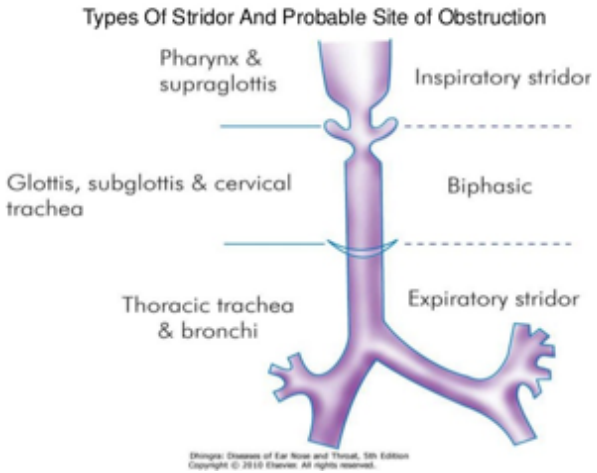
Stridor and Tracheostomy

JUH
March 2020

Definition

- **Stridor** is a high-pitched sound produced by narrowing/obstruction within the larynx (inspiratory) or trachea (inspiratory and expiratory)
- **Stertor** is a **respiratory** sound characterized by heavy snoring or gasping

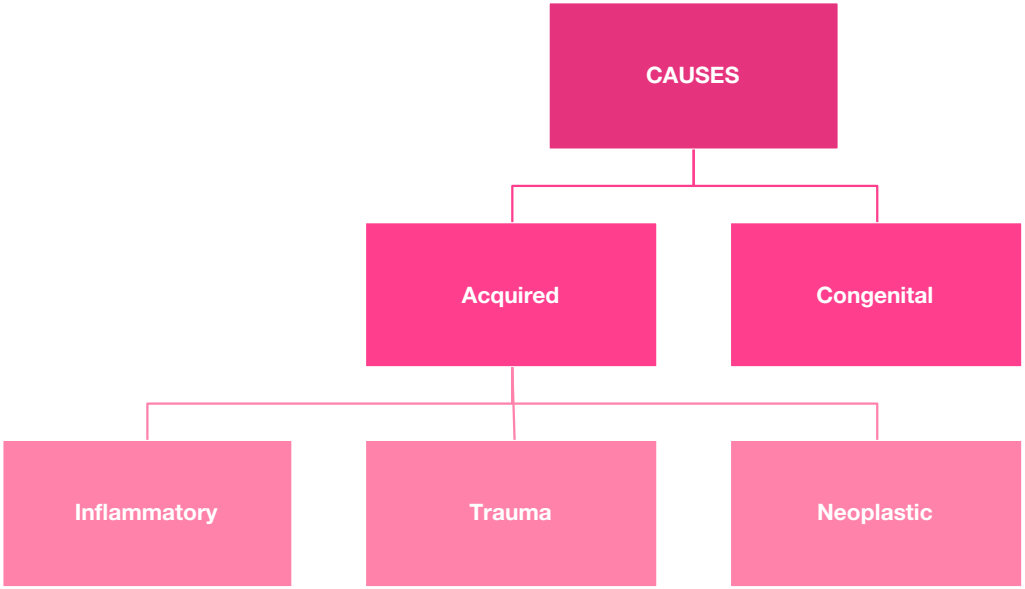


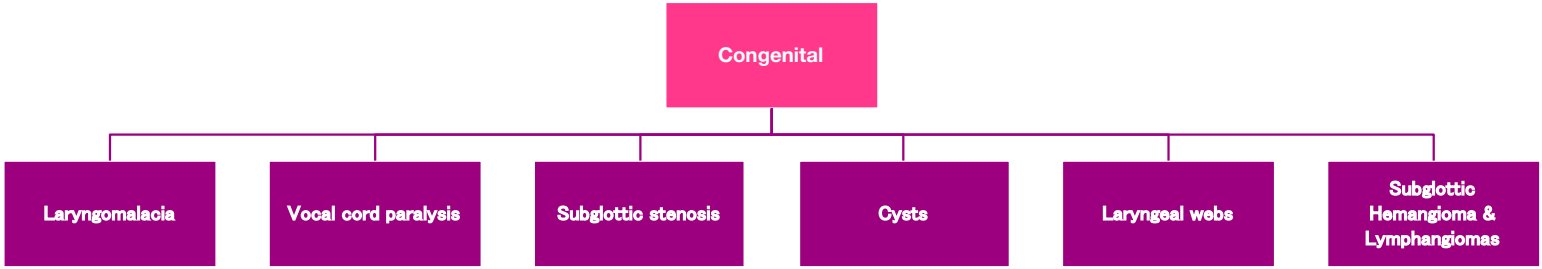
- If the narrowing is below this level then its wheezes.
- Not a disease… It is a symptom or a sign.
- Any child with stridor is potentially at risk of dying from asphyxia and every case should be investigated to determine the cause.
- It is dangerous to believe that all children ‘grow out’ of a tendency to stridor.
- The most common presenting symptom of the laryngeal diseases is hoarseness not stridor.

