



Acute Upper Airway Obstruction

Perhaps no other clinical scenario in emergency medicine demands swift, rapid action as much as an imminent or a potential airway obstruction. This course will provide a practical approach to the patient with an obvious or a suspected airway obstruction.

- Discuss the common causes of acute airway obstruction in children and adults.
- Explain the clinical findings encountered in the patient with suspected upper airway obstruction.
- Discuss general and diagnosis-specific treatments in the patient with acute upper airway obstruction.

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FACULTY

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Quintessential Emergency Medicine

The Ultimate Challenge for an Emergency Physician
Knowledge / Judgement / Skill / Composure
True life and death decision making and action in an otherwise health individual
Where the ABC=s begin and end.....
What else can come close in terms of the urgency, life threat, and challenge to one=s skills?
Stab wound to the chest with rapidly deteriorating vital signs?
Sudden cardiac arrest in a reasonably young person?

Reflex thought processes

Is this upper or lower airway distress?
What could be causing this distress?
Does the apparent cause offer or limit options?
Is there time to think and evaluate?

Airway Options - assuming airway obstruction

Jaw tilt Naso or Oro pharyngeal airway Tongue traction
Bag valve mask Laryngeal Mask Nasotracheal intubation
Orotracheal intubation with or without rapid sequence intubation
Fiber-optic intubation
Percutaneous Transtracheal Ventilation (PTV)
Cricothyrotomy - surgical or needle guided

One piece of Important Physiology

Pousilles Law: Flow through a lumen is directly proportional to **R⁴**
Therefore very small changes in lumen diameter can lead to dramatic decreases in air flow and sudden and dramatic deterioration.

Progression of Clinical Signs and Symptoms

Much of the following will overlap and vary from patient to patient.

- 1) Dyspnea - the patient may be able to describe the inability to inhale enough air +/- There may be pain and possibly dysphonia.

Rhonchi that will be tough to localize and to quantify. May be able to hear stridor if the patient becomes distressed or

excited. Modest increase in heart and respiratory rate
The entire picture is likely to be confusing and possibly misleading.

- 2) The pitch of the sound will increase as the obstruction progresses. Stridor may be present at rest. The intensity of the sound will begin to decrease. The timing will be more clearly associated with inspiration. Heart rate and respiratory rate increases.
- 3) Stridor will be obvious or the movement of air will be insufficient to create a sound (not a good sign). Patient becomes anxious and possibly confused.
- 4) The patients level of consciousness will deteriorate. The heart rate and respiratory rate will fall. The practitioner=s heart rate and respiratory rate will increase.

Causes of Acute Upper Airway Obstruction

Sub-acute - hours to days

Oropharyngeal infections (croup / tracheitis / adult epiglottitis)
High esophageal foreign bodies
Stevens Johnson=s Syndrome

Acute - minutes to an hour

Burns (chemical / thermal)
Hematoma (coumadin / coagulopathy)
Epiglottitis (child)
Allergic / Angioedema - tongue swelling
Psych

Crashed patient

Laryngospasm - usually after some form of manipulation
Foreign body (toy, hot dog, balloon, candy)

The cause may be obvious or may be a mystery. Foreign bodies may be obvious if a history can be given by someone. Burns will be obvious. The rest of the causes are likely to be a mystery unless there is time for good history taking and physical examination.

Patient In Airway Distress

General Approach

Just like an oral board case:

IV, O₂, Monitor, Pulse Oximetry

Airway tray - prep: Blades, handle, suction, bag - mask, cric kit, 10 gauge catheter

?fiberoptic scope, larynxvue (a simple to use scope with a prism at the end of a narrow tube that enables one to view tissues 360° from the end of the scope)

Drugs: Epi, prednisone, antibiotics, inhaled epi, ketamine, succinylcholine, atropine

The Stable Patient

Patient complains of SOB or something in their airway, etc., but the vital signs are stable, the skin is warm and dry and the patient is not in extremis. It may not be clear that there is upper airway obstruction.

The patient needs a thorough exam after a good history. Close monitoring is required. The airway must be examined directly.

The Crashing Patient

Airway distress is obvious although it may not be clear that it is an **upper** airway problem.

The patient may be labeled as having an asthma attack, yet one must be alert for conflicting findings. The patient is anxious but is alert and cooperative. The skin may be moist or dry. If the airway is observed closely, stridor will probably be noted.

- 1) History and directed exam
- 2) Visualize the airway
Larynxvue, mirror, laryngoscope, fiberoptic scope
- 3) Xray

Exam tips: Anesthetize the airway with a >caine= (Cetacaine, Hurricane, Lidocaine). Can spray the anesthetic or place it in a nebulizer and have the patient inhale the agent.

Suggest using a direct laryngoscope while holding magill forceps in the other hand and suction readied nearby. The magills and the suction can be used to remove any foreign body visualized.

Active Airway Management:

When and how to control the airway will be directed by the cause and severity of the problem. In the patient with definite upper airway obstruction, unless an obvious reversible cause is discovered, the airway should be actively controlled in this >crashing= patient.

A major DON=T - No Blind Nasotracheal intubation and no Retrograde intubation in cases of upper airway obstruction

These processes are unlikely to be successful - may cause more distortion of the anatomy - and may make the process worse.

- 1) Fiberoptic intubation - the ideal choice in skilled hands
- 2) Visualized nasal intubation - guided with magill forceps
- 3) Rapid sequence orotracheal intubation - using ketamine as the induction drug

The Crashed Patient

The patient is now anxious and combative. The airway sounds may become softer or absent. The skin is moist, and the heart rate and blood pressure are falling. Respiratory arrest is imminent

This patient can not cooperate. This is an uncontrolled situation.

