

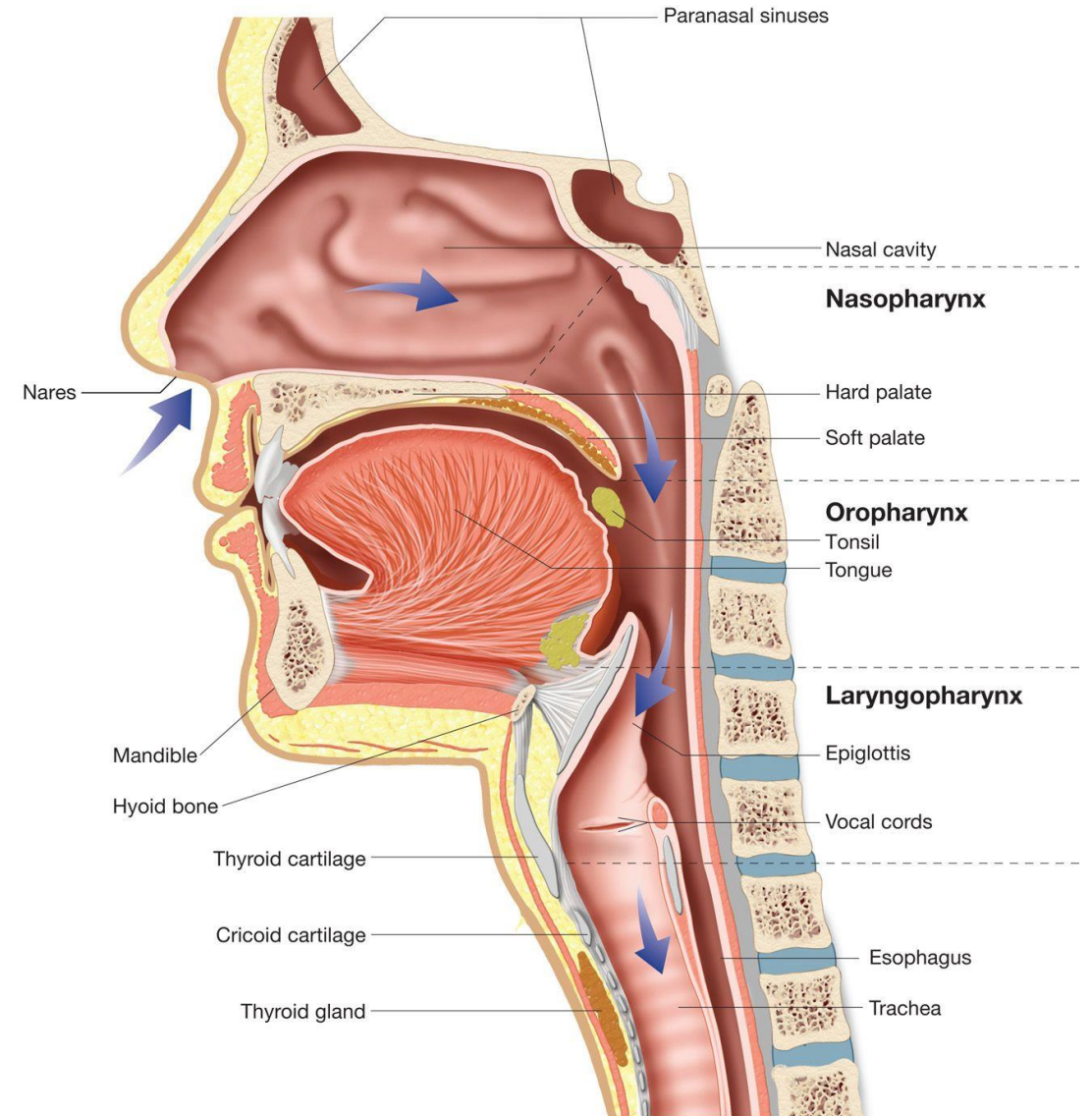
Upper Airway Obstruction in Children



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Anatomy

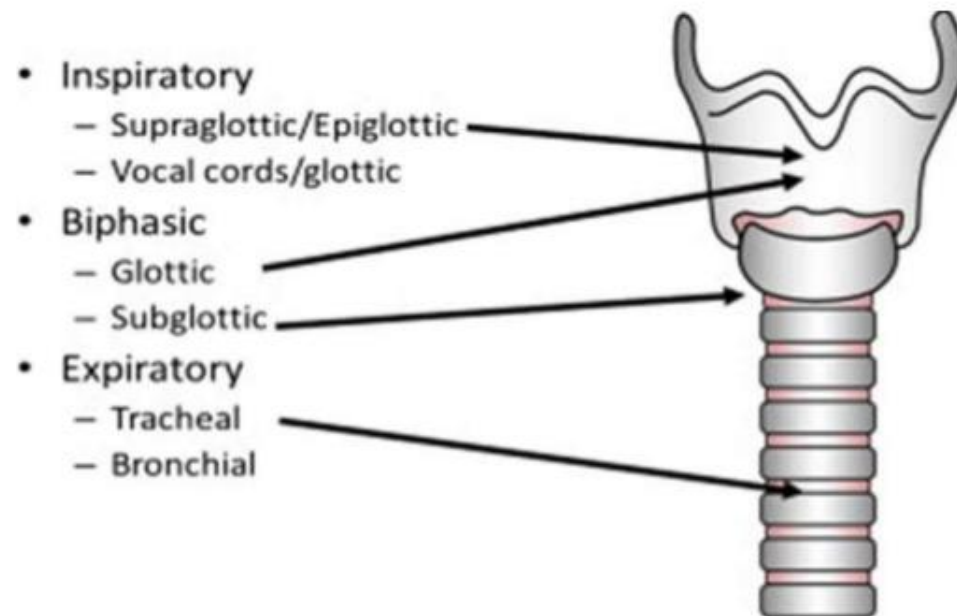
- Upper airway includes:
 - ✓ Nose
 - ✓ Pharynx
 - ✓ Larynx
 - ✓ Trachea



