Stridor and Hoarseness of voice

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- Emily Turner, a 3-year-old girl, presents with a barking cough and difficulty breathing. She had a mild cold with a runny nose and low-grade fever (100.4°F) for the past two days. On Day 3, her cough worsened to a characteristic barking sound, especially when she cried or laughed, and she developed stridor (a high-pitched noise while breathing). Her mother noticed labored breathing, with chest retractions visible, and Emily was struggling more than usual, particularly at night. Concerned, Mrs. Turner brought Emily to the pediatrician on Day 4
- Liam Harris, a 4-year-old boy, presents to the emergency room with difficulty swallowing, drooling, and severe sore throat. His mother reports that for the past 24 hours, Liam has had a high fever (102°F) and complained of a sore throat, but his symptoms rapidly worsened overnight. By the time they arrived at the hospital, Liam was visibly distressed, had trouble swallowing, and was drooling excessively. He refused to speak and was sitting in a forward-leaning position, drooling from his mouth.

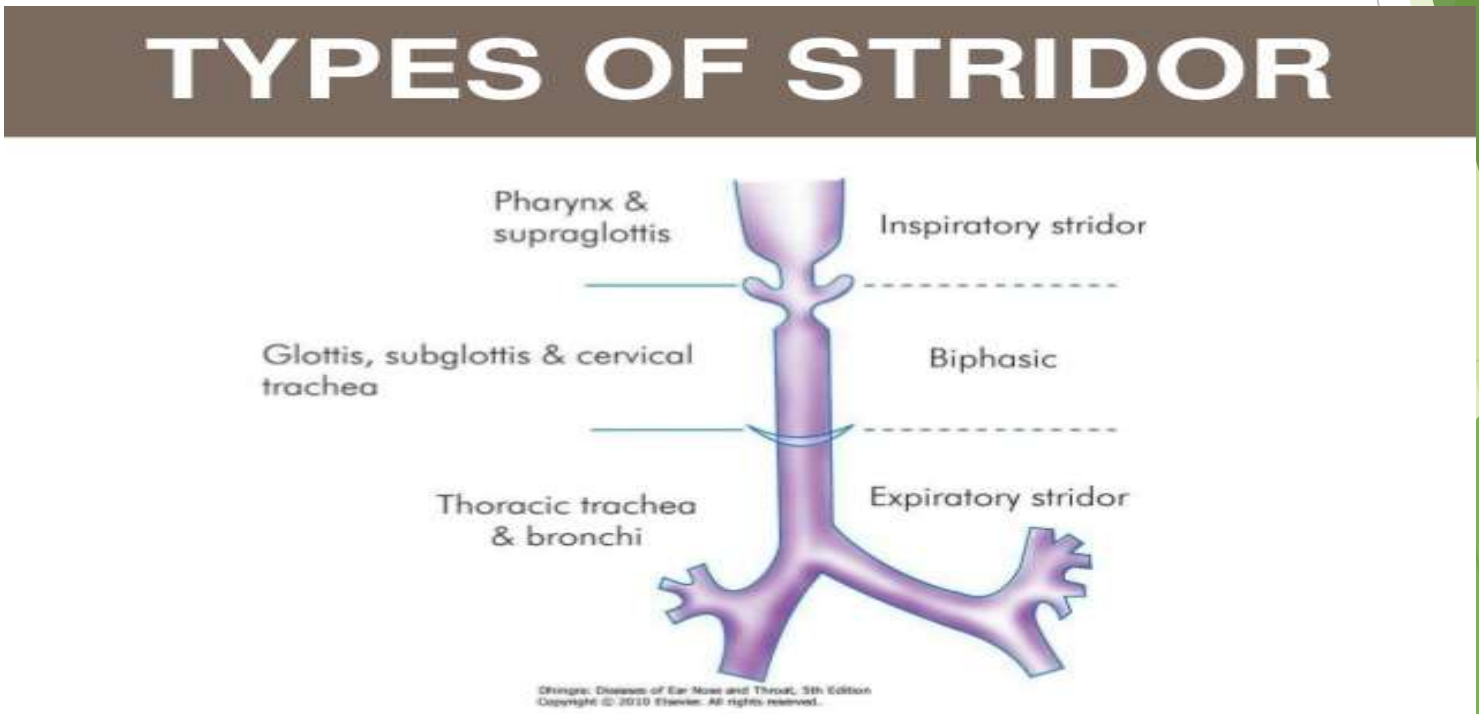
INTRODUCTION

- **Stridor** is an abnormal, high-pitched sound produced by turbulent airflow through a partially obstructed airway at the level of the supraglottis, glottis, subglottis, or trachea.
- Any obstruction above those levels will cause a **stertor** sound and obstruction at the level of the bronchi or below will cause a **wheeze.**

- Stridor **is a symptom, not a diagnosis** or a disease, and the underlying cause must be determined.