2. Expiratory stridor implies **tracheal** obstruction

3. Biphasic stridor suggests a **subglottis** obstruction.

CAUSES


CAUSES
Acquired
Congenital
Inflammatory
Trauma
Neoplastic


Congenital
Laryngomalacia
Vocal cord paralysis
Subglottic stenosis
Cysts
Laryngeal webs
Subglottic Hemangioma & Lymphangiomas

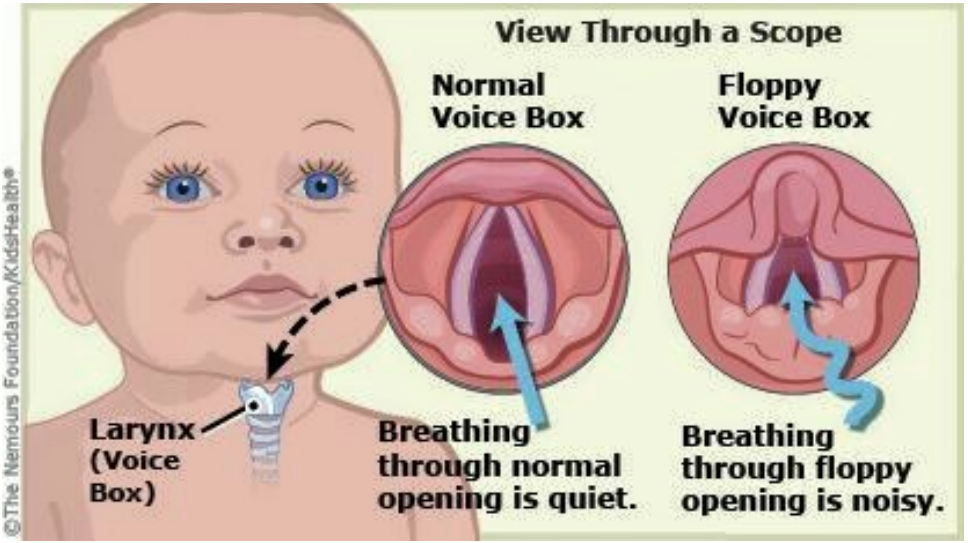
Laryngomalacia

"Malacia" means abnormal softening of the tissue…Laryngomalacia is abnormal softening of the larynx "cartilage"

It is a delayed cartilage development characterized by:

1-Softening of the laryngeal cartilages 2-Omega-shaped epiglottis

Due to inadequate support, there will be severe enfolding of the epiglottis and aryepiglottic folds during inspiration resulting in stridor.


View Through a Scope
Normal Voice Box
Floppy Voice Box
Larynx (Voice Box)
Breathing through normal opening is quiet.
Breathing through floppy opening is noisy.
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Laryngomalacia

It’s the most common cause of inspiratory stridor in the neonatal period and early infancy and accounts for up to 75% of all cases of stridor.

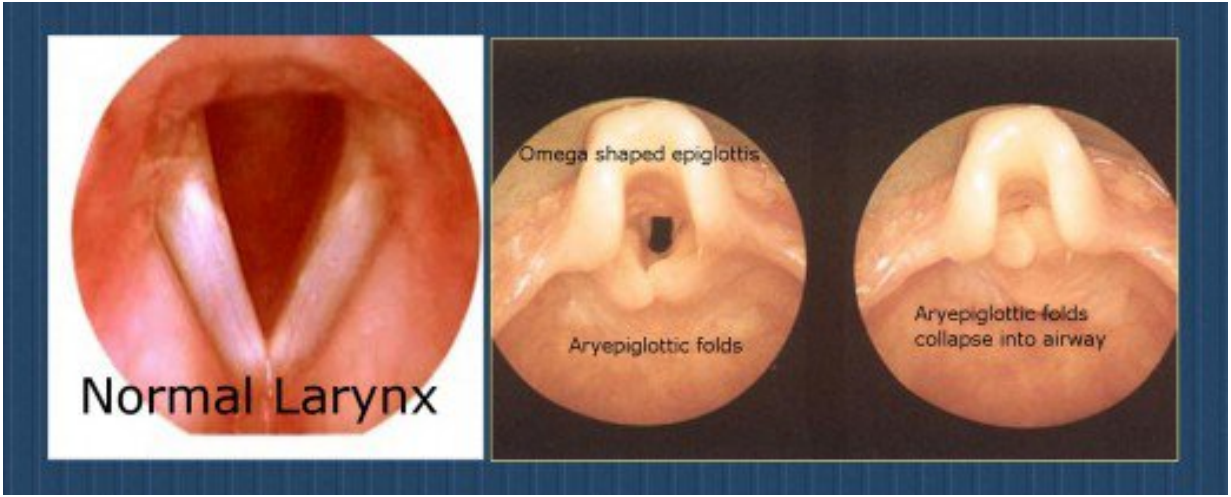
Diagnosis

Stridor is aggravated by supine position and head flexion, relieved by prone position and head extension. (tongue and epiglottis get pulled by gravity)

