

Approach to Stridor in Children

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Wheezing Vs Stridor

Wheezing

- Obstruction of lower respiratory tract.
- Continuous, whistling sound heard more on expiration.

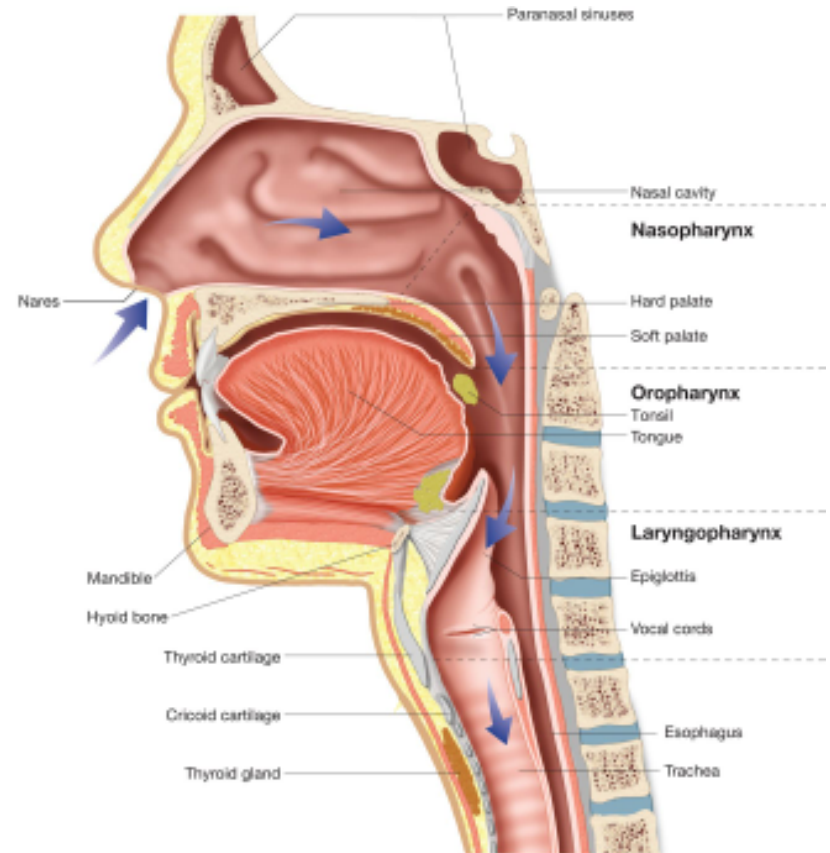
Stridor

- Obstruction of airway outside of chest cavity.
- High pitched sound, heard more on inspiration.

Anatomy

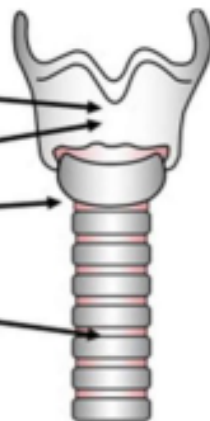
- Upper airway includes:

- ✓ Nose
- ✓ Pharynx
- ✓ Larynx
- ✓ Trachea



TYPES OF STRIDOR

- Inspiratory
 - Supraglottic/Epiglottic
 - Vocal cords/glottic
- Biphasic
 - Glottic
 - Subglottic
- Expiratory
 - Tracheal
 - Bronchial



- An inspiratory stridor suggests airway obstruction *above the glottis*.
- An expiratory stridor is indicative of obstruction in *the lower trachea*.
- A biphasic stridor suggests a *glottic or subglottic lesion*.