Stridor may be inspiratory (most common), expiratory, or biphasic. Each suggest different causes, as follows:

- **Inspiratory stridor:** supraglottic obstruction
- **Expiratory stridor**: implies tracheobronchial obstruction
- **Biphasic stridor:** suggests a subglottic or glottic anomaly.
- Stridor is mainly classified to **acute** and **chronic** according to the onset and severity of the stridor



CLINICAL PRESENTATION

History

- The most common presenting symptom is loud, raspy, noisy breathing.
- Age of onset, duration, severity, and progression of the Stridor.
- Precipitating events (eg. crying or feeding)
- Positioning (eg. prone, supine, or sitting)
- Presence of aphonia.
- Other associated symptoms (eg. paroxysms of cough, aspiration, difficulty in feeding, drooling, or sleep-disordered breathing)
- history of color change (cyanosis)

Examination

- On initial presentation, especially if the symptoms are of acute onset, the child should immediately be assessed for severity of stridor and respiratory compromise. Special attention should be paid to the following:

- Heart and respiratory rates
- Pulse oximetry , O2 sat.
- Cyanosis
- Use of accessory muscles of respiration
- Nasal flaring
- Level of consciousness
- Responsiveness

- The patient may prefer certain positions that alleviate the stridor.
- It is important to observe the character of the cough, cry, and voice.
- The presence of fever and toxicity generally implies serious bacterial infections.
- **Note**: Any form of airway examination should be avoided in cases of suspected epiglottitis or croup, as can predispose to sudden airway closure

INVESTIGATIONS

- On initial evaluation, pulse oximetry may be useful to determine the extent and severity of the stridor and respiratory compromise.

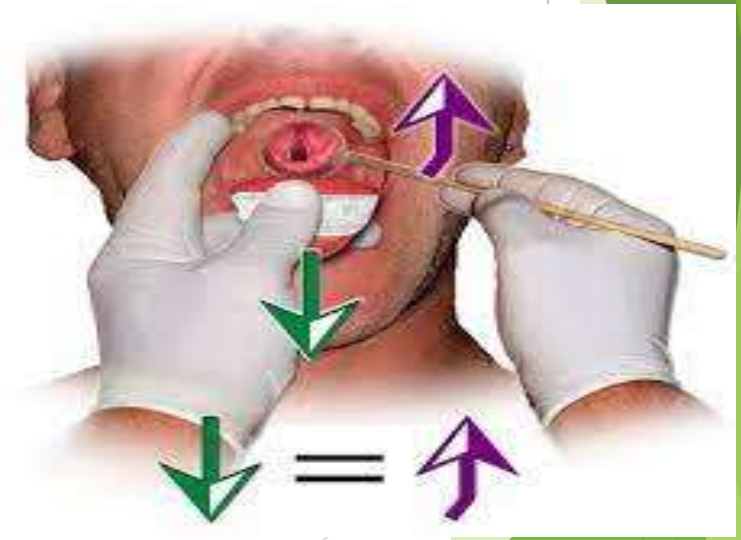
Fiber-optic nasal endoscopy

A quick and minimally invasive method to differentiate where the pathology lies.

- Note: Fiber-optic nasal endoscopy is contraindicated in patient suspected of croup or epiglottitis.

Laryngeal mirror

- indirect laryngoscopy
  - for local laryngeal causes

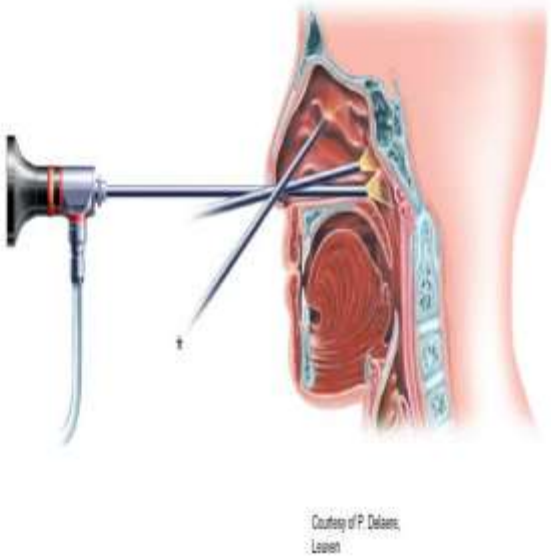


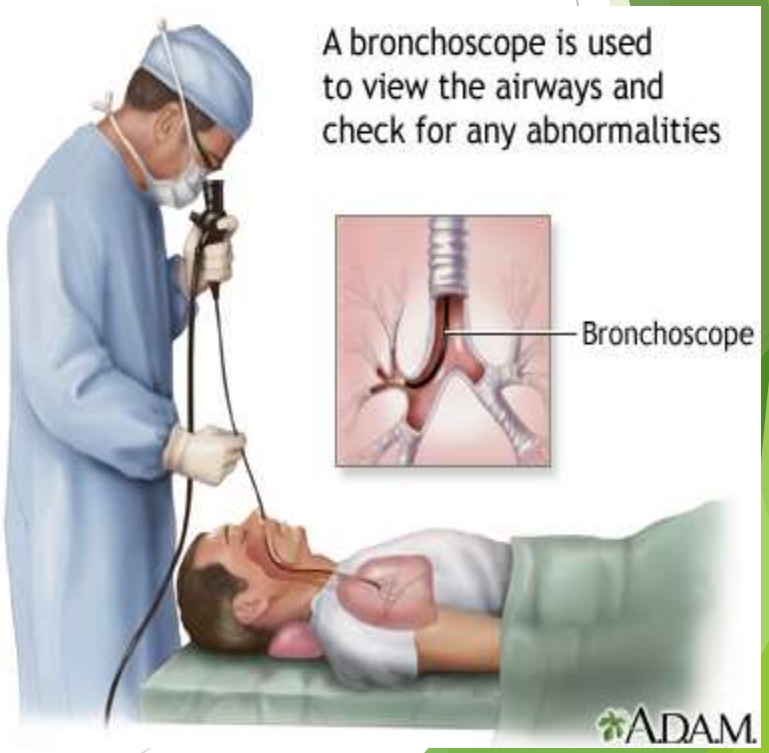
- **CT Scan**

Used in the case of abscess or malignancy.