Diagnosis

- laryngoscopy without intubation:

- Omega-shaped epiglottis
- Short arye-epiglottic fold


Normal Larynx
Omega shaped epiglottis
Aryepiglottic folds
Aryepiglottic folds
collapse into airway

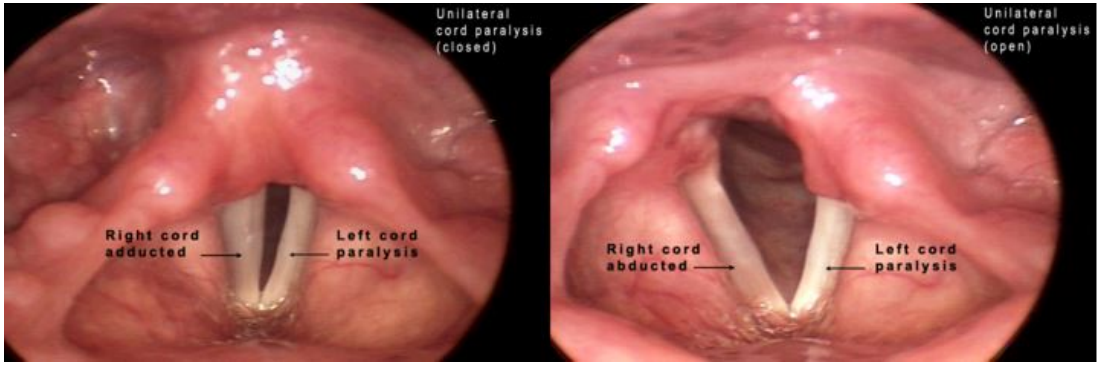
Management

- Laryngomalacia is usually benign and self-limiting and improves as the child reaches age 1 year, so for mild and moderate cases: observation
- For severe cases a tracheostomy may be needed till it resolves spontaneously.
- Surgical correction or supraglottoplasty may be considered if tight mucosal bands are present holding the epiglottis close to the true vocal cords or redundant mucosa is observed overlying the arytenoids.

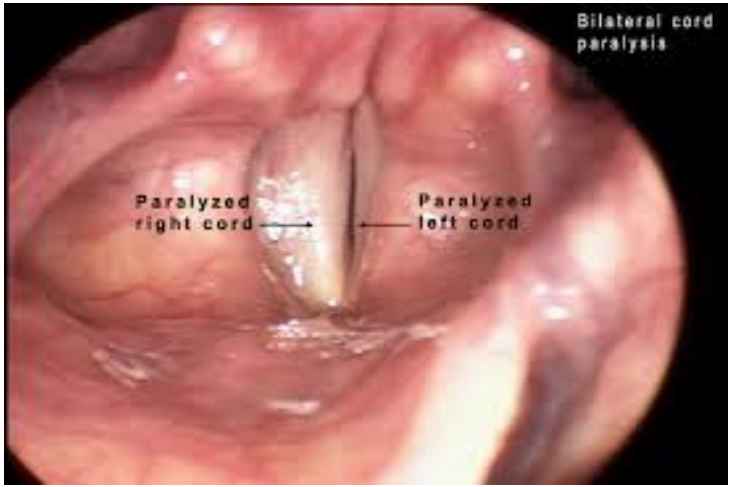
Vocal Cord Paralysis

- It is probably the second most common cause of stridor in infants.
- Could be either unilateral (more common) or bilateral.
- Patients with unilateral paralysis present with a weak cry and biphasic stridor that is louder when awake and improves when lying with the affected side down.
- Bilateral vocal cord paralysis is a more serious entity. Patients usually present with aphonia or dysphonia and a high-pitched biphasic stridor that may progress to severe respiratory distress especially during exertion

unilateral paralysis



Bilateral vocal cord paralysis



Vocal Cord Paralysis
Etiology

- Vocal cords are innervated by the Vagus nerve which begins from the ambiguous nucleus in the brain stem, so any injury to the nucleus or the nerve during its course will cause vocal cord paralysis.
- 1- Birth trauma
- 2- Arnold-chiari syndrome (herniation of the brain stem)

Clinical Picture

- Unilateral: Weak cry, Biphasic stridor that is louder when awake and improves when lying with the affected side down.
- Bilateral: Aphonia, high-pitch biphasic stridor that may progress to severe respiratory distress.
- Recurrent aspiration

- Diagnosis by: Laryngoscopy.

