

Sample Applied Exam - Anesthesiology

Scenario 1

Domain: Airway

Objectives of the scenario:

- Management of an obstructing airway in a developmentally challenged patient
- Management of a leaking endotracheal tube in the ICU

You are called to the emergency department to help manage a 23-year-old man with severe cerebral palsy who has swelling and pain in his neck. On examination, he has a firm swelling extending from the submental space down into his neck. He is drooling and stridorous. His blood pressure is 130/80, pulse is 125, and respiratory rate is 24; his oxygen saturation is 92% on room air. His temperature is 39.5°C.

Question 1

What are your considerations for this situation?

MODEL ANSWER

- Emergency: limited time for optimization and preparation
- Must recognize impending airway obstruction (Ludwig's angina) and the difficult airway – maintain spontaneous ventilation until airway is secured
- Out of OR environment: OR is optimal place to manage the airway with its appropriate equipment (airway adjuncts, difficult airway cart, tracheotomy set-up) and expert help, including the presence of an ENT surgeon in the room realizing that this is likely a difficult surgical airway as well; accompany patient at all times during transport
- Other considerations include: possible sepsis, possible full stomach, cerebral palsy (uncooperative, difficult positioning, possible C-spine instability, reflux, nutritional problems, possible difficult iv access)
- Need for ICU following tracheal intubation or surgical airway



Question 2

The patient has severe developmental delay and aggressive tendencies. Today he was lethargic and would not eat or take his medications. On examination, he is agitated but not aggressive. He will not let you examine his airway. The emergency department staff were unable to insert an iv, take blood work or complete any imaging. The emergency department physician believes this is secondary to a dental abscess.

How will you manage this situation?

MODEL ANSWER

- Provide supplementary oxygen while keeping patient calm, recognizing impending loss of the airway
- Request transfer to OR for airway management, surgeon in room, skilled assistance, difficult airway cart including videolaryngoscopes (Glidescope, C-Mac, Bonfils), direct scope + fiberoptic, tracheotomy set-up available.
- Plan to secure an iv using trusted caregiver presence, topical anesthetics, gentle restraint (should be aware of constraints of chosen technique)
- Conflict: preference for an awake intubation in a patient who cannot cooperate
- A direct visualization technique is preferred in this situation over a blind technique
- Must have an appropriate plan to secure the airway using spontaneous ventilation without paralytics
- Definitive surgical intervention by ENT or dentistry to drain dental abscess
- Recognize the need for extended ventilation until swelling resolves
- Ensure adjunctive treatments given: antibiotics, dexamethasone (controversial)

Question 3

The next day, you are called urgently to the intensive care unit because this patient's endotracheal tube has developed a large air leak. Oxygen saturation is 85% on 100% oxygen. The tube is at 19 cm at the lip. The intensivist could not advance the tube.

How will you manage this situation?

MODEL ANSWER

- Candidate must recognize that it is still a difficult airway and that any manipulation could result in complete loss of the airway. Same equipment and personnel as the previous day must be present. May order CXR but should not delay other action. Consider moving to OR – cognizant that any movement of patient or transportation may further dislodge ETT and result in airway loss
- Ventilation (although inadequate) should be confirmed by capnography
- Endotracheal position of the tube tip should be confirmed by fiberoptic scope before attempting re-advancement of the tube over the scope or over an Aintree exchange catheter. Blind insertion of a tube exchanger or bougie in the original ETT is suboptimal and candidate must recognize significant risks – candidate may gently insert and be prepared to “back off” if any resistance met. Alternatively, re-advancement of the tube could be done under direct vision with videolaryngoscopy.



Scenario 2

Domain: Resuscitation and Trauma

Objective(s) of the scenario:

- Management of cervical spine fracture surgery in a burn patient
- Management of stable ventricular tachycardia in the prone position

You are called urgently to assist a colleague in the operating room. The patient has a cervical spine injury after jumping from the second story window of a burning house 1 week ago. The patient suffered burns to 40% of his upper body and face, requiring skin grafting 3 days ago. He is now having posterior instrumented fusion of his sixth cervical spine fracture.