Stridor

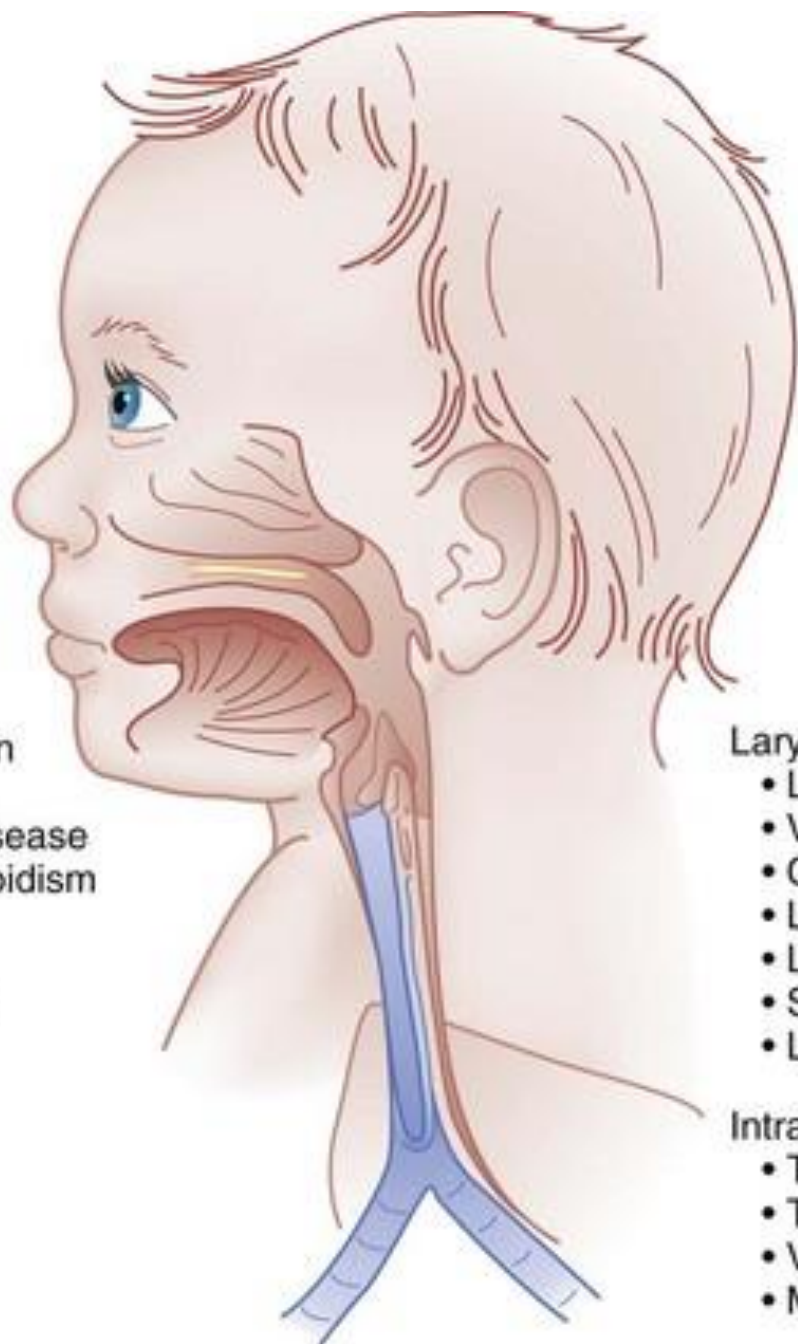
Is a high-pitched breath sound resulting from turbulent air flow in the upper airways...A cute or chronic

TYPES OF STRIDOR



Supraglottic

- Craniofacial
 - Pierre Robin
 - Treacher Collins
 - Hallermann-Streiff
- Macroglossia
 - Beckwith-Wiedemann
 - Down syndrome
 - Glycogen storage disease
 - Congenital hypothyroidism
- Choanal atresia
- Encephalocele
- Thyroglossal duct cyst
- Lingual thyroid



Laryngeal

- Laryngomalacia
- Vocal cord paralysis
- Congenital subglottic stenosis
- Laryngeal web
- Laryngeal cyst
- Subglottic hemangioma
- Laryngotracheoesophageal cleft

Intrathoracic

- Tracheomalacia
- Tracheal stenosis
- Vascular rings/slings
- Mediastinal masses