- Management: Tracheostomy if severe enough.

Subglottic Stenosis

- Narrowing of the area below the VC, which is usually the narrowest in the URT.
- Symptoms can be evident at any time during the first few years of life.
- Symptoms:

  Mild – moderate: it may pass unnoticed.

  Severe: any mild infection causes severe inspiratory, biphasic stridor

Diagnosis and management

- Diagnosis: The stenosis may be visible on a lateral X-ray of the neck. Diagnosis is confirmed by laryngoscopy.
- Management: Tracheostomy until definitive treatment is done.

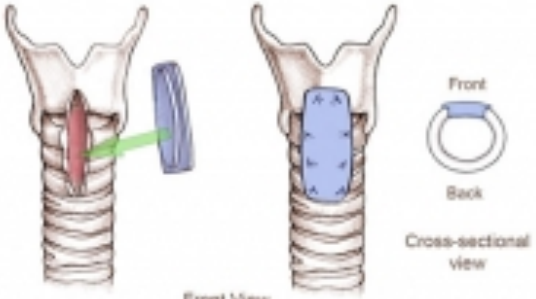
If the thickness of the wall of the stenosed area is less than 1 cm, then laser is used to widen it.

If it is more than 1 cm, then laryngotracheal reconstruction is done.

Laryngotracheal reconstruction

- Involves inserting a small piece of cartilage (from ribs) into the narrowed section of the windpipe to make it wider.

Anterior Costal Cartilage Graft



Front View
(graft shown in blue; level of stenosis shown in pink)

Laryngeal Web

- Laryngeal webs are caused by an incomplete recanalization of the laryngeal lumen during embryogenesis.
- Most (75%) are in the glottic area.
- Infants with laryngeal webs have a weak cry and biphasic stridor.

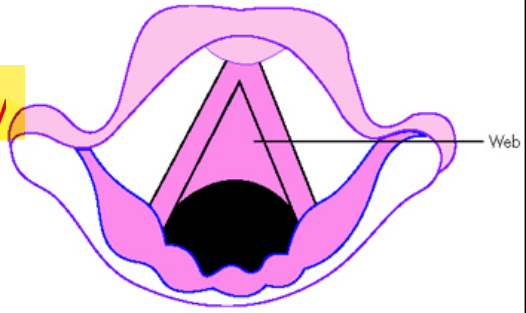
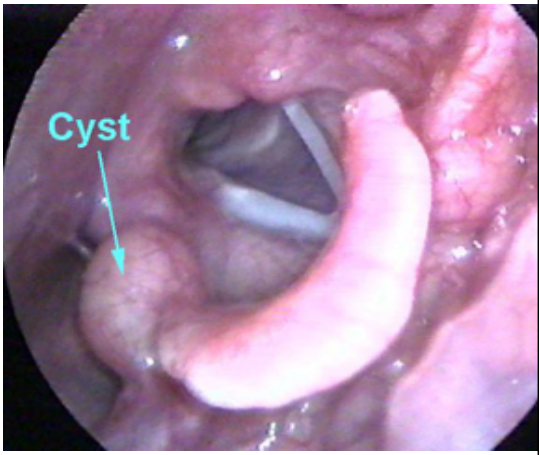
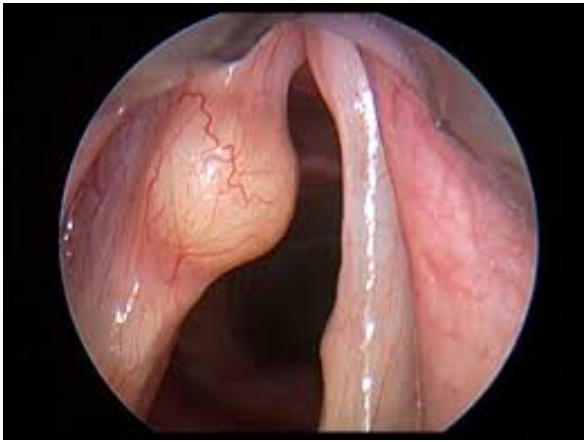


Fig. 57.2 Laryngeal web.