Question 1

What are your considerations?

MODEL ANSWER

- Trauma patient: other injuries and complications (aspiration, sepsis) could have revealed themselves during the week following admission
- Burn patient: temperature dysregulation, prone to sepsis, potential inhalational injury (increased secretions/pneumonia/ARDS), high sedation/narcotic requirement, difficult/edematous airway/face, avoid succinylcholine. Did the patient require chest escharotomy? Is ventilation problematic?
- Cervical spine surgery: stability of fracture, neurologic status (deficits); spinal cord perfusion, inline stabilization, possible difficult airway, possible neurogenic shock
- Prone position: worsening dependent airway edema, secure ETT, difficult access/resuscitation, ischemic optic neuropathy, venous air embolism, keep stretcher readily available for change to supine
- Intraoperative emergency: patient vs. health care provider emergency; rapid, decisive action required; limited time to get full details, assertive management of operating room team



Question 2

As you arrive, the patient is being prepped just after prone positioning in Mayfield head pins. He is 60 years old, was previously healthy and has no allergies. His only injuries are the burn and C-spine fracture. There are no neurologic deficits. Today he came from the intensive care unit sedated with a # 8 oral endotracheal tube in place and an arterial line. He is grossly edematous and your colleague is having a very hard time ventilating him. Peak airway pressure alarm is sounding at 40 cm H₂O. Arterial oxygen saturation is 82%.

What is your differential diagnosis and what is your management plan?

MODEL ANSWER

- Must declare an intraoperative emergency: stop the surgical team from going on, ask for difficult airway cart and personnel for potential position change with spinal stabilization
- Must weigh the risk of working through Ddx and management while patient is hypoxic and prone vs. turning supine unnecessarily and putting C-spine/spinal cord at risk – cognizant of time it will take to turn supine, especially with Mayfield head device in place
- Attempt to quickly work through Ddx and treat problem while preparing to turn if problem not resolved imminently – use colleague to help:
 - Endotracheal tube issue: kinked, blocked, extubated, cuff herniation → listen bilaterally, pass suction catheter, cuff down, fiberoptic scope
 - Machine problem: quick machine check to rule out malfunction or change to Ambu bag
 - Patient issue: aspiration, pneumothorax, foreign body, bronchospasm, light anesthesia, biting ETT
- Ensure patient on 100% O₂ with a functional iv and scan monitors (vitals and anesthesia monitors)

Question 3

You successfully diagnose and treat a kinked endotracheal tube. You have taken over the case from your colleague. It is now halfway through the operation. Pedicle screws are being placed, prior to stabilizing rods, when you note ventricular tachycardia with a blood pressure of 110/60, an oxygen saturation of 98% and an end-tidal CO₂ of 34.

Describe your management.

MODEL ANSWER

- Must identify stable ventricular tachycardia in prone position of an unstable C-spine patient and attempt to convert with meds (amiodarone, Mg²⁺, lidocaine, procainamide) and SYNCHRONIZED cardioversion as per ACLS guidelines
- Must recognize potential for neurologic injury and infection if turning the patient to supine position and avoid if possible
- Must look for causes of ventricular tachycardia (hypoxia, cardiac ischemia, hypocalcemia, hypomagnesemia, hypokalemia)



Scenario 3

Domain: Role Play

This scenario has TWO components. First you will speak to with your colleague, Dr. Miller, role-played by the examiner. Second, you will have to answer a post-encounter probe question related to the case.

You are sitting in the staff room with Dr. Miller, a colleague, who was drinking alcohol with friends at a party until early this morning. It is clear that he/she is still impaired. It is now 8 am and he/she is about to start his/her shift.

Question 1

You need to discuss this with your colleague.

MODEL ANSWER

- Show that there is an ethical obligation to intervene ensuring patient safety. Must not let the colleague work (mandatory to pass the scenario).
- Report the colleague.
- Communication style addressing a colleague who is impaired at work in a sensitive manner.
- Consider colleague's welfare during the discussion.
- Express empathy when discussing stressors.

Question 2

List who you will contact after this discussion AND list where you would get help for your colleague.