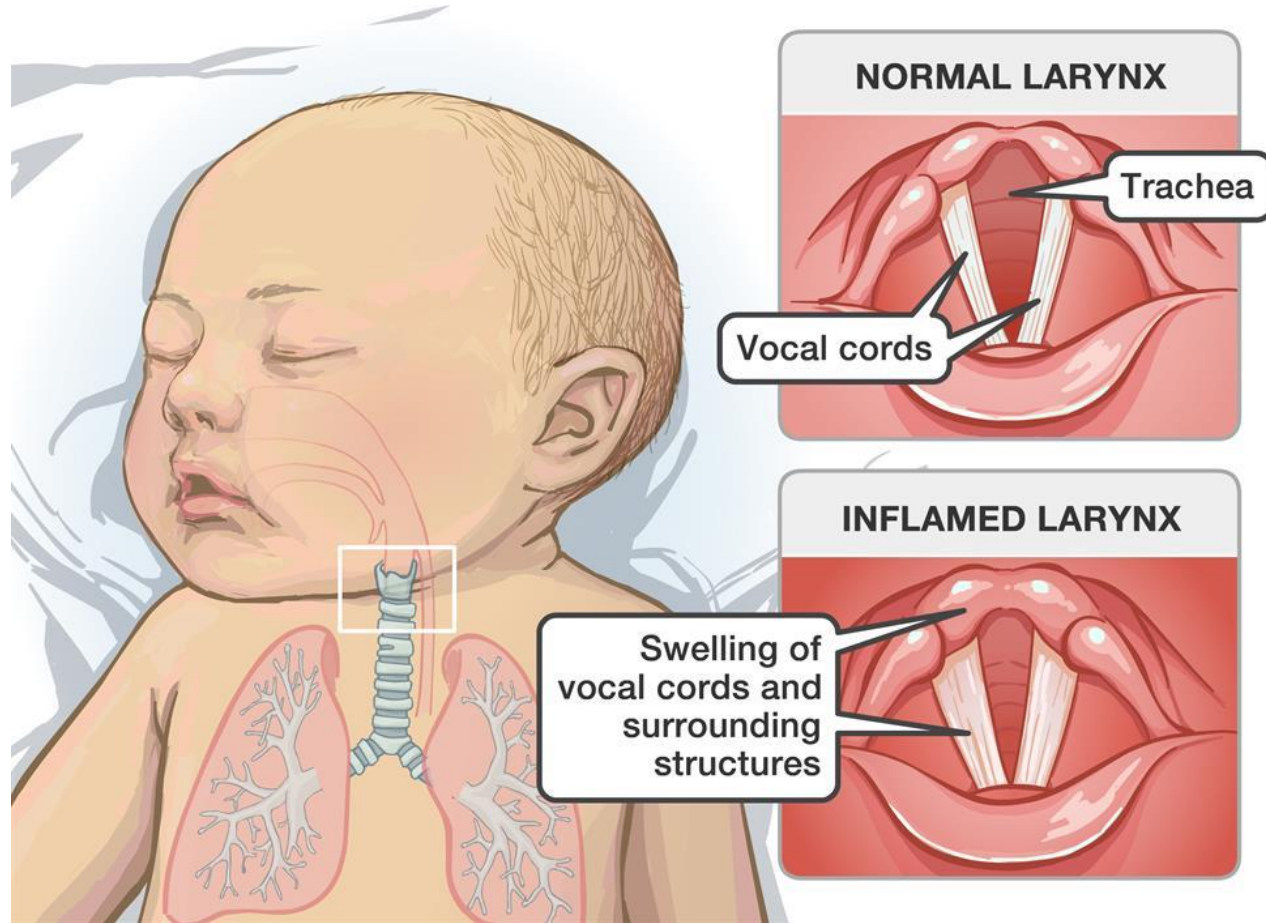
Age Related Differential Diagnosis of Upper Air way obstruction

Newborn	Infancy	Toddlers
<ul style="list-style-type: none">• Choanal atresia• DigGeorge syndrome• Laryngeal web , atresia• Vocal cord paralysis• Pharyngeal collapse	<ul style="list-style-type: none">• Laryngomalacia• Viral croop• Subglottis stenosis• Laryngeal web• Vascular ring• Rhinitis	<ul style="list-style-type: none">• Viral croop• Bacteria tracheitis• Foreign body• Retrolaryngeal abscess• Hypertrophied tonsil• Laryngeal papillomatosis

Acute onset stridor

Differential diagnosis of acute onset stridor and respiratory distress	
Toxic appearance	Non-toxic appearance
<ul style="list-style-type: none">• Bacterial tracheitis• Epiglottitis• Retropharyngeal abscess• Peritonsillar abscess (quinsy)• Anaphylaxis	<ul style="list-style-type: none">• Croup• Angioneurotic oedema (eg hereditary angioedema)• Laryngeal foreign body• Subglottic haemangioma

Croup



Clinical Manifestations

- Usually starts with **minor respiratory symptom**: non-specific cough, rhinorrhea and fever
- **Barking cough**, stridor, and resp distress that develops suddenly during the evening or at night
- **Stridor** typically occurs during **inspiration**. Biphasic with more severe cases.
- Hoarseness of voice

Key Points

- Croup is a common cause of airway obstruction in young children.
- Symptoms are usually mild to moderate (worse at night and on day two) and self-limiting but
- can be severe and rarely, life-threatening.
- Avoid distressing a child with croup as this may exacerbate symptoms.

Steeple sign on CXR



Once confident in the diagnosis of croup, an accurate assessment of severity guides treatment.

Assessment of severity of croup			
Mild	Moderate	Severe	Life-threatening
Occasional barking cough, no audible stridor at rest	Frequent barking cough, audible stridor at rest	Persistent stridor at rest (may also be expiratory)	Stridor at rest, although may be quieter
No or mild respiratory distress* at rest	Moderate respiratory distress	Severe respiratory distress	Exhausted, poor respiratory effort
Normal SpO ₂ [#] , no cyanosis	Normal SpO ₂ , no cyanosis	SpO ₂ ≤ 93% or cyanosis	SpO ₂ ≤ 93% or cyanosis
Alert	Little or no agitation	Fatigue, agitation or distress	Lethargy or decreased level of consciousness

*Signs of respiratory distress include accessory muscle use, abdominal breathing, intercostal recession, subcostal recession and tracheal tug. [#] Oxygen saturations using pulse oximetry, commonly referred to as “sats”

Management

- Recommended management includes:
- The appropriate use of corticosteroids and nebulised adrenaline. These interventions have been shown to reduce the need for, and duration of endotracheal intubation, length of stay, and representation rates to emergency services.
- Nursing the child upright on carer's lap

Corticosteroid dosing for the treatment of croup

Dexamethasone (Oral/IM/IV)

Mild-moderate croup: 0.15-0.3mg/kg^{20, 23}, maximum 12mg²³

- Some uncertainty remains about optimal dexamethasone dosing in croup.^{20, 23}
- 0.15 mg/kg is an effective dose in most cases. In practice clinicians may opt for a higher dose to ensure the desired dose is ingested in a child who is vomiting/having difficulty taking oral medicine.

Severe or life-threatening: 0.6mg/kg (oral/IV/IM), maximum 12mg.

