

Upper Airway Obstruction

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Upper vs. peripheral airways

- ^ Upper airways- mouth to carina
 - ◆ intrathoracic- from carina to vocal cords
 - ◆ extrathoracic- superior to vocal cords

Learning Objective

- ^ Explain the etiologies, patho- physiology, manifestations, diagnostic techniques and management of upper airway obstructive conditions.

Upper vs. peripheral airways

- ^ Upper airway categories
 - ◆ supraglottic- above the true cords
 - ◆ intraglottic- involving the true vocal cords
 - ◆ infraglottic- below the true cords and above the carina

Etiologies

Foreign Body Aspiration

- ^ children
- ^ intoxicated patients
- ^ stroke patients- impaired swallowing

Edema

- ^infections
 - ◆croup
 - ◆epiglottitis
 - ◆tonsillitis
 - ◆diphtheria

Edema

- ^angioedema- agents
 - ◆ACE inhibitors
 - lisinopril (Zestril, Prinivil)
 - enalapril (Vasotec)
 - captopril (Capoten)

Edema

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

Edema

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

Edema

- ^angioedema- agents
 - ◆radiocontrast agents
 - ◆opiates
 - ◆aspirin
 - ◆NSAIDs

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=N3Z6E12Bif4>

Anatomic

^ laryngospasm

- ◆ uncontrolled, involuntary muscular contraction of the laryngeal cords
- ◆ duration usually less than one minute
- ◆ complication of intubation, extubation, GERD

Click for video of laryngospasm 6 sec)
<http://www.youtube.com/watch?v=TCzDbsewRi0>

Anatomic

^ Acquired conditions

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

Anatomic

^ vocal cord dysfunction

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

Anatomic

^ Acquired conditions

- ◆ iatrogenic- intubation, tube cuffs
 - tracheal stenosis
 - vocal cord paralysis

Click for video of tracheal stenosis (2.2 min)
<http://www.youtube.com/watch?v=NI7g1X-ftQc>

Anatomic

^ vocal cord dysfunction

- ◆ etiologies
 - congenital, idiopathic
 - cortical injury
 - brainstem compression
 - psychopathology
 - malingering- can be voluntary
 - irritant-induced; e.g., at workplace

Pathophysiology

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

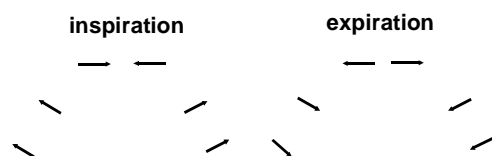
Upper vs. peripheral airways

^ 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.

Manifestations

Upper vs. peripheral airways



AP Jones

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

Physical Examination

^ Severe

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

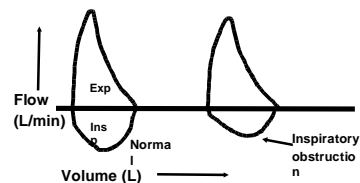
History

^ Occupational exposure

- ◆ allergens
- ◆ inhalants

Pulmonary Function Testing

- ^ decreased inspiratory flow or
- ^ decreased inspiratory and expiratory flow
- ^ no bronchodilator response



Physical Examination

^ Mild to moderate

- ◆ dysphonia (hoarseness)
- ◆ stridor
- ◆ wheezing- may be referred from neck

Other Diagnostic Techniques

- ^ imaging- radiographs, CT scans
- ^ laryngoscopy
- ^ bronchoscopy

Management

Infections

- ^ epiglottitis
 - ◆ extreme caution
 - ◆ antibiotics
 - ◆ intubation
 - ◆ sedation
 - ◆ wait for antibiotics to work

Impending ventilatory failure:

- ^ heliox- reduces resistance by decreasing gas density
 - ◆ can provide immediate relief
 - ◆ temporary measure
- ^ endotracheal intubation
- ^ cricothyrotomy
- ^ tracheotomy

Infections

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

Foreign body aspiration

- ^ Removal of aspirate, assisted by:
 - ◆ laryngoscopy
 - ◆ bronchoscopy

Edema

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

Edema

- ^ post-extubation tracheitis
 - ◆ inhaled racemic epinephrine???
 - ◆ inhaled L-epinephrine
 - ◆ inhaled alpha adrenergic; e.g., neosynephrine?? (no research)
 - ◆ inhaled steroids
 - ◆ systemic steroids
 - ◆ heliox

Vocal cord dysfunction

- ^ Removal from exposures, if there is environmental cause
- ^ Speech therapy
 - ◆ education about condition
 - ◆ breathing exercises, panting
- ^ Psychotherapy
- ^ Sedatives, anxiolytics

Inhalation injury

- ^ racemic epinephrine
- ^ L - epinephrine
- ^ steroids
- ^ beta-adrenergics- for accompanying bronchospasm
- ^ heliox

Neoplasms, congenital anomalies, trauma, hematoma

- ^ heliox until surgery is completed
- ^ cricothyrotomy
- ^ surgical resection
- ^ stent placement

Vocal cord dysfunction

- ^ Helium-oxygen therapy- severe exacerbations
- ^ Anticholinergic aerosol may be effective for exercised-induced VCD
- ^ CPAP

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