- **Bronchoscopy**

Bronchoscopy can be used if visualization below the vocal cords is warranted, such as suspected subglottic stenosis.





Investigation cont.

- Triple endoscopy :
  endoscopic evaluation of the pharynx, larynx, esophagus, trachea, and bronchi .
  Usually in malignancy .

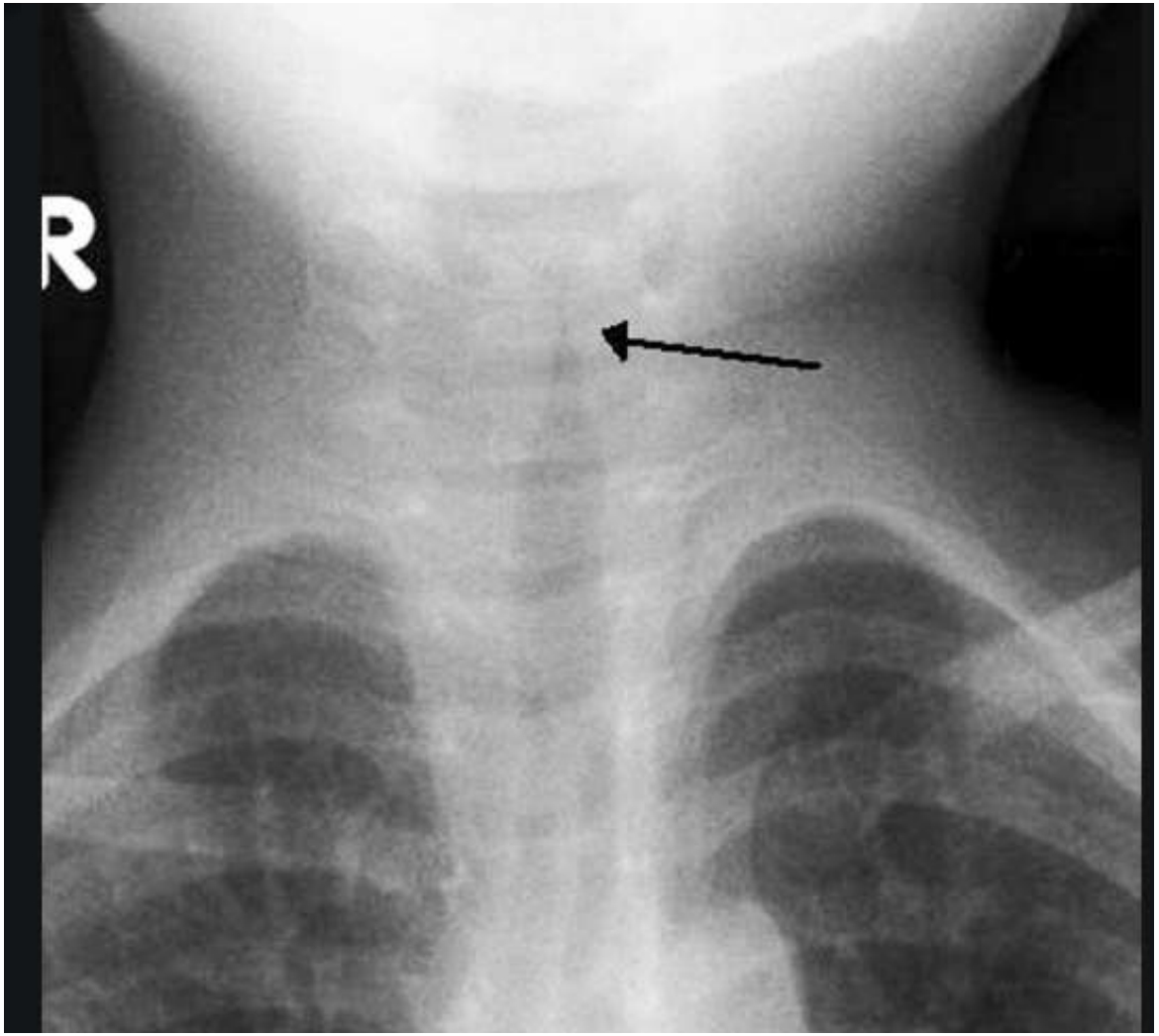
  - Direct laryngoscopy
  - Bronchoscopy
  - esophagoscopy
    then biopsy .

ACUTE STRIDOR

Laryngotracheobronchitis (Croup)
Epiglottitis
Foreign body inhalation
Anaphylaxis
Neck space abscess
Laryngitis

LARYNGOTRACHEOBRONCHITIS (CROUP)

- Laryngotracheobronchitis (also known as croup) is inflammation of the larynx, trachea, and bronchus, including the vocal cords.
- Croup is the most common cause of acute stridor in children aged 6 months to 2 years.
- The cause of croup in 95% of cases is viral infection, common organisms including parainfluenza, influenza and rhinovirus
- It is typically preceded by an upper respiratory infection, before developing into dyspnoea and a characteristic **barking cough**, with potential fever. Symptoms are usually worse at night.
- Most cases do not require any investigations and can be made as a clinical diagnosis.