Laryngeal Cyst

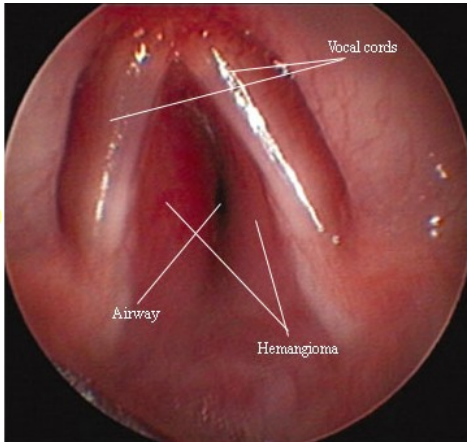
- Laryngeal cysts are a less frequent cause of stridor.
- They are usually found in the supraglottic region in the epiglottic folds.
- Patients may present with stridor, hoarse voice, or aphonia, or cysts may cause obstruction of airway lumen if they are very large.



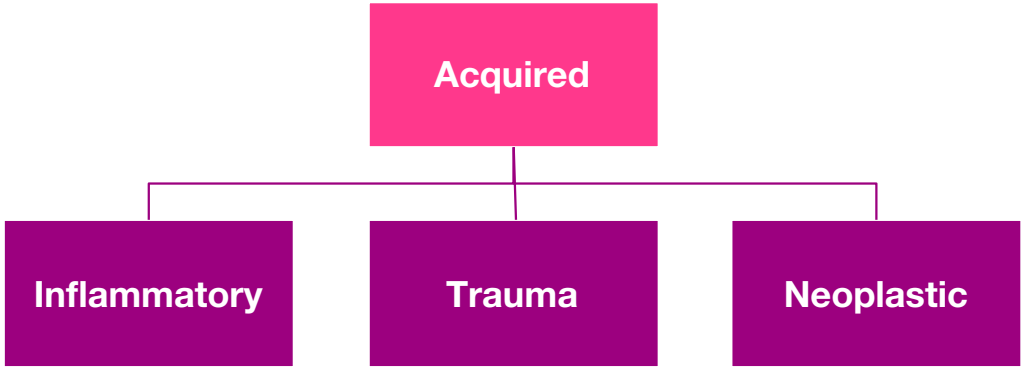


Hemangiomas

- **Webs, hemangiomas, lymphangiomas and cysts.**
- **Dx :** Depends on laryngoscopic examination
- **Treatment :**Removal of causative lesion **usually using laser**



Acquired Stridor



Inflammatory

- Acute inflammation
- Chronic Inflammation (usually with TB and with dysphagia)

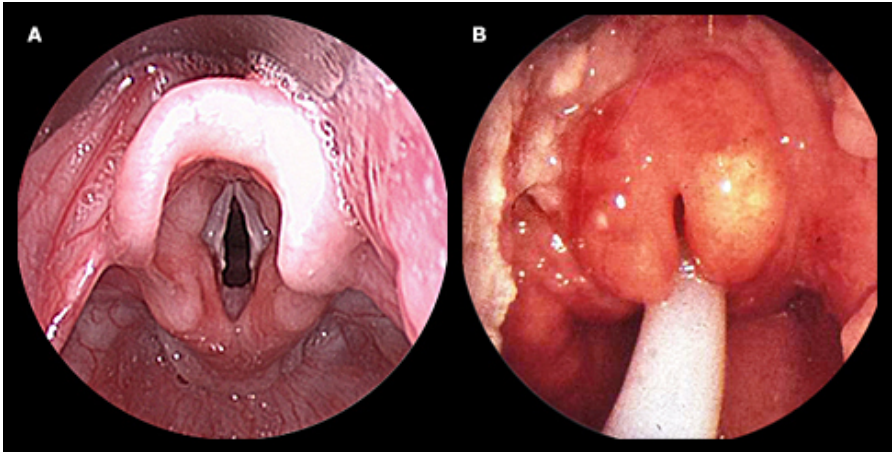
Acute Inflammation

- Acute epiglottitis
- Acute laryngotrachobroncitis (CROUP)
- Acute laryngitis

Acute epiglottitis

- A medical emergency.
- Epiglottitis is an acute inflammation in the supraglottic region of the oropharynx with inflammation of the epiglottis, arytenoids and aryepiglottic folds .
- Most common causative organism is H. influenzae type B (25%), followed by: H. parainfluenzae, Streptococcus pneumoniae, Group A streptococci
- Affects children between 2 and 7 years old, but can occur at any age.(stridor, high fever, dysphagia)