Aetiology - common causes in infants and children

Stridor

Congenital

- Laryngomalacia
- Laryngeal Web
- Subglottic Stenosis
- Haemangioma
- Vocal Cord Paralysis
- Tongue and jaw abnormalities

Acquired

Afebrile

- Papillomatosis
- Injury
- Foreign Body
- Laryngeal Edema
- Adenotonsillar hypertrophy

Febrile

- Epiglottitis
- Acute laryngitis
- Laryngotracheitis
- Diphtheria
- Retropharyngeal abscess
- Infectious mononucleosis
- Peritonsillar abscess

Laryngotracheobronchitis (Viral Croup) (acute stridor)

- The **most common** cause of acute stridor in childhood.
- The condition is caused most commonly by **parainfluenza virus**, but it can also be caused by influenza virus types A or B, RSV and rhinoviruses.
- Croup usually occurs in children **6 months to 6 years** of age, with a peak incidence in the second year of life.
- The male-to-female ratio is approximately 3:2.4

- Is usually preceded by an upper respiratory tract infection of several days' duration.
- A low-grade fever, barking cough, inspiratory stridor and hoarseness then develop.
- Symptoms are characteristically worse at night and are aggravated by agitation and crying.

Epiglottitis (acute stridor)

- True Medical Emergency
- In children, epiglottitis is almost always caused by **Haemophilus influenzae type b**.
- In recent years, the occurrence of epiglottitis has been reduced dramatically by the widespread use of the H. influenzae type b vaccine.
- Epiglottitis usually occurs in children 2-7 years of age, with a peak incidence in three-year-olds

- The male-to-female ratio is approximately 3:2.
- The disease is characterized by an abrupt onset of high fever, toxicity, agitation, stridor, dyspnea, muffled voice, dysphagia and drooling.
- The older child may prefer to sit leaning forward with the mouth open and the tongue somewhat protruding.
- *An edematous, cherry red epiglottitis, visualized in a controlled environment, is the hallmark of epiglottitis.*

Bacterial Tracheitis (acute stridor)

- Is usually caused by **Staphylococcus aureus**, although it can also be caused by H. influenzae type b and Moraxella catarrhalis.
- Most patients are younger than 3 years of age.
- Bacterial tracheitis usually follows an upper respiratory tract infection.
- The patient then becomes seriously ill with high fever, toxicity and respiratory distress.

Retropharyngeal abscess: (acute stridor)

- Complication of bacterial pharyngitis
- Younger than 6 years
- Abrupt onset of high fever, difficulty swallowing , refusing to feed , sore throat , hyperextension of the neck, and respiratory distress.

Laryngomalacia (chronic stridor)

- Is the most common cause of chronic stridor in children younger than two years.
- It has a male-to-female ratio of approximately 2:1.
- The condition is due to an intrinsic defect or delayed maturation of supporting structures of the larynx.
- The airway is partially obstructed during inspiration by the prolapse of the flaccid epiglottis, arytenoids and aryepiglottic folds.
- The inspiratory stridor is usually worse when the child is in a supine position, when crying or agitated, or when an upper respiratory tract infection occurs

Tracheomalacia (chronic stridor)

- Characterized by abnormal tracheal collapse secondary to inadequate cartilaginous and myoelastic elements supporting the trachea.
- Tracheal narrowing occurs with expiration and causes stridor.
- The stridor may not be present at birth but appears insidiously after the first weeks of life.
- The stridor is usually aggravated by respiratory tract infections and agitation.

Vocal Cord Paralysis

- **Unilateral vocal cord paralysis** occurs more often on *the left side* because of the longer course of the recurrent laryngeal nerve, which makes it more vulnerable to injury.
- Unilateral dysfunction may result from *birth trauma, trauma during thoracic surgery or compression by mediastinal masses of cardiac, pulmonary, esophageal, thyroid or lymphoid origin*

- **Bilateral vocal cord paralysis** is more commonly associated with central nervous system problems including perinatal asphyxia, cerebral hemorrhage, hydrocephalus, bulbar injury and Arnold-Chiari malformation.
- The vocal cords may also be injured by direct trauma from endotracheal intubation attempts or during deep airway suction.

