Stridor in Children

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- Stridor is a harsh, vibratory sound of variable pitch caused by partial obstruction of the respiratory passages that results in turbulent airflow through the airway.

- Stridor is a sign of upper airway obstruction.
- ***laryngomalacia*** is the most common cause of chronic stridor.
- ***Croup*** is the most common cause of acute stridor.

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- 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.
- Laryngeal lesions often result in voice changes.

Causes of Stridor in Children According to Site of Obstruction

Nose and pharynx

Choanal atresia

Lingual thyroid or thyroglossal cyst

Macroglossia

Micrognathia

Hypertrophic tonsils/adenoids

Retropharyngeal or peritonsillar abscess

Larynx

Laryngomalacia

Laryngeal web, cyst or laryngocele

Laryngotracheobronchitis (viral croup)

Acute spasmodic laryngitis (spasmodic croup)

Epiglottitis

Vocal cord paralysis

Laryngotracheal stenosis

Intubation

Foreign body

Cystic hygroma

Subglottic hemangioma

Trachea

Tracheomalacia

Bacterial tracheitis

External compression

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

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 epiglottis, visualized in a controlled environment, is the hallmark of epiglottitis.*

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

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.

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.

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 larynogotracheal 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

PHYSICAL FINDINGS	*POSSIBLE ETIOLOGY*
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

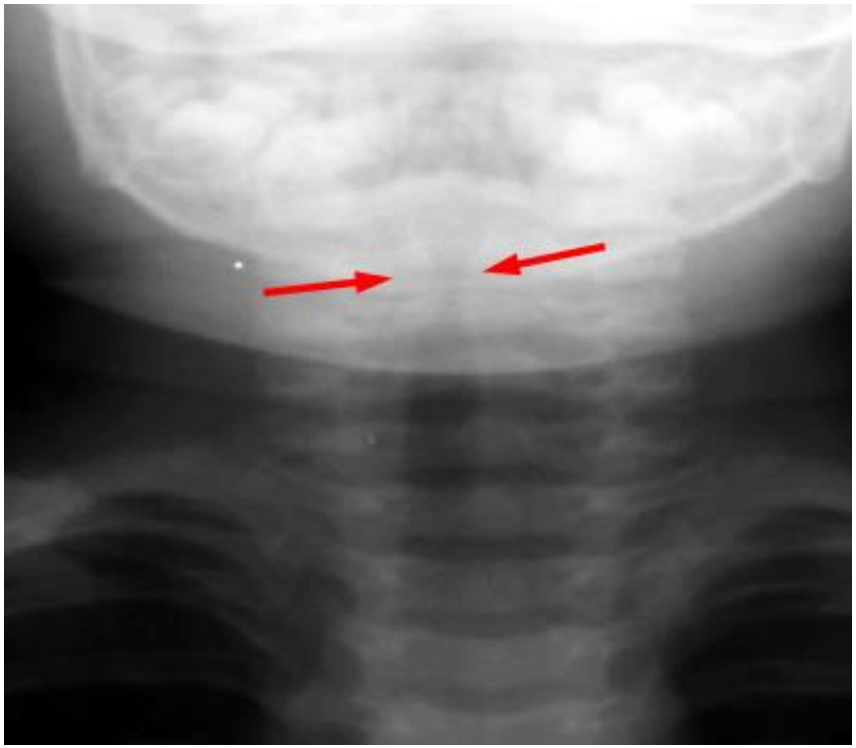
Arrhythmias, significant heart murmurs, abnormal heart sounds	Structural heart disease
Cutaneous hemangiomas	*Subglottic hemangioma*
Peripheral neuropathy	Vocal cord paralysis
Urticaria/angioneurotic edema	Angioneurotic edema

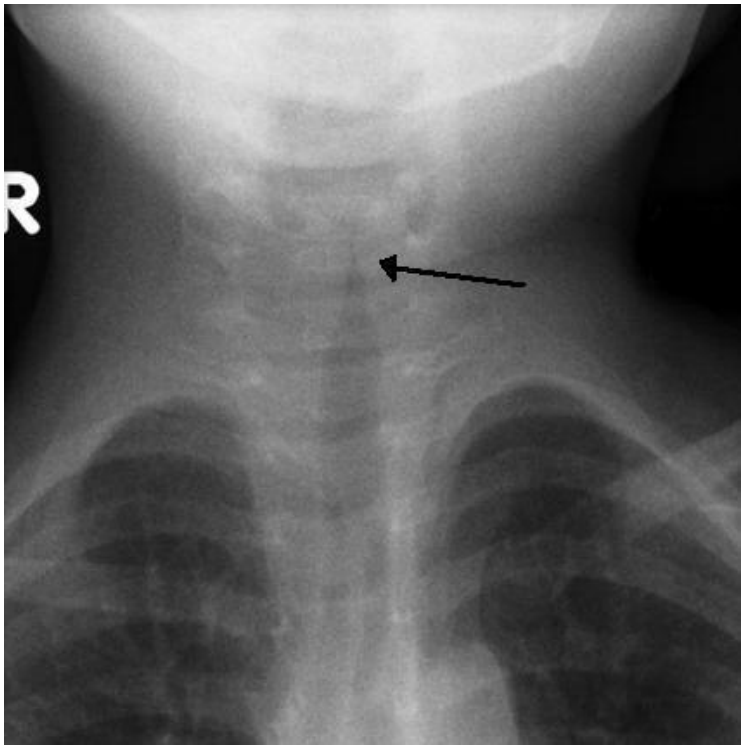
Diagnostic Studies

- ***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

THANK YOU