Acute epiglottitis



Acute epiglottitis

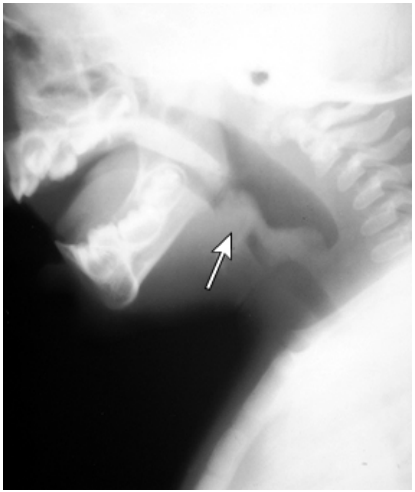
- Dx depends on clinical picture (**can't examine**, laryngospasm)
- Symptoms:
- Sore throat (95%)
- Sever dysphagia (95%)& drooling of saliva
- Muffled voice (54%) - "Hot potato voice,"
- Severe stridor with the patient sitting in air hunger position.
- Very high fever, >40 c.
- Patient looks very toxic, tachycardic and tachypnic

Management

- ABCs
- Secure the airways via tracheostomy or intubation.
- IV fluids
- IV antibiotics, ampicillin and chloramphenicol.
- IV steroids, to relieve the edema.
- Nebulizers with epinephrine.

Diagnosis

Lateral neck radiograph demonstrating swollen epiglottis (arrow) and aryepiglottic folds in a child with epiglottitis . The swollen epiglottis is often called a "**thumb sign**."



Acute Laryngotracheobronchitis (Croup)

- The most common cause of acute stridor in children, especially children aged 6 months to 2 years.
- Follows Viral infection.
- Most commonly caused by Para influenza virus.

Symptoms

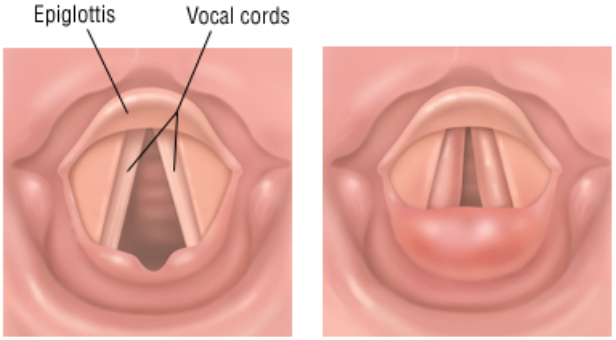
- Stridor.
- Barking cough.
- Wheezes.
- Crepitation.
- Low grade fever .
- Patient looks ill but not toxic.

Management

- Supportive
- Secure the airways if compromised.
- IV steroids
- Nebulizers with epinephrine.

Acute Laryngitis

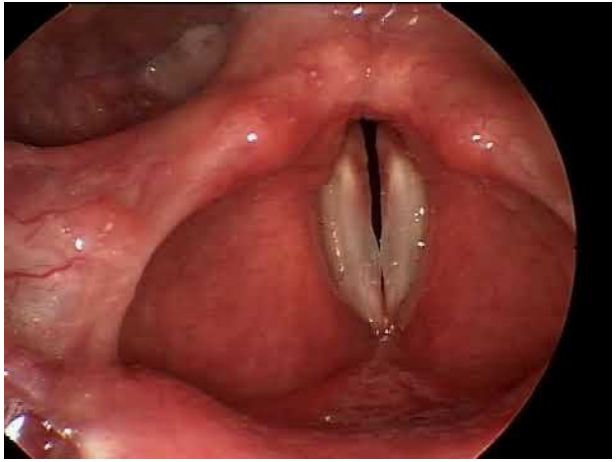
- Usually viral
- Swelling and inflammation at the level of the vocal cords
- Seen in children less than 12 years old.
- Self limiting and doesn't cause significant morbidity and mortality



Acute Laryngitis

Symptoms:

- Stridor.
- Cough.
- Hoarseness of voice.



Management (supportive)

- Secure airways.
- Nebulizers, preferring cold stream with epinephrine.
- Steroids.

Trauma

not common since the larynx is a **well-protected organ**.

Classifications:

1) Mechanism

- Mechanical: blunt trauma and penetrating trauma (stab wound, gunshot…etc.)
- Chemical: aspiration of chemical substances (corrosive substances) taken mistakenly.
- Physical: thermal injuries (hot fumes associated with burns), radiation (causes fibrosis)...etc.

2) According to severity: Mild Moderate Severe
3) According to cause: Accidental, Personal assaults, Road traffic accidents, Sport injuries, Gun shoots

Clinical findings

- Can be very mild even without any symptoms.
- Subcutaneous emphysema or crepitus.
- Dysphonia.
- Loss of laryngeal prominence.
- Dysphagia.
- Odynophagia.
- Stridor.
- Hemoptysis.
- Cough.