The steeple sign is a radiologic sign found on an AP neck radiograph where subglottic tracheal narrowing produces the shape of a church steeple within the trachea itself

Management

- all children with croup should receive single dose of **oral dexamethasone** (0.15mg/kg) to reduce the inflammation and symptoms.
- Pain and fever can be controlled with **paracetamol** and **ibuprofen**, as needed.

In the presence of any of the following signs, hospital admission should be considered:

- Known structural upper airway obstruction, a history of severe croup, or immunocompromise
- Uncertain diagnosis
- An unwell child with inadequate oral intake
- Less than 6 months old

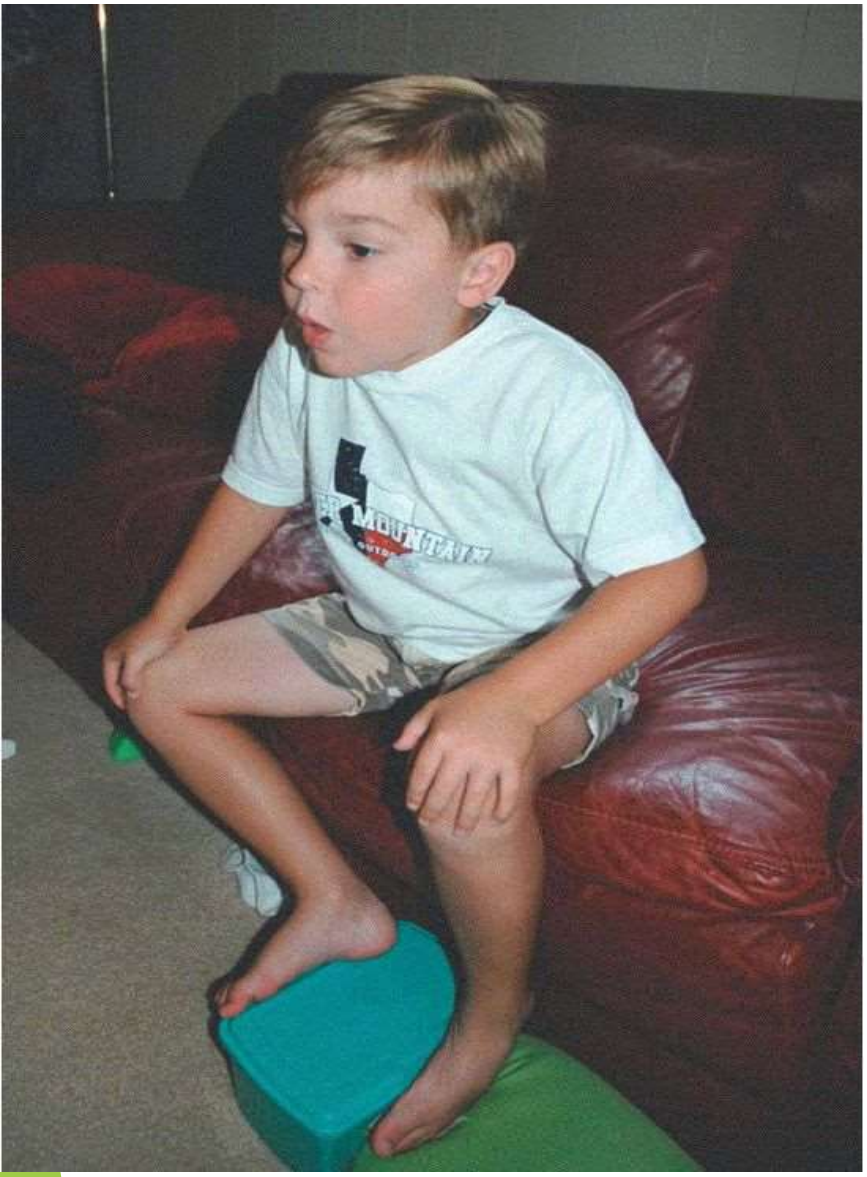
In hospital, **inhaled corticosteroids** can be given, alongside **nebulised adrenaline(rapid effect)**, to decrease airway inflammation. In severe cases, intubation may be warranted