- In vocal cord paralysis, the stridor is typically ***biphasic***.
- In unilateral vocal cord paralysis, the infant's cry is weak and feeble; however, there is usually no respiratory distress.
- In bilateral vocal cord paralysis, the voice is usually of good quality, but there is marked respiratory distress

Clinical Evaluation

Historical Information in the Evaluation of Stridor in Children

HISTORICAL DATA

POSSIBLE ETIOLOGY

Age of onset

Birth

Vocal cord paralysis, congenital lesions such as choanal atresia, laryngeal web and vascular ring

4 to 6 weeks

Laryngomalacia

1 to 4 years

Croup, epiglottitis, foreign body aspiration

Chronicity

Acute onset

Foreign body aspiration, infections such as croup and epiglottitis

Long duration

Structural lesion such as laryngomalacia, laryngeal web or laryngotracheal stenosis

Precipitating Factors

Worsening with straining or crying

Laryngomalacia, subglottic hemangioma

Worsening in a supine position

Laryngomalacia, tracheomalacia, macroglossia, micrognathia

Worsening at night

Viral or spasmodic croup

Worsening with feeding

Tracheoesophageal fistula, tracheomalacia, neurologic disorder, vascular compression

Antecedent upper respiratory tract infection

Croup, bacterial tracheitis

Choking

Foreign body aspiration, tracheoesophageal fistula

Associated symptoms

Barking cough

Croup

Brassy cough

Tracheal lesion

Drooling

Epiglottitis, foreign body in esophagus, retropharyngeal or peritonsillar abscess

Weak cry

Laryngeal anomaly or neuromuscular disorder

Muffled cry

Supraglottic lesion

Hoarseness

Croup, vocal cord paralysis

Snoring

Adenoidal or tonsillar hypertrophy

Dysphagia

Supraglottic lesion

Past health

Endotracheal intubation

Vocal cord paralysis,
laryngotracheal stenosis

Birth trauma, perinatal
asphyxia, cardiac problem

Vocal cord paralysis

Atopy

Angioneurotic edema,
spasmodic croup

Family history

Down syndrome

Down syndrome

Hypothyroidism

Hypothyroidism

Physical Examination Findings in the Evaluation of Stridor in Children

<i>PHYSICAL FINDINGS</i>	<i>POSSIBLE ETIOLOGY</i>
General	
Cyanosis	Cardiac disorder, hypoventilation with hypoxia
Fever	Underlying infection
Toxicity	Epiglottitis
Tachycardia	Cardiac failure
Bradycardia	Hypothyroidism
Quality of stridor	
Inspiratory stridor	Obstruction above glottis
Expiratory stridor	Obstruction at or below lower trachea
Biphasic stridor	Glottic or subglottic lesion

