# Upper Airway Obstruction

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This Presentation is Approved for
1 CRCE Credit Hour

## Learning Objectives

- Explain the etiologies, pathophysiology, manifestations, diagnostic techniques, & 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

## Upper vs. Peripheral Airways

- Upper airway categories
  - Supraglottic: above the true cords
  - Intraglottic: involving the true vocal cords
  - Infraglottic: below the true cords & above the carina

## Foreign Body Aspiration

- Children
- Intoxicated patients
- Stroke patients - impaired swallowing

## Edema

- Infections
  - Croup
  - Epiglottitis
  - Tonsillitis
  - Diphtheria

## Edema

- Angioedema
  - Rapid swelling of mucosa, submucosa & skin
  - Commonly associated with anaphylaxis

## Edema

- Angioedema - agents
  - Radiocontrast agents
  - Opiates
  - Aspirin
  - NSAIDs

## Edema

- Angioedema - agents
  - ACE inhibitors
    - Lisinopril (Zestril, Prinivil)
    - Enalapril (Vasotec)
    - Captopril (Capoten)

FYI see links below for article on ACE inhibitors & angioedema

## Edema

- Post-extubation tracheitis
  - Anaphylaxis - angioedema
    - Medications: penicillin
    - Insect stings: bees, wasps
    - Food allergies: peanuts, sea food
    - Animal dander, especially feline

FYI see links below for article on post-extubation stridor

## 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)

See links below to view vascular ring anomalies

Up next: Video of laryngeal web

## Anatomic

- Acquired conditions
  - Trauma: laryngeal fractures
  - Neoplasm: tumors
  - Hematoma: line insertion
  - CNS depression: relaxation of muscles controlling airways

## Anatomic

- Acquired conditions
  - Iatrogenic: intubation, tube cuffs
    - Tracheal stenosis
    - Vocal cord paralysis

See links below for image of tracheal stenosis

Up next: Video of tracheal stenosis

## Anatomic

- Laryngospasm
  - Uncontrolled, involuntary muscular contraction of the laryngeal cords
  - Duration usually less than one minute
  - Complication of intubation, extubation, GERD

Up next: Video of laryngospasm

FYI see links below for humorous video by the Laryngospasms

## Anatomic

- Vocal cord dysfunction
  - Paradoxical vocal cord adduction during inspiration
  - Often mistaken for asthma, with inappropriate therapy administered
  - Very important to respiratory therapists

## Anatomic

- Vocal cord dysfunction
  - Etiologies
    - Congenital, idiopathic
    - Cortical injury
    - Brainstem compression
    - Psychopathology
    - Malingering - can be voluntary
    - Irritant-induced, e.g. at workplace

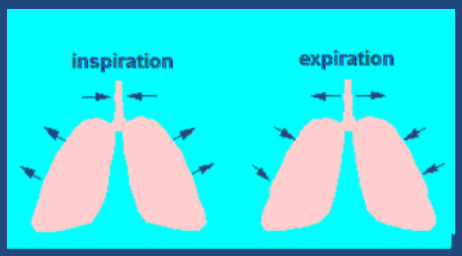
FYI see links below for article on vocal cord dysfunction

## Pathophysiology

## Upper vs. Peripheral Airways

- Upper airways
  - Intrathoracic: from carina to vocal cords are expanded by inspiration & compressed by expiration
  - Extrathoracic: superior to vocal cords are collapsed by inspiration & expanded by expiration

## Upper vs. Peripheral Airways




## 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 see links below for article on upper airway pathophysiology

## 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

## History

- Occupational exposure
  - Allergens
  - Inhalants

## Physical Examination

- Mild to moderate
  - Dysphonia (hoarseness)
  - Stridor
  - Wheezing - may be referred from neck

## Physical Examination

- Severe
  - Inspiratory retractions
  - Dysphagia, drooling
  - Stridor
  - Abdominal paradox (fatigue)
  - Cyanosis

## Pulmonary Function Testing

- Decreased inspiratory flow or
- Decreased inspiratory & expiratory flow
- No bronchodilator response

## Other Diagnostic Techniques

- Imaging: radiographs, CT scans
- Laryngoscopy
- Bronchoscopy

## Management

## 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

FYI see links below for article on budesonide & croup

## Edema

- Allergic (anaphylaxis)
  - Epinephrine
  - Diphenhydramine (Benadryl)
  - Steroids
  - Beta-agonist (albuterol) - for bronchospasm

## 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 see links below for article on heliox in critical care

## Vocal Cord Dysfunction

- Helium-oxygen therapy: severe exacerbations
- Anticholinergic aerosol may be effective for exercise-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

See links below to view stents & placement
(scroll ↓ for placement video)

## 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