- 0.6 mg/kg may be used in more severe cases²³. Adverse effects of higher doses are uncommon.²⁰

Preferred corticosteroid as associated with lower representation rate, shorter course, less vomiting and fewer school days missed.^{20, 24-27}

Oral suspension is not widely available. Dexamethasone 0.5mg and 4mg tablets are available but they are not easily dispersed in water to give in a partial dose. Doses that can be rounded to full tablet size can however be crushed and dispersed in water²⁸. Dexamethasone injection can be given orally and is tasteless. If IV stock is in shortage, please give liquid suspension.

Prednisolone (Oral)

Day 1: 1mg/kg/day

Day 2: 1mg/kg/day in the evening

Nebulised Budesonide

Consider for a child who repeatedly vomits the oral medication.

Budesonide (NEB) dosing for the treatment of croup	
Dose	2 mg nebulised with oxygen.
Side effects	Facial irritation – cover child's eyes while administering, wash face afterwards

Adrenaline (NEB) dosing for the treatment of croup	
Dose	5 mL of undiluted 1:1000 Adrenaline nebulised with oxygen as a single dose. Dose may be repeated in 10 minutes if there is inadequate response. ³⁷
Monitoring	Clinical observations every 15 minutes for the first hour.

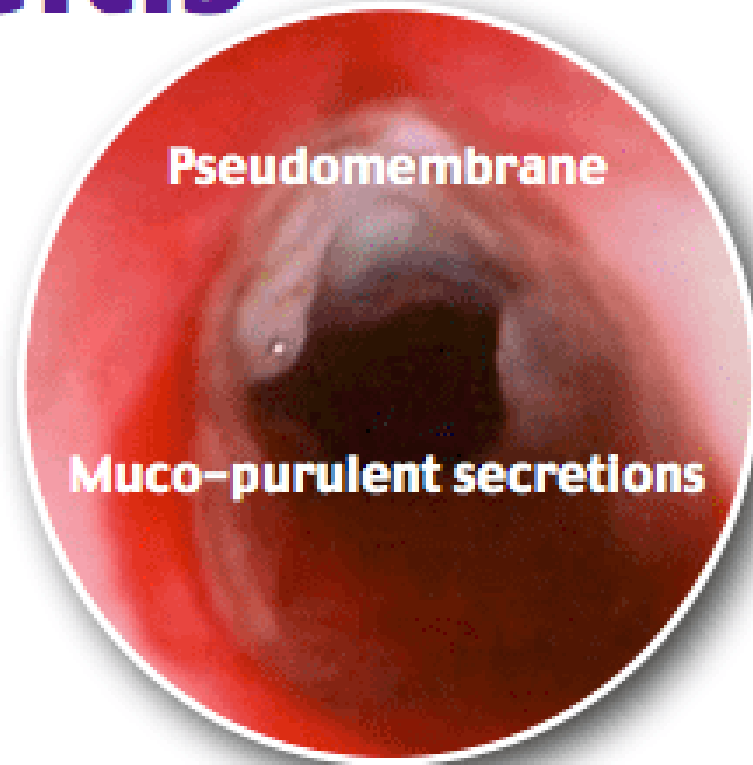
Bacterial Tracheitis



- 3 - 5 years old
- Fever
- Barky cough
- Stridor

[Looks similar to croup/epiglottitis]

