnea: a necessary part of intubation, but due to the buildup of CO₂ causes worsening acidosis and prevents oxygenation, worsening hypoxia (O&P)
 - Transition to positive pressure: Refers to the change from natural (negative pressure) breathing to forced (positive pressure) ventilation with a BVM. Causes increased pressure in the thorax and decreases cardiac return, and can cause or worsen hypotension (H)
 - Tunnel Vision/Task Fixation on the Airway: Intubation is a stressful and involved process for the provider as well. It requires a great mental task load to prepare for, execute and manage an intubation. This task can distract the provider from other life-threats or critical interventions (HOP)
 - Sedatives and Paralytics: These medications take away the ill patient's drive to survive (adrenaline tone), potentially leading to worse hypotension. They may cause apnea (as above). (H)
- All together, intubation is a perfect combination to take a critically ill patient and push them over the edge if done too aggressively
- How do we avoid this? RESUSCITATE BEFORE YOU INTUBATE!

- **Identifying a Physiologically Difficult Airway**

- How do you identify that a patient is going to be a physiologically difficult airway?
- Simple: They are CRITICALLY ILL with ABNORMAL vital signs!
 - Some of these patients may try to hide from you, so you need to approach each intubation with a critical eye looking for these derangements
- Factors that can predict a physiologically difficult airway:
 - Any VS abnormalities
 - Patients who required aggressive interventions to meet goals (pressors, multiple fluid boluses, BVM)
 - Patients who barely meet goals
 - Patients with a high Shock Index (HR/SBP) (>0.9 = bad, Normal <0.7)
 - Also don't be fooled by paced/bradycardic patients as that breaks this formula
 - Patients who are septic or have multiple comorbid conditions
- When in doubt, treat any airway like it is going to go bad
- Can be very hard to predict which ones will be challenging!
 - Before any airway, consider what your plan will be if hypotension or hypoxia results after intubation

- **It's About Preparing the Patient**

- Prepare for adversity or you will fail
- There are almost NO scenarios in which a patient needs to be intubated within minutes of first encounter (including cardiac arrest)
- You need to prepare your patient before you attempt to take the airway!
 - You also need to prepare a post intubation plan to deal with adverse events

- Preparing your patient – Its Resuscitation!
 - Meet your intubation goals!
- Bolus fluids, consider pressors early if the bolus does not cause improvement
 - If pressors used to meet goals, be ready to give additional PDE or increase your drip after the intubation
- Pre-oxygenate aggressively
- Per protocol, you need to preoxygenate for at least 60 seconds
- In these patients, you may need to take a LOT longer
 - The point of preox is to wash out the nitrogen in the patient's lungs and replace it with oxygen (this is referred to as de-nitrogenation)
 - This provides a reservoir of oxygen for the patient to survive on while they are apneic
 - Keep in mind that multiple things can affect preoxygenation:
 - Obese patients or those with lung disease have a smaller reservoir and will desat more quickly
 - Patients with increased metabolic demands (septic or pediatric patients) will burn through oxygen more rapidly and will use up reserves more quickly
 - Ill obese patients with lung disease have very little reserve
 - Ideally, these patients will get preoxygenated for 5 full minutes or 8 full breaths with a BVM on 100% O2
- Apneic Oxygenation is crucial!
 - Keep the high-flow nasal cannula in place during your intubation attempts
 - In critically ill patients, get the nasal cannula on at flush rate to provide a source of oxygen while the patient isn't breathing
 - This is STANDARD OF CARE for intubation and significantly prolongs apnea times without desaturation
 - This trick can be the key to adding a few critical seconds to your intubation attempt

- **It's About Preparing the Plan?**

- In patients that you predict a physiologically difficult airway, you need to prepare to deal with hypotension post intubation
 - Have Push Dose Epi (PDE) ready before you start if you believe your patient has a high risk for hypotension
 - Spike a bag of fluids or have them running (unless contraindicated)
 - Consider having norepi ready to administer after the intubation, or start it at a low rate prior to attempting to intubate
- Preoxygenation
 - Do this thoroughly
 - Even though your goal is 94%, we encourage you to shoot for 98%+ (the higher the better and safer)
 - Some patients will not be able to get to 100%, but have them prove it to you (don't assume)
- Apneic Oxygenation

- As discussed previously, is an absolute must in physiologically frail patients
- Should be standard of care for all intubations
- Airway Checklist
 - Running through your checklist will help ensure that you are thinking of contingencies and have all of your equipment ready
 - Use this fantastic tool!