EPIGLOTTITIS

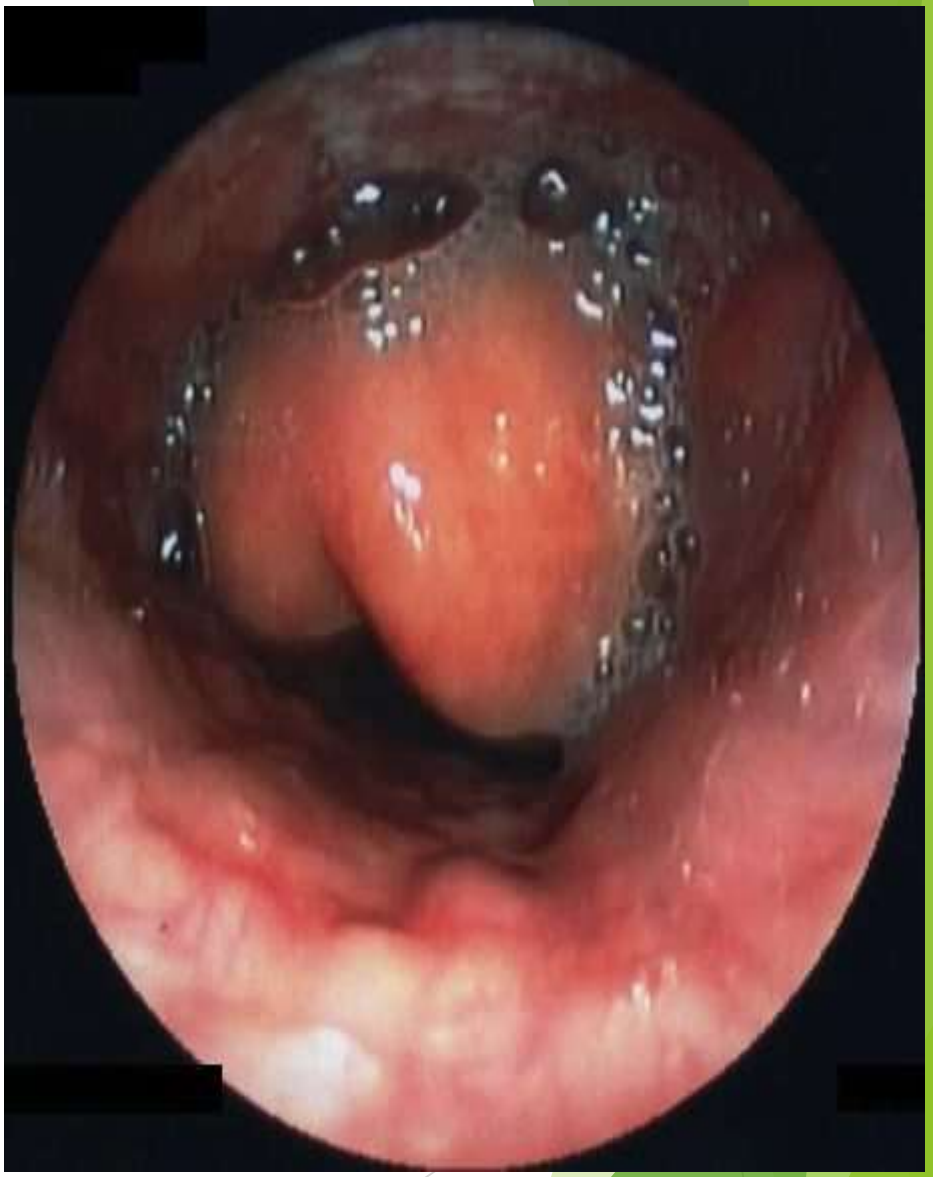
- Most commonly caused by **H. Influenzae type B infections.**
- Typically affects **children between 2-7 years.**
- Patients will initially present with a **sore throat**, a **fever**, and **dyspnoea**, characteristically in the **absence of a cough**. Late signs of the condition if left untreated include drooling, dysphagia, and stridor.
- Hot potato voice ("**Hot potato voice**" (HPV) is a thick, muffled voice)
- The patient will **look unwell** and is classically seen, in late stages on the disease, sitting in the **tripod position** (to allow gravity to assist in keeping the airway open).

INVESTIGATIONS AND MANAGEMENT

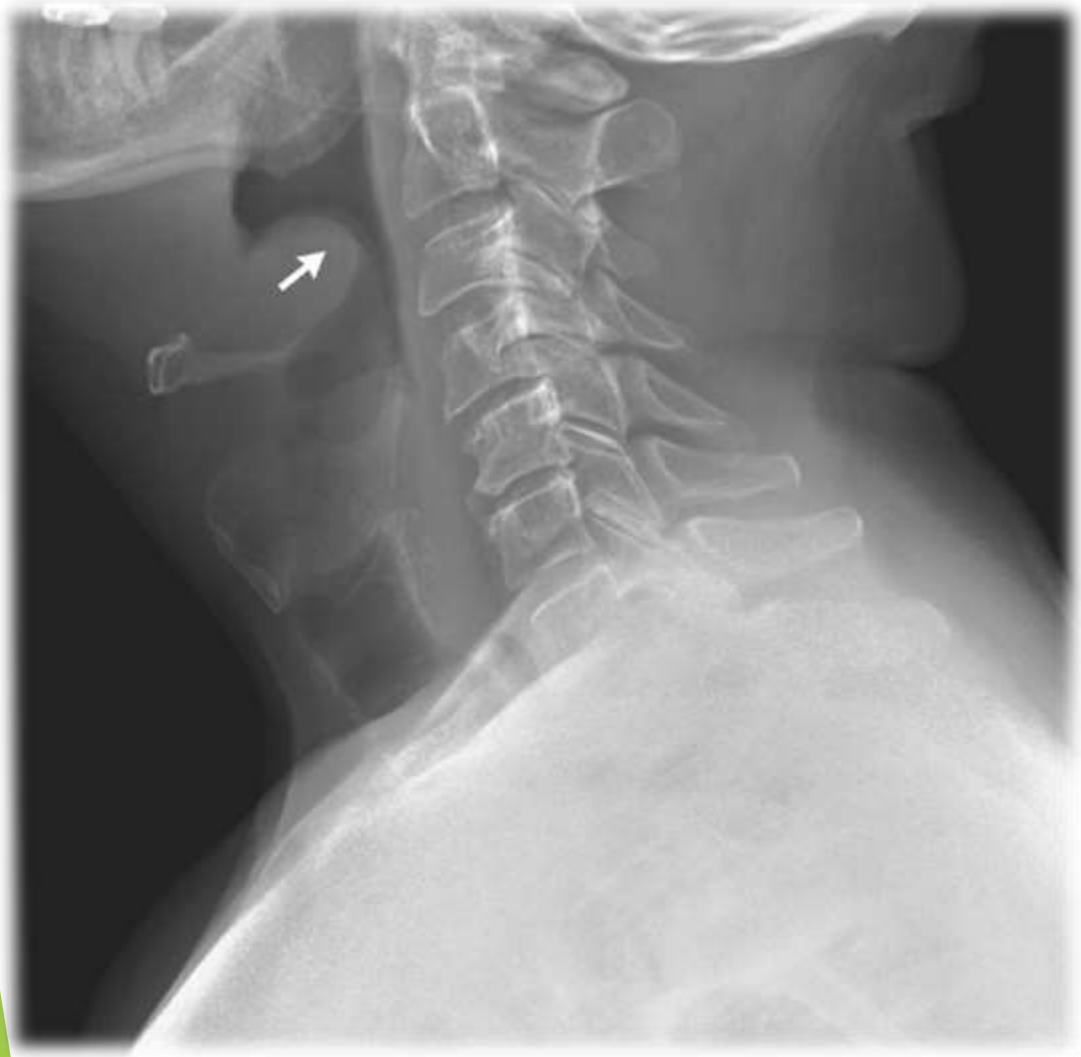
- All cases of epiglottitis need urgent assessment by **senior anesthetist or ENT surgeon**, in a HDU or ICU setting (the airway should not be examined without such support due to the high risk of airway narrowing).
- **Nebulised adrenaline** and **IV dexamethasone** should be started in all suspected cases.
- **Blood and throat cultures** should be taken and **IV broad-spectrum antibiotics** (2nd 3th generations cephalosporins if allergy macrolides) should be given, alongside **analgesia and IV fluids.**