Management:

- Secure airways.
- Admit patient with dysphonia and laryngeal trauma
- Exploration, if not intact (usually in penetrating injury)
- High resolution CT scan. Fractures and other injuries.
- Remember to rule out any cervical injuries before intubation or tracheostomy.
- For cut wounds do NOT suture, just put a stent to prevent stenosis.
- Reduction of displaced fractures.
- Treat other associated Injuries.

Airway Obstruction

Clinical picture

- Stridor
- Use of accessory muscles of respiration.
- Pallor, sweating and restlessness.
- Tachycardia.
- Cyanosis.
- Intercostal and sternal recession.
- Exhaustion —a late stage in asphyxia (less effort to breathe, stridor & insuction less pronounced)

Do not try to examine the throat in patient with stridor as this may induce laryngospasm and total airway obstruction.

Maintain airway

Medical treatment:

- Humidified oxygen inhalation.
- Corticosteroids: Systemic – Inhalation.
- Bronchodilators.
- IV fluids.
- Strict observation.

Maintain airway

Intervention:

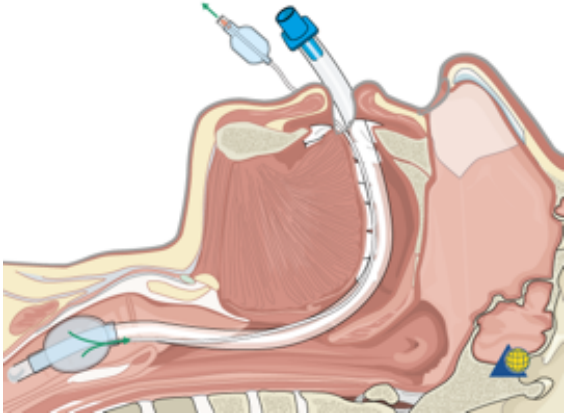
- Endotracheal intubation (Inflammatory)
- Tracheostomy.
- Cricothyroidotomy (extreme emergency)

Indications

Many conditions, most commonly:

- Respiratory failure (unconscious head injury, tetanus…)
- Airway obstruction (foreign body, tumor, edema, vocal cord paralysis …)
- Protection of tracheobronchial tree (polyneuritis (e.g. Guillain–Barré syndrome, bulbar poliomyelitis, multiple sclerosis, myasthenia gravis, tetanus, brain-stem stroke, coma)

Endotracheal Intubation



Intubation

Orotracheal and nasotracheal intubation

not practical for a long period of time (2 weeks)

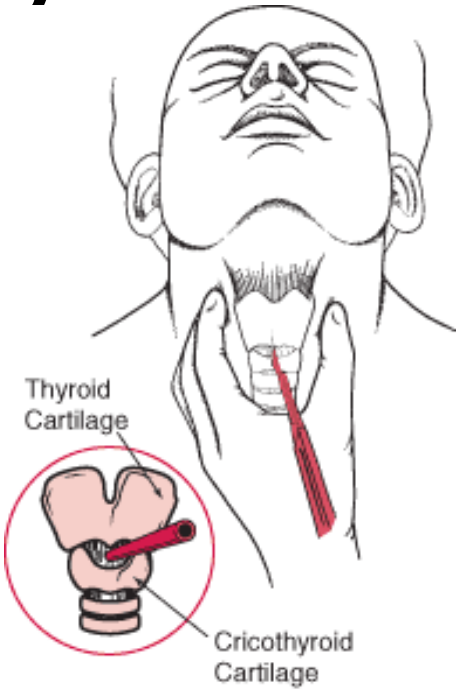
nasotracheal intubation may cause sinusitis, pressure necrosis of the nasal skin, interfere with eating and talking, and requires more nursing care

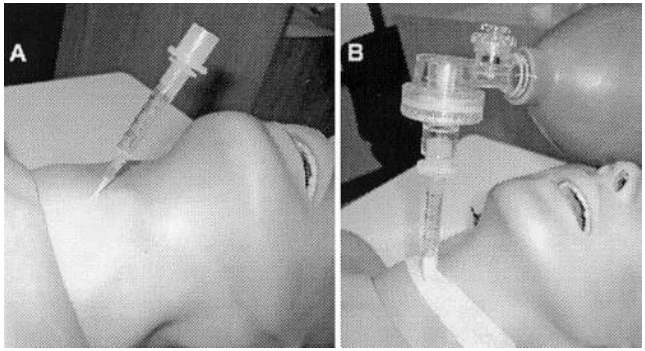
Cricothyrotomy

Done when an urgent surgical airway is needed

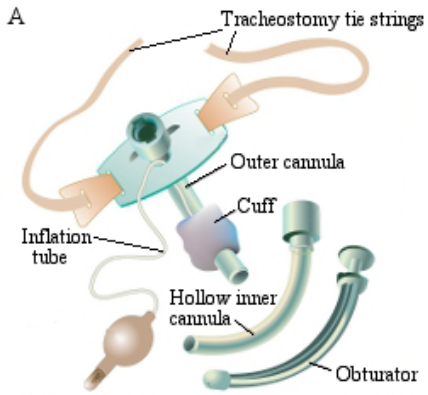
If left for more than 2 or 3 days, it may produce glottic or Subglottic stenosis (must be converted to tracheostomy)

Procedure:
vertical incision on the skin of the neck just below the "Adam's apple" or thyroid cartilage and another transverse incision in the cricothyroid membrane which lies deep to this point.Then inserts a tube into this opening, which allows patient to breath with a machine or bag.