Rapid progression



Pseudomembrane

Muco-purulent secretions

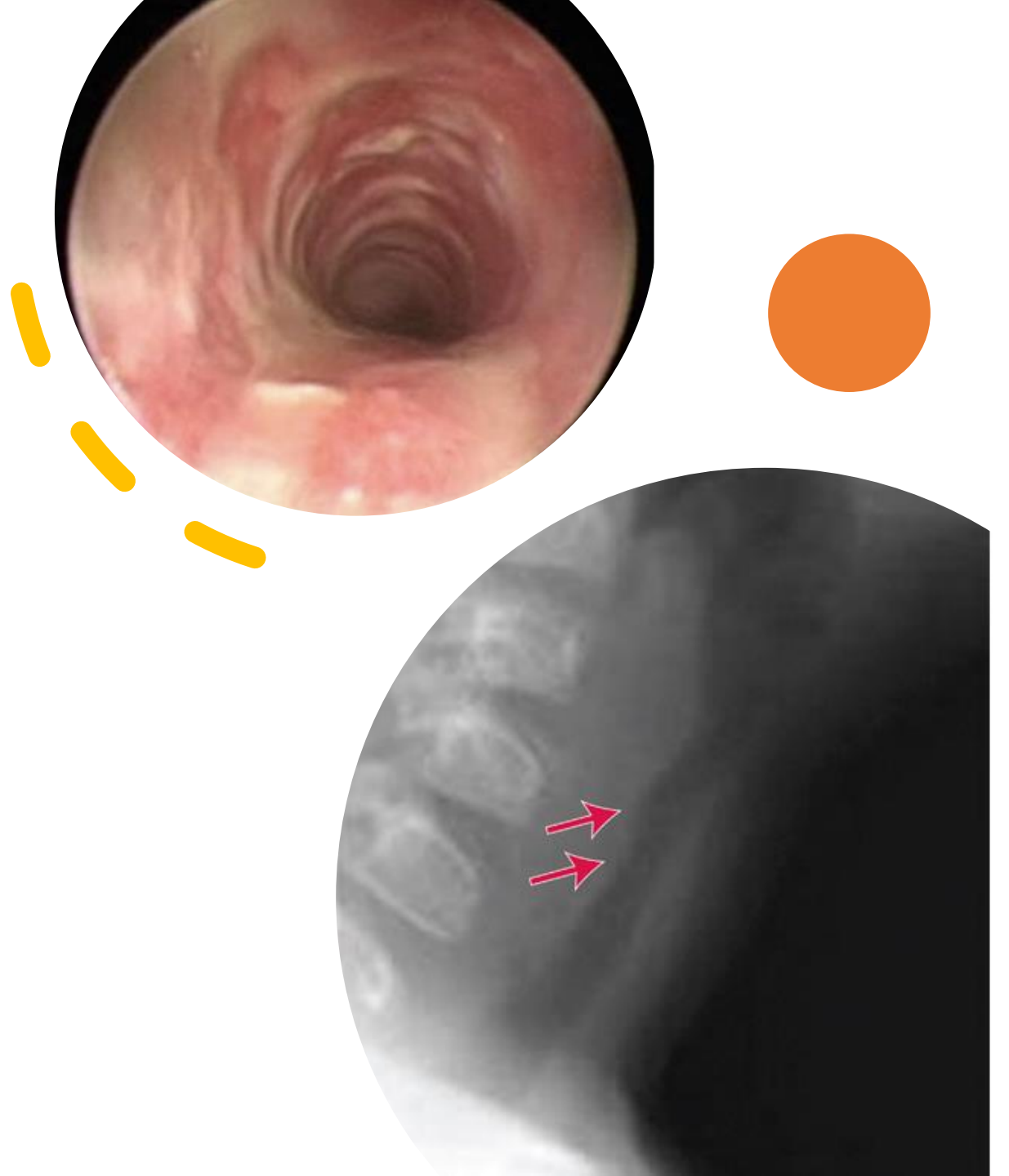
But...Toxic appearing

Airway emergency

- Aggressive airway management (in OR)
- IV antibiotics (broad spectrum)
- IV fluids
- Bronchoscopy

Diagnosis

- Direct laryngoscopy
- Characteristic x-ray findings



Management

- Adequate airway ensured
- Antibiotics effective against *S. aureus* and streptococcal species
- Initial antibiotics should cover *S. aureus*, including methicillin-resistant *S. aureus* (MRSA), and streptococcal species; IV vancomycin and ceftriaxone may be appropriate empirically.

Epiglottitis

Clinical presentation

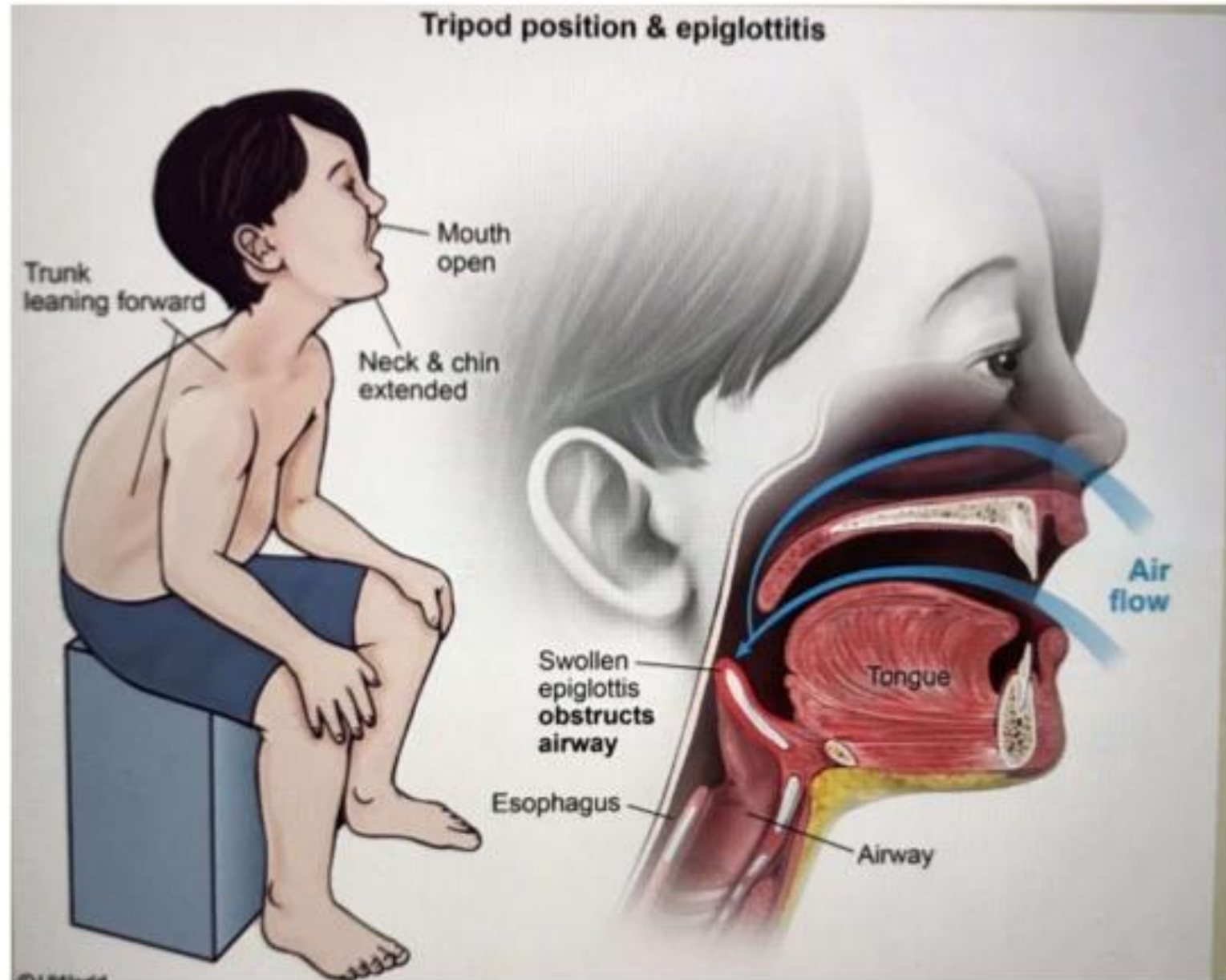
Drooling

Sick looking

Hyperextended neck

Stridor

Cough is unusual





Assessment

- Initial rapid assessment of potential for epiglottitis

Examination

- Approach the child calmly and avoid aggravating the child, do not use a tongue depressor to examine the oral cavity