Tripod position



Epiglottitis



The thumb sign in epiglottitis is a manifestation of an edematous and enlarged epiglottis which is seen on lateral soft-tissue radiograph of the neck, and it suggests a diagnosis of acute infectious epiglottitis.

MANAGEMENT OF ACUTE STRIDOR

For acute causes that require urgent management, initial steps should involve:

- **Stabilize the patient**, start **high-flow oxygen**, and **alert suitable senior specialists** (ENT and / or anesthetist)
- Try to **suction secretions** or clear any foreign body from airway if obvious or visible
- Give **adrenaline** or **steroids** (IV or inhaled), as necessary
- Take **bloods**, including an ABG or cultures if indicated
- In emergency situations, be prepared to perform or assist with an emergency tracheostomy or intubation

CHRONIC STRIDOR

Laryngomalacia
Subglottic stenosis
Vocal cord paralysis
Subglottic haemangioma
Macroglossia or micrognathia
Malignancy

- Sophia Johnson, a 6-week-old infant, is brought to her pediatrician by her parents who are concerned about her noisy breathing. They report that Sophia has been making a high-pitched, wheezing sound, particularly when she is feeding or lying on her back. This noise, which they describe as a "stridor," has been present since birth but seems to have worsened over the past week. Her parents also notice that she is feeding well and gaining weight, but they are worried because the sound is becoming more pronounced.

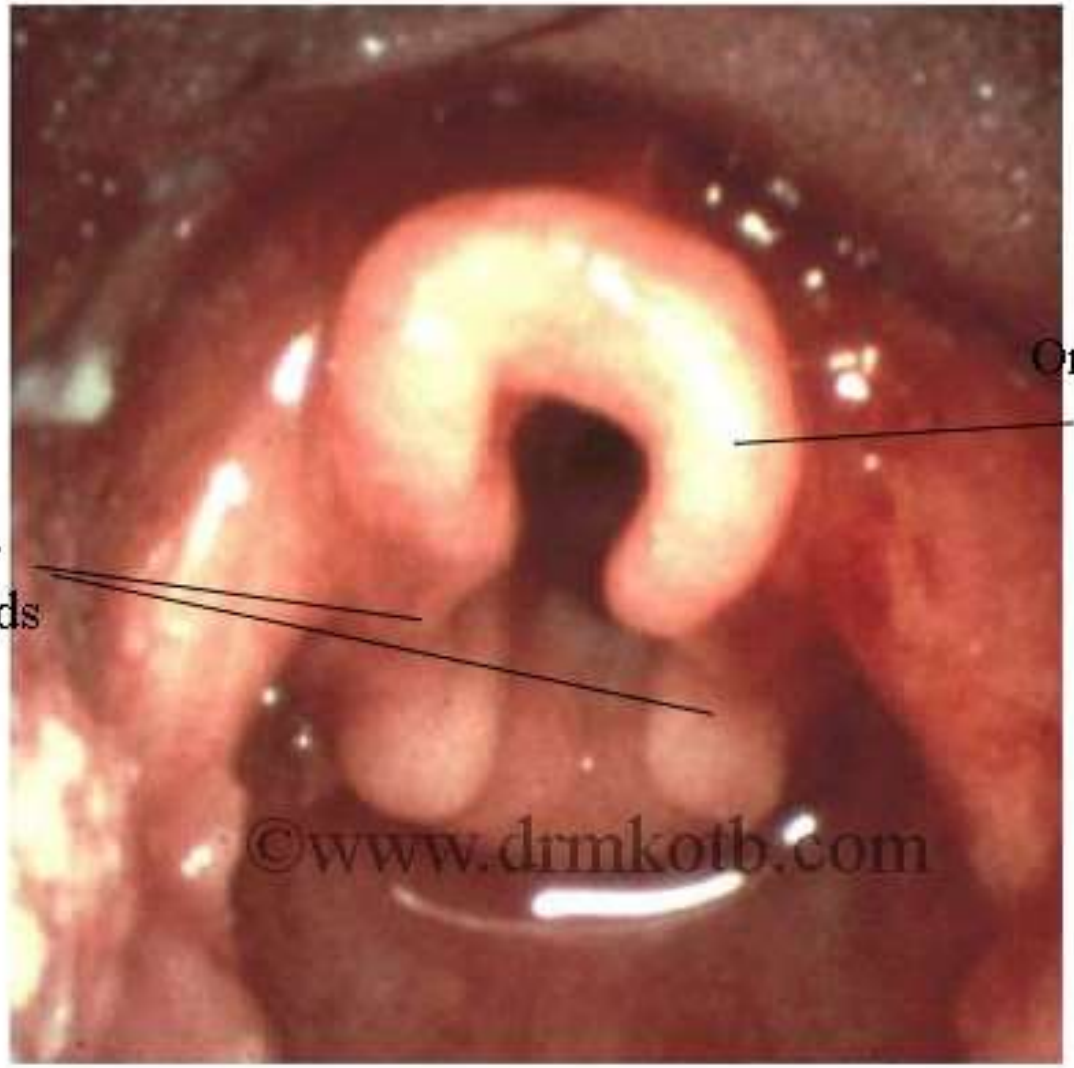
- David Miller, a 35-year-old man, presents to the ENT clinic with complaints of a hoarse voice that has persisted for the past two months. He reports that his voice sounds raspy, and he has difficulty projecting it, especially during his work as a teacher. He mentions that he has had a mild sore throat on and off but has not experienced any pain or difficulty swallowing. He denies any recent respiratory infections or smoking history. However, he acknowledges that he frequently raises his voice and speaks for extended periods in the classroom, often without taking breaks.