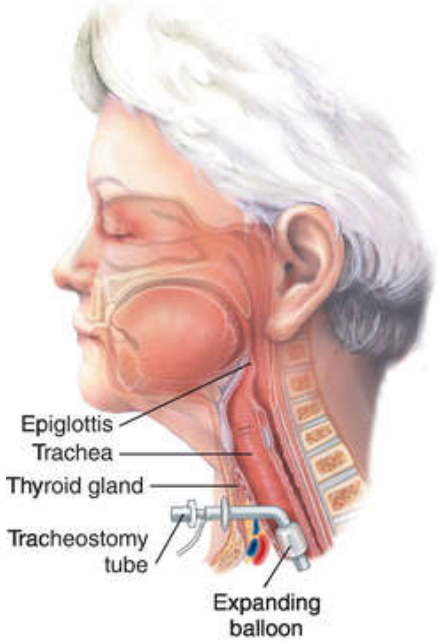



A
B

Tracheostomy



(From Lewis, S.L. and others. [2011]. Medical-surgical nursing: Assessment and management of clinical problems [8th ed.]. St. Louis: Mosby.)



Tracheostomy

It is an opening surgically created through the neck in to the trachea, a tube is usually placed through this opening to provide an airway and to remove secretions.

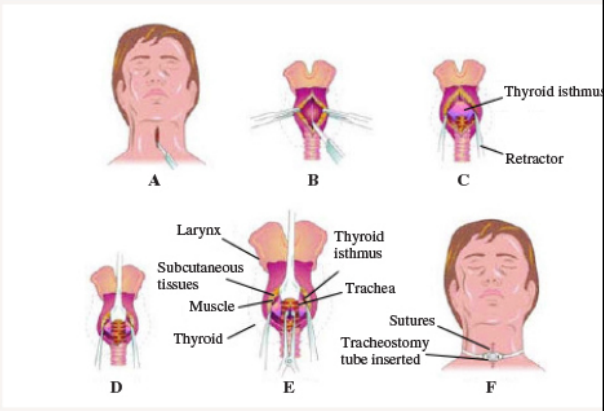
There are no contraindications for tracheostomy, once indicated it should be done since it is a lifesaving procedure.

It is done either as a selective (to prevent deterioration) or emergent procedure.

Tracheostomy

- Skin incision.
- Separation of Strap ms.
- Division of Thyroid isthmus.
- Incision of trachea.
- Insertion of tracheostomy tube.
- Fixation of tube.

FIGURE 5: THE SURGICAL PROCEDURE ITSELF



A: Longitudinal Incision
B: Retraction of tissue to expose thyroid
C: Retraction of tissue to expose thyroid
D: Retraction of thyroid to expose trachea
E: Opening the trachea between the 2nd and 3rd ring of tracheal cartilage (anterior segment)
F: Tracheostomy tube inserted

Courtesy of YourSurgery.com.

Advantages

- Reduces patient discomfort
- Reduces need for sedation
- Ability to maintain oral and bronchial hygiene
- Reduces risk of laryngotracheal trauma, and
- Reduces dead space and work of breathing

Complications

- Immediate complications
- Early complications
- Late complications

Immediate complications

- Apnea due to loss of hypoxic respiratory drive
- Bleeding (usually from thyroid vessels)
- Pneumothorax or pneumomediastinum
- Injury to adjacent structures
- Postobstructive pulmonary edema

Early complications

- Early bleeding Anterior Jugular V. in Midline Superior, Inferior Thyroid A. and Superior, Middle, Inferior Thyroid V. often injured during retraction
- Perichondritis and subglottic stenosis
- Subcutaneous emphysema
- Plugging with mucus (The use of dual cannula tubes lessens this as a threat)
- Displacement
- Atelectasis
- Tracheitis
- Cellulitis

Late complications

- Bleeding(after 48 hours which suggest tracheoinnominate fistula)
- Tracheomalacia(caused by a tube that fits poorly)
- Stenosis
- Tracheoesophageal fistula
- Granulation
- Scarring
- Failure to decannulate

Thank you