There may be time to take a quick look for an obvious treatable cause such as a large foreign body or a swollen obstructing tongue. But in general there is no time to consider other causes. Treat first and diagnose later.

Options: Always consider the options you are most comfortable with first.

-Traditional rapid sequence intubation - may be diagnostic as well as therapeutic

-Cricothyrotomy (surgical or needle cric) The latter is preferred

-Percutaneous transtracheal intubation (PTV)

No IV???

Cric / PTV or paralysis with IM Succinylcholine
Don't forget to double the dose of Succinylcholine when administered IM

Notes on Percutaneous Transtracheal Intubation

Needs: An Oxygen source under 50 PSI, Catheter 14g or larger, a delivery system

Simple oxygen tubing will suffice as a delivery system as long as one has a valve system to control flow. Such a system will deliver about 1200cc / sec although 30- 60% will be lost out the mouth and nose.

The only absolute contraindication is 100% airway obstruction below the cords.

Attach a syringe to the 14 g catheter. Direct the catheter through the cricothyroid membrane at a 45 degree angle. Secure the catheter and attach to the oxygen source. Use an inspiratory : Expiratory ratio of 1 : 2 for a rate of 20 breaths per minute. This system can provide adequate oxygenation and ventilation.

Oxygen tubing with a nasal cannula can act as a delivery and valve system. One prong can be attached to the catheter - the other hole can be covered and uncovered to function as the valve system.

Can connect a bag and mask to the catheter and delivery low volumes when an oxygen source is not available. Attach a # 3 pediatric ETT adapter to the end of a large bore catheter. The bag will attach to the other end of the adapter. The larger the catheter the better (10g is desirable). Kinking of the catheter is one of the biggest problems. Adequate oxygenation can be maintained but ventilation is inadequate and severe respiratory acidosis will quickly develop.

Cases

1) History: 67 yr old man complains of throat tightness about 10 minutes after eating dinner. No known allergies and no sudden choking.

Physical: Anxious but cooperative male

Skin - warm and dry

BP 195/104 HR 86 RR 32 Sat 95% (RA)

Hoarse but no stridor
Larynxvue exam epiglottis -wnl cords very edematous

Course: No response to medical therapy (epi - sub q and IV, solumedrol, benadryl, cimetidine)

Progressive tightness in throat and increasing air hunger

Saturation falls to 95% from 100% on a non-rebreather mask

Recommendations: Avoid paralysis if possible - but have sux ready

Ketamine may be ideal - but suggest a reversible sedative as an alternative (versed)

One look with direct laryngoscopy - have small tubes available

Cook - needle cric

2) History: 2 1/2 year old child presented with several hours of fever, cough and lethargy. Father brought her to the ED when she refused to eat or drink.

Physical: T - 1030 HR - 136 RR - 44 BP 104/66

Ill appearing child, sitting at a 600 angle, drooling out of the left side of her mouth. Soft stridor is audible. Exam of the oral cavity is deferred, the skin is hot and dry but the rest of the exam is unremarkable.

Course: The child is sent to xray. The tech carries her back to the ED before the films are complete because she became cyanotic and lost consciousness. The ED doc is unable to intubate because of the swollen inflamed epiglottis. The code is called 16 minutes later.

Recommendations: Recognize that an airway disaster is imminent and prepare while the work up is in progress.

Treat with racemic epi

Obtain an IV if possible

Portable lateral xray of the neck (child sitting), chest

Ready at the bedside

Ketamine, atropine, succinylcholine

Laryngoscope, appropriate pediatric tubes

Needle cric kit

PTV materials

Call for backup

Ideal scenario: Obtain IV access, administer 0.02 mg/kg atropine and 1 mg/kg ketamine, then orally intubate.

Without an IV line, can still administer IM ketamine (4mg/kg). May be able to orally intubate but PTV may be the ideal option to oxygenate while preparing for definitive airway management.

Bibliography

1. Dailey RH, Simon BC, et al, *The Airway: Emergency Management*, ch (12,13,14,15,16,17,27), Mosby Year Book, St. Louis, 1992.
2. Ma OJ, Bentley B 2nd, Debehnke DJ, Airway management practices in emergency medicine residencies, *Am J Emerg Med*, 1995 Sep, 13:5, 501-4.
3. Ratnayake B, Langford RM, A survey of emergency management in the United Kingdom, *Anaesthesia*, 1996 Oct, 51:10, 908-11.
4. Deem S, Bishop MJ, Evaluation and management of the difficult airway, *Crit Care Clin*, 1995 Jan, 11:1, 1-27.
5. Kharasch M, Graff J, Emergency management of the airway, *Crit Care Clin*, 1995 Jan 11:1, 53-66
6. Schwartz DE, Matthay MA, Death and other complications of emergency management in critically ill adults. A prospective investigation of 297 tracheal intubations, *Anesthesiology*, 1995 Feb, 82:2, 367-76.
7. Jacobson LE, Gomez GA, et al, Surgical cricothyroidotomy in trauma patients: analysis of its use by paramedics in the field, *J Trauma*, 1996 Jul, 41:1, 15-20.
8. Aye T, Milne B, Use of laryngeal mask prior to definitive intubation in a difficult airway: a case report, *J Emerg Med*, 1995 Sept-Oct, 13:5, 711-4.