- **Close Monitoring During the Attempt**

- Someone (not the intubating provider) needs to have eyes on the monitor the whole attempt
- Before trying to tube, verbalize abort criteria to stop intubation attempt and come out for re-oxygenation
 - These patients will NOT tolerate a prolonged attempt at intubation
 - If you take too long, they will crash
- Use a sat of 93% as your abort number
 - Gives you fair warning even with the delay inherent in pulse oximetry
- Allows enough time to get the airway
- Allows early enough intervention to prevent full crash
- If after a couple of safe attempts with interval re-oxygenation, the patient simply desats too quickly to safely intubate, place a King

- **Multiple Intubation Attempts**

- Sometimes it takes more than one attempt to secure an airway
- There are two CRUCIAL components to keep in mind:
 - You MUST reoxygenate between attempts
 - To consider a second attempt at placing an ETT, you MUST meet goals again!
 - If you cannot meet goals, you CANNOT attempt intubation (go to King)
 - You need to change something between attempts
 - Doing the same thing over-and-over, you will not get better results
 - If you identified a mistake from the first attempt, try to correct
 - If no obvious mistake, attempt to optimize positioning or consider changing VL blade size
- If you need more than one attempt, you need more than one preoxygenation
 - Each attempt is a new procedure
- If you do multiple stacked intubation attempts in a row WITHOUT adequate reoxygenation, you are stacking progressive hypoxia, hypercarbia and acidosis and increasing risk of arrest and patient harm with each attempt
 - DON'T do this

- **The Rapid Airway Algorithm**

- We suggest you approach physiologically difficult airways with the following thought process
- Max BVM and assess success within 30-60 seconds using EtCO₂ and SPO₂ response
 - If failing to oxygenate or ventilate, rapidly shift to quick king and attempt to oxygenate via the king
- If BVM successful in meeting goals, you have time

- PRIOR to intubation, prepare to deal with hypotension after the airway
 - Prepare IVF, push dose epi as needed, and any other tools you want to deal with the patient post intubation
- If at any point, BVM fails and you cannot meet goals, rapidly shift to King airway
- Rapid intubation
 - Push DAA meds (if necessary at all)
 - Have suction ready
 - Follow your training for optimal intubation
 - Lead with suction
 - Stay midline
 - Progressive movement of the blade
 - Get 50/50 view
 - Place your bougie
 - If during your attempt the patient drops to 93% or less, STOP
 - Come out, BVM the patient back up to 94%+ before doing another attempt
 - If you cannot re-meet goals, shift to a King airway
- If at any point you enter a COCV situation, move to surgical airway
- This approach helps avoid:
 - Prolonged attempts (very high risk in fragile patients)
 - Multiple stacked attempts without adequate reoxygenation (just as bad as a prolonged attempt)

- **Post-Intubation Hypos**

- Think about the HOP killers
 - Hypoxia
 - Hypotension
 - pH (acidosis)
- You need to rapidly identify and treat these post-intubation
 - Even with perfect prep, critically ill patients can still get worse after intubation
- Use the same interventions as you would normally, but be aggressive in intervening early
 - It is unlikely that they will improve on their own
- Don't forget about the DOPE mnemonic to troubleshoot hypoxia post-intubation

SUMMARY IN BRIEF

- Not all airways are hard because of anatomy
- Physiologically difficult airways are easier to predict than anatomically difficult airways
 - Look at the vitals!
- Critically ill patients are not in a good position to survive intubation – resuscitate BEFORE you intubate
- Have a plan for a patient that decompensates after intubation
- Monitor the patient closely during and after ANY attempt
- If a second attempt is needed, FULLY pre-oxygenate prior to trying again
- Immediately after intubation is a dangerous time period, watch closely!