Personnel Resources

- Ensure the multi-disciplinary team is available and alerted for the potential patient

Airway Management

- Airway management if necessary should be performed in the operating room with mask ventilation proceeding to airway evaluation and intubation; a surgical airway is a last resort

Ongoing Care

- Obtain cultures if possible, continue airway intubation in an ICU setting until a leak develops, and begin appropriate antibiotics as indicated

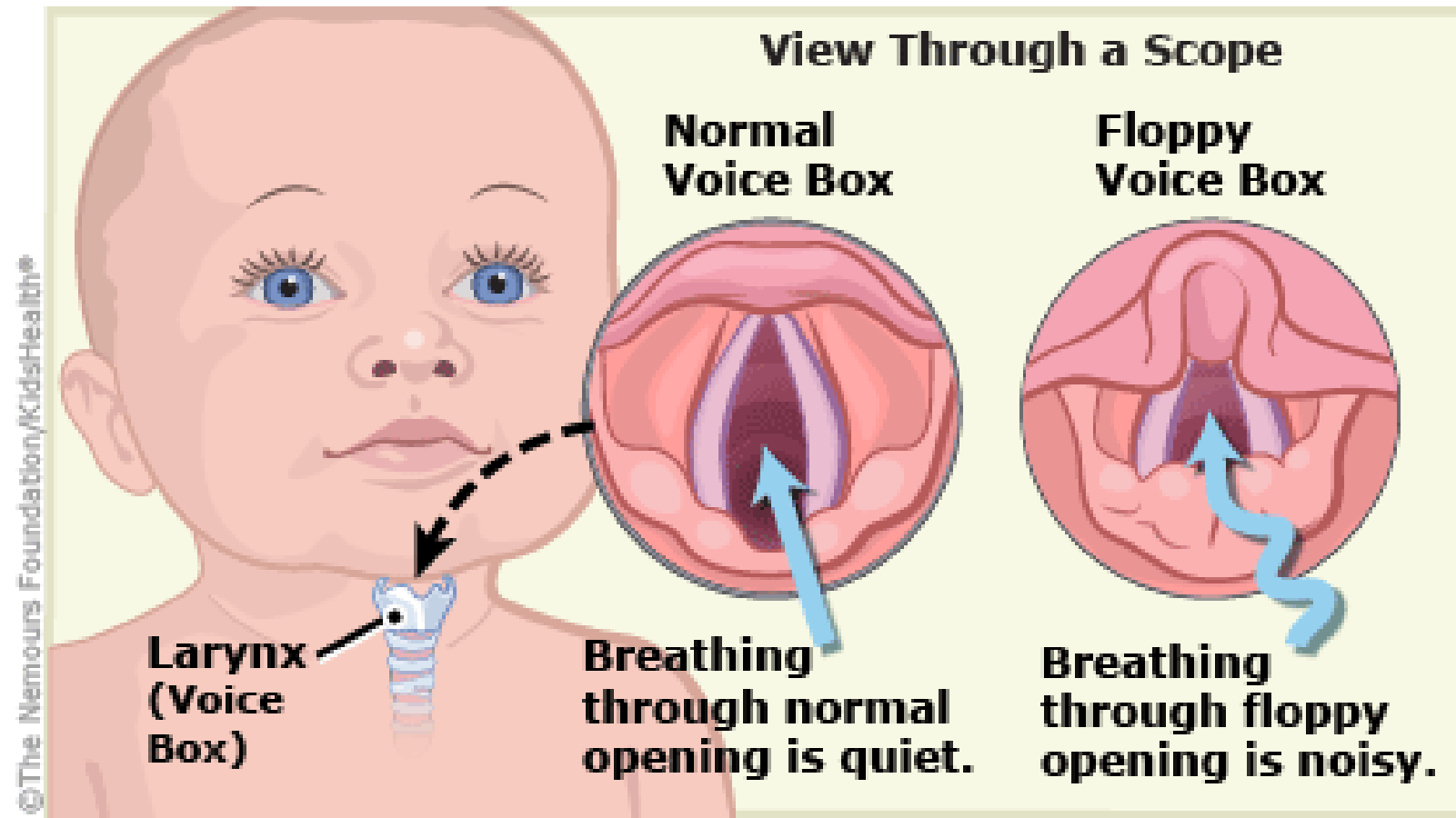
Extubation

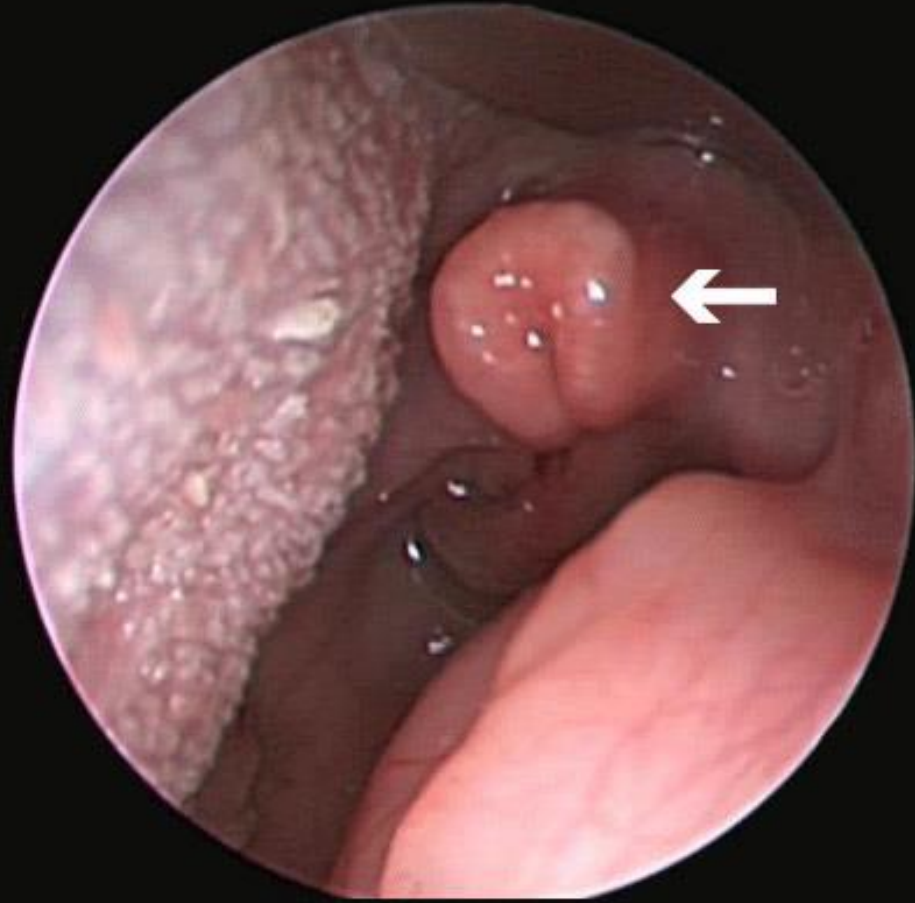
- Wean to extubate as airway parameters permit; consider an interval examination in the operating room prior to extubation

Chronic stridor

Laryngomalacia

M/C cause of chronic stridor



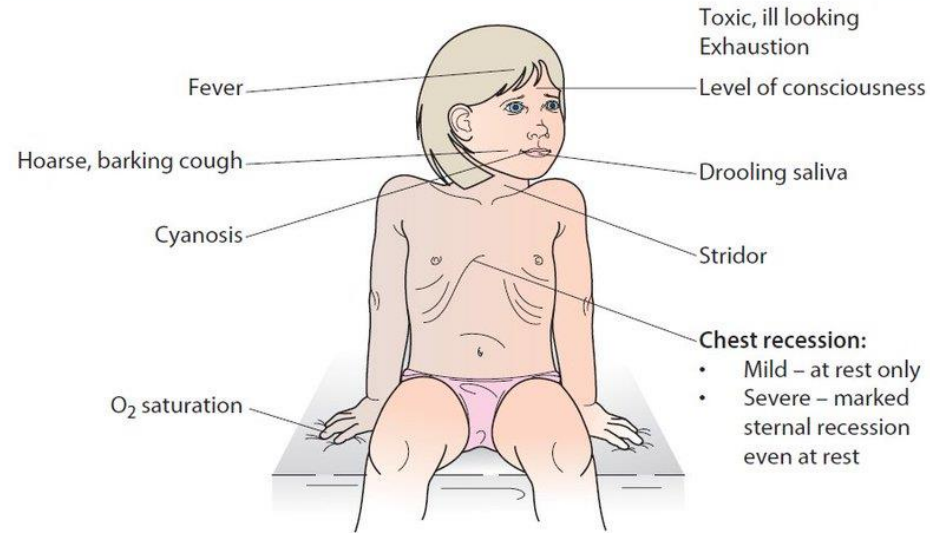


Signs/Symptoms