Position of the child

Hyperextension of the neck

Extrinsic obstruction at or above larynx

Leaning over, drooling

Epiglottitis

Lessening of stridor in prone position

Laryngomalacia

Chest findings

Prolonged inspiratory phase

Laryngeal obstruction

Prolonged expiratory phase

Tracheal obstruction

Unilateral decreased air entry

Foreign body in ipsilateral
bronchus

Associated signs

Arrhythmias, significant heart murmurs, abnormal heart sounds

Structural heart disease

Cutaneous hemangiomas

Subglottic hemangioma

Peripheral neuropathy

Vocal cord paralysis

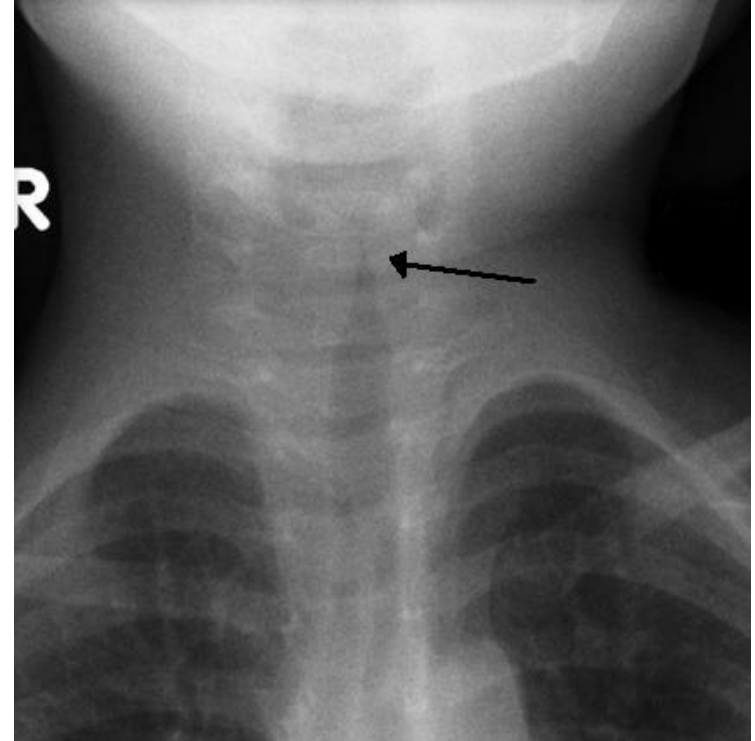
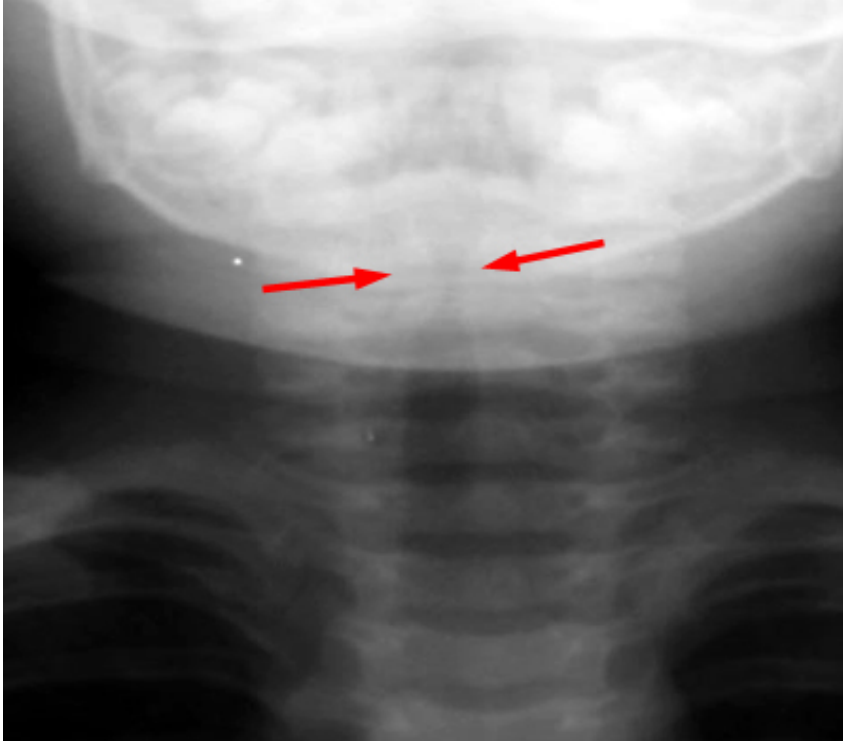
Urticaria/angioneurotic edema

Angioneurotic edema

Diagnostic Studies

- ***AP & Lateral CXR:***
- views of the neck are useful in the assessment of adenoidal and tonsillar size, epiglottic size and shape, retropharyngeal profile and subglottic and tracheal anatomy.
- detection of radio-opaque foreign body and concomitant pulmonary disease.

Steeple sign



Thumb Sign



- **Barium swallow** is a useful method if vascular compression or gastroesophageal reflux is suspected. Gastrografin should be used as the contrast medium if tracheoesophageal fistula is suspected.:
- **Bronchoscopy/ flexible or rigid:** Airway malacia
- CT neck and chest

Management

- ABC
- According to the cause:
 - Croup: Systemic steroid/ inhaled adrenaline
 - Tracheitis: Antibiotics/ supportive treatment.

THANK YOU