Upper Airway Obstruction

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http://rc-edconsultant.com/

Learning Objective
- Explain the etiologies, pathophysiology, manifestations, diagnostic techniques and management of upper airway obstructive conditions.

Etiologies

Upper vs. peripheral airways
- Upper airways- mouth to carina
  - intrathoracic- from carina to vocal cords
  - extrathoracic- superior to vocal cords

Foreign Body Aspiration
- children
- intoxicated patients
- stroke patients- impaired swallowing
Edema
- infections
  - croup
  - epiglottitis
  - tonsillitis
  - diphtheria

Edema
- angioedema
  - rapid swelling of mucosa, submucosa and skin
  - commonly associated with anaphylaxis

Edema
- angioedema - agents
  - radiocontrast agents
  - opiates
  - aspirin
  - NSAIDs

Edema
- ACE inhibitors
  - lisinopril (Zestril, Prinivil)
  - enalapril (Vasotec)
  - captopril (Capoten)

FYI - Link to article on ACE inhibitors and angioedema

Edema
- post-extubation tracheitis
- anaphylaxis - angioedema
  - medications; penicillin
  - insect stings; bees, wasps
  - food allergies; peanuts, sea food
  - animal dander; especially feline

FYI - Link to article on post-extubation stridor
http://ccforum.com/content/pdf/cc8142.pdf

Edema
- inhalation injury
  - burns - thermal injury
  - smoke - numerous irritants
  - noxious inhalants; e.g., chlorine gas
Anatomic

Congenital airway anomalies

- micrognathia (small mandible)
- macroGLOSSIA (large tongue)
- laryngeal web
- vascular ring
- vocal cord dysfunction (may be acquired)

Click to see laryngeal web video (40 sec)
http://www.youtube.com/watch?v=N3Z6El2lfl4
Click to see vascular ring anomalies
http://emedicine.medscape.com/article/425233-media

Acquired conditions

- trauma- laryngeal fractures
- neoplasm- tumors
- hematoma- line insertion
- CNS depression- relaxation of muscles controlling airways

Click for image of tracheal stenosis
http://www.virtualpediatrichospital.org/providers/ElectricAirway/PathImages/TrachStenosisGran.jpg
Click for video of tracheal stenosis
http://www.youtube.com/watch?v=DJPV6m52lM&NR=1
FYI - Click for humorous video by the Laryngospasms
http://www.youtube.com/watch?v=kP2OuZtI_s

Vocal cord dysfunction

- paradoxical vocal cord adduction during inspiration
- often mistaken for asthma, with inappropriate therapy administered
- very important to respiratory therapists

FYI - Link to review on vocal cord dysfunction
Upper vs. peripheral airways

- **Upper airways**
  - intrathoracic - from carina to vocal cords are expanded by inspiration and compressed by expiration.
  - extrathoracic - superior to vocal cords are collapsed by inspiration and expanded by expiration.

Upper vs. peripheral airways

- **Upper airway obstruction**
  - inspiration more vulnerable to obstruction
  - turbulent flow predominates in larger airways
  - additional source of resistance
  - rationale for Heliox, which reduces resistance to flow in turbulence

FYI - Link to article on upper airway pathophysiology
http://www.aic.cuhk.edu.hk/web8/upper_airway_obstruction.htm

Manifestations

- **History**
  - Chronic symptoms
    - may be exercise-induced
    - may be exacerbated by work environment
  - dyspnea
  - cough
  - hoarseness
**History**
- Medical history
  - previous treatment for asthma (misdiagnosed)
  - sleep apnea
  - intubation, tracheostomy
  - allergies
  - psychiatric illness
  - upper respiratory infections

- Occupational exposure
  - allergens
  - inhalants

**Physical Examination**
- Mild to moderate
  - dysphonia (hoarseness)
  - stridor
  - wheezing - may be referred from neck

- Severe
  - inspiratory retractions
  - dysphagia, drooling
  - stridor
  - abdominal paradox (fatigue)
  - cyanosis

**Pulmonary Function Testing**
- decreased inspiratory flow or
- decreased inspiratory and expiratory flow
- no bronchodilator response

**Other Diagnostic Techniques**
- Imaging: radiographs, CT scans
- Laryngoscopy
- Bronchoscopy
Impending ventilatory failure:
- heliox - reduces resistance by decreasing gas density
  - can provide immediate relief
  - temporary measure
- endotracheal intubation
- cricothyrotomy
- tracheotomy

Foreign body aspiration
- Removal of aspirate, assisted by:
  - laryngoscopy
  - bronchoscopy

Infections
- epiglottitis
  - extreme caution
  - antibiotics
  - intubation
  - sedation
  - wait for antibiotics to work

Infections
- croup
  - inhaled racemic epinephrine
  - inhaled steroids (budesonide)
  - mist therapy - no effects
- chronic tonsillitis
  - antibiotics
  - tonsillectomy

Edema
- allergic (anaphylaxis)
  - epinephrine
  - diphenhydramine (Benadryl)
  - steroids
  - beta-agonist (albuterol) - for bronchospasm

FYI - Link to article on budesonide and croup
http://content.nejm.org/cgi/content/full/331/5/285
### Edema
- post-extubation tracheitis
  - inhaled racemic epinephrine???
  - inhaled alpha adrenergic; e.g., neosynephrine?? (no research)
  - inhaled steroids
  - systemic steroids
  - heliox

### Inhalation injury
- racemic epinephrine
- steroids
- beta-adrenergics- for accompanying bronchospasm
- heliox

*FYI - Link to article on heliox in critical care*

### Vocal cord dysfunction
- Helium-oxygen therapy - severe exacerbations
- Anticholinergic aerosol may be effective for exercised-induced VCD
- CPAP

### Vocal cord dysfunction
- Removal from exposures, if there is environmental cause
- Speech therapy
  - education about condition
  - breathing exercises, panting
- Psychotherapy
- Sedatives, anxiolytics

### Neoplasms, congenital anomalies, trauma, hematoma
- heliox until surgery is completed
- cricothyrotomy
- surgical resection

### Acquired tracheal stenosis
- stent placement

*Click to see stents and placement (scroll down for video of placement)*
http://www.bronchotraining.org/spip.php?article80
Summary & Review

- Etiologies of upper airway obstruction
  - congenital
  - infections
  - edema
  - acquired

- Pathophysiology
  - compromised inspiratory flow
  - large airways- turbulent flow

Summary & Review

- Manifestations
  - evidence of increased inspiratory work
  - stridor, wheezing

- Diagnosis
  - decreased inspiratory flow
  - visualization- bronchoscopy
  - imaging

Summary & Review

- Management
  - Surgical intervention- emergent cases
  - Antibiotics for infections
  - Steroids for inflammation
  - Heliox until resolution of cause
  - Surgical resection- tumors
  - Stents- stenosis

END