Laryngomalacia

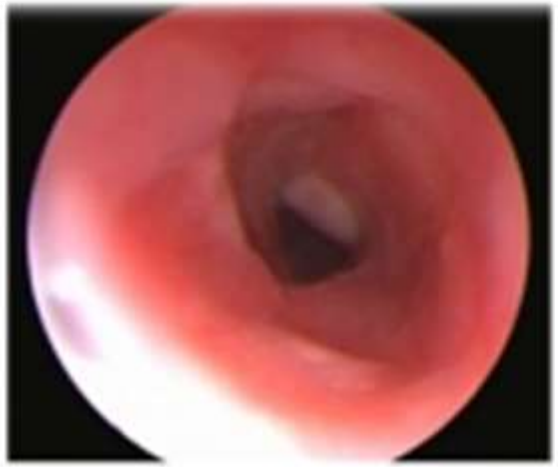
- The most common cause of inspiratory stridor in the neonatal period and early infancy and accounts for as many as 75% of all cases of stridor.
- Stridor may be exacerbated by crying or feeding. Placing the patient in a prone position with the head up alleviates the stridor; a supine position exacerbates the stridor.
- Laryngomalacia is usually benign and self-limiting and improves as the child reaches age 2 year. In cases where significant obstruction or lack of weight gain is present, surgical correction or supraglottoplasty may be considered

Subglottic stenosis

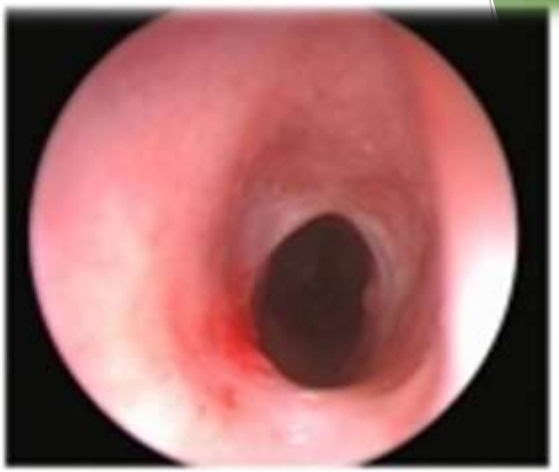
- *Most commonly seen secondary to prolonged intubation.*