- Low pitched inspiratory stridor
 - Peaks at 6-9 months
 - Positional variation
 - Exacerbated by activity (feed, exertion), supine position, and during viral illnesses.
 - appears within first 2 weeks of life
 - diminishes by rest, prone position and sleeping
- Rarely produces cyanosis

The child with stridor

Clinical features to assess



Clinical conditions

Croup

- Mostly viral
- 6 months to 6 years of age
- Harsh, loud stridor
- Coryza and mild fever, hoarse voice

Bacterial tracheitis:

- High fever, toxic
- Loud, harsh stridor

Inhaled foreign body

- Choking on peanut or toy in mouth
- Sudden onset of cough or respiratory distress

Laryngomalacia or congenital airway abnormality:

- Recurrent or continuous stridor since birth

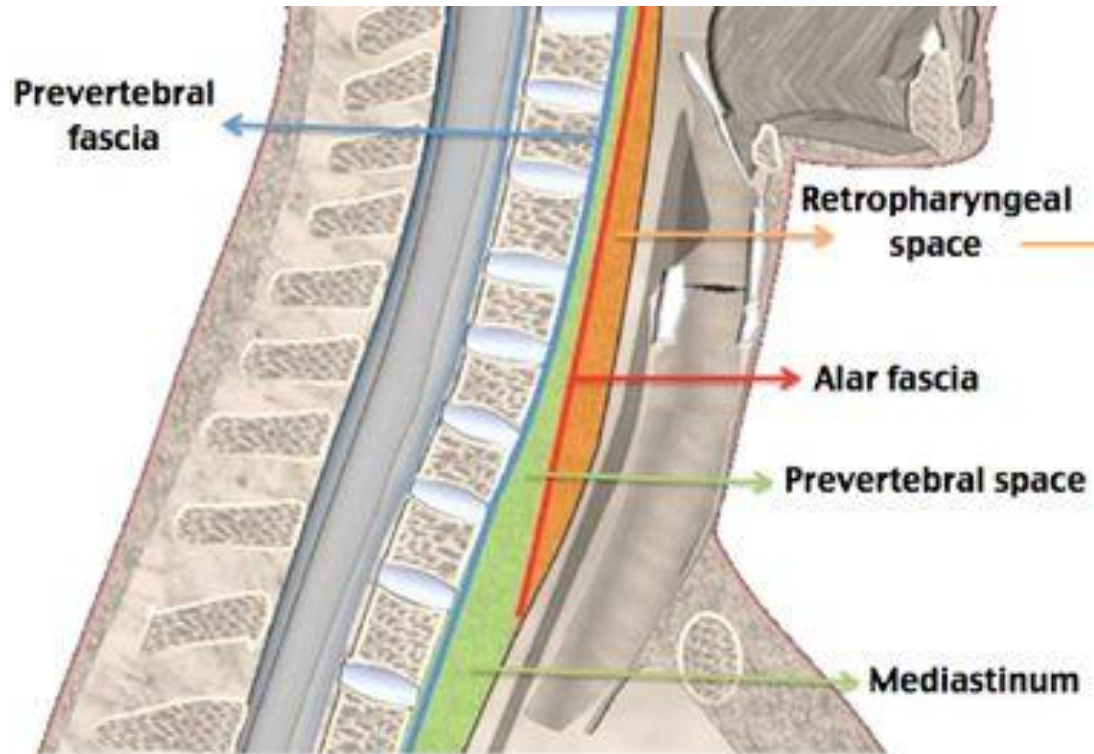
Epiglottitis:

- Caused by *H. influenzae* type b, rare since Hib immunisation
- Mostly aged 1–6 years
- Acute, life-threatening illness
- High fever, ill, toxic-looking
- Painful throat, unable to swallow saliva, which drools down the chin

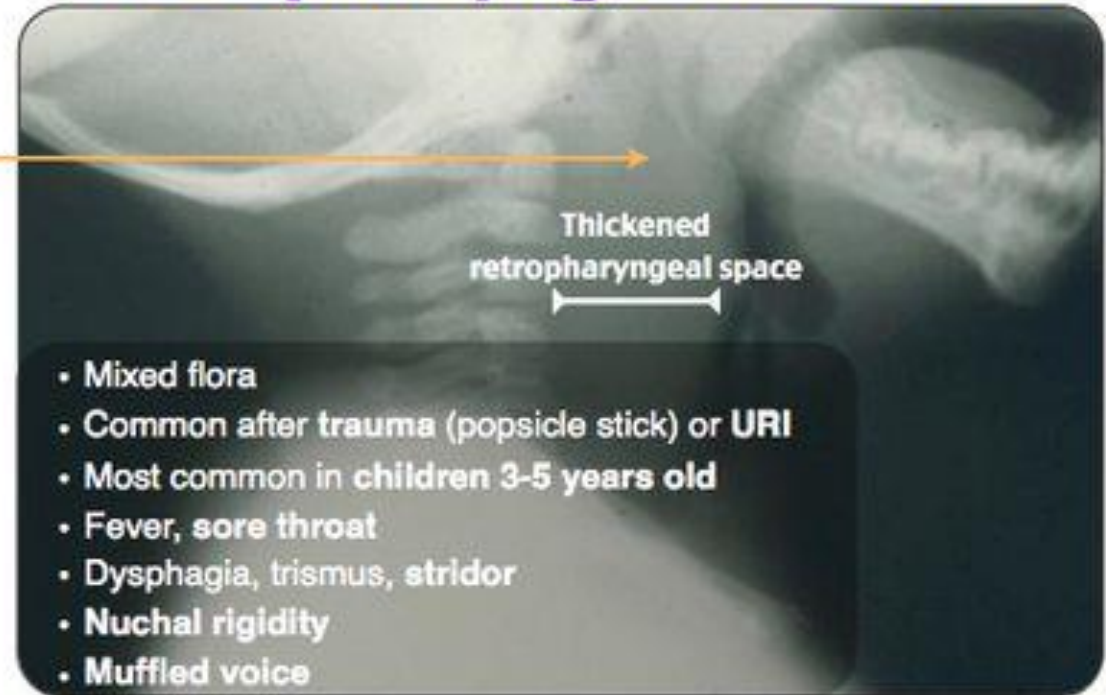
Other rare causes:

- See Box 16.1

Retropharyngeal Abscess



Retropharyngeal Abscess



Continue.....

- Retropharyngeal abscesses are uncommon but potentially life-threatening diagnoses.
- They can occur at any age, although are most commonly found in children under the age of five.
- Without proper treatment, retropharyngeal abscesses can lead to upper airway obstruction and asphyxiation.

Continue....

- Retropharyngeal abscesses are often polymicrobial infections.
- Bacteria that commonly contribute to these infections include **Group A Streptococcus pyogenes, Staphylococcus aureus, Fusobacterium, Haemophilus species**, and other respiratory anaerobic organisms.

Treatment

- Hospital admission.
- Intravenous antibiotics: to cover upper respiratory organisms including anaerobic organisms.
- Patients presenting airway compromise should have immediate surgical incision and drainage performed to relieve their upper airway obstruction.

Vocal Cord Paralysis

- A condition in which the vocal cords cannot move on one side (unilateral) or both sides (bilateral).

Unilateral vocal fold paralysis may lead to:

- A breathy, weak voice
- A weak cry in babies
- Aspiration of liquids into the trachea
- Noisy breathing (stridor)

Continue...

□ Bilateral Vocal Cord Paralysis: 62% of all pediatric VCP

- Often presents with stridor.
- Feeding difficulties
- Children with congenital bilateral vocal cord paralysis are more likely to exhibit severe manifestations such as cyanosis and apnea.
- Children with bilateral vocal cord paralysis often present with a ***normal voice*** because the vocal cords remain in the paramedian position with abductor paralysis, but can have marked inspiratory stridor and accessory muscle use with inspiration.

- Obstructive sleep apnoea
- Failure to thrive.

Continue...

- The diagnosis of vocal cord paralysis is usually made by laryngoscopy while awake.

Causes:

Bilateral VCP

- Neurological such as Arnold-Chiari malformation.
- Idiopathic
- Birth trauma

Unilateral VCP

- Iatrogenic: Heart surgery
- Idiopathic
- Neurological
- Birth trauma

Treatment:

- **Unilateral:**

50% recover spontaneously by the age of 12 months

- **Bilateral:**

If severe respiratory distress: surgical intervention; **tracheostomy**

THANK YOU