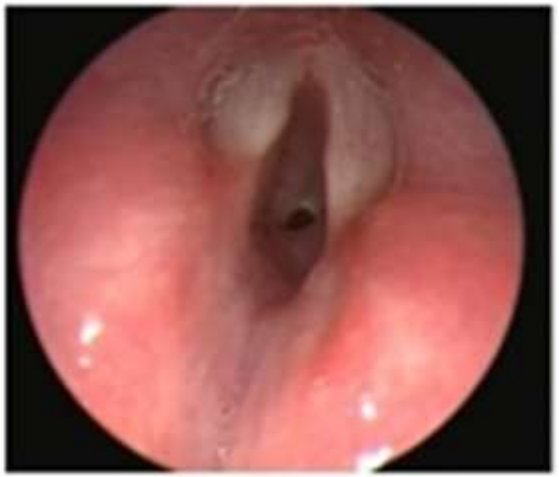
Laryngomalacia



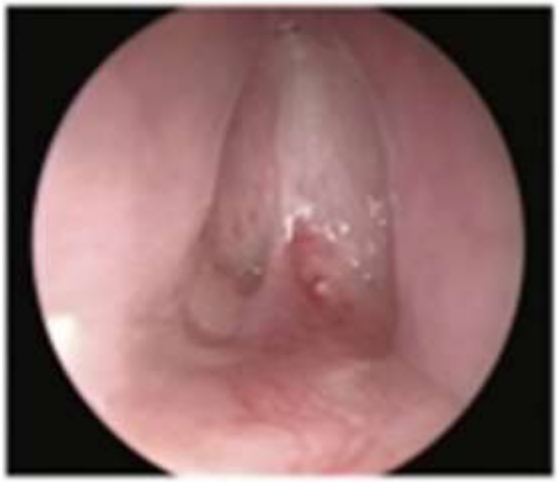
Grade 1
Stenosis 0-50%



Grade 2
Stenosis 51-70%



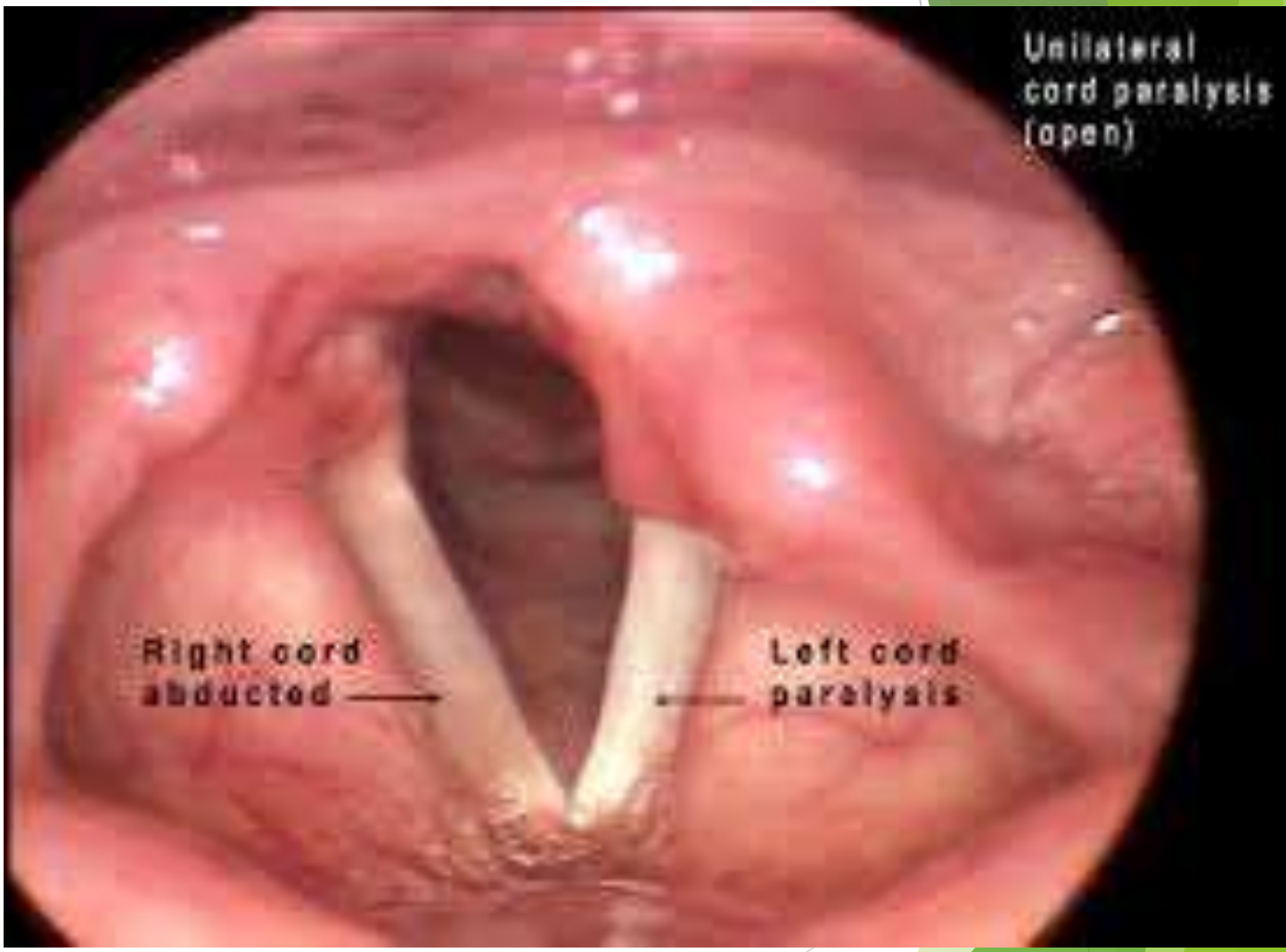
Grade 3
Stenosis 71-99%



Grade 4
Stenosis 100%

Vocal cord dysfunction

- Probably the second most common cause of stridor in infants. Unilateral vocal cord paralysis can be either congenital or secondary to birth or surgical trauma (eg, from cardiothoracic procedures, thyroid surgery).
- Patients with a unilateral vocal cord 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 and a high-pitched biphasic stridor that may progress to severe respiratory distress.


Unilateral
cord paralysis
(open)
Right cord
abducted
Left cord
paralysis

MANAGEMENT OF CHRONIC STRIDOR

- For non-emergency or chronic cases, visualisation of the upper airway will normally be done via fibreoptic nasal endoscopy.
- Further imaging studies, such as CT scanning, can be used in the case of abscess or malignancy, whilst bronchoscopy can be used if visualisation below the vocal cords is warranted, such as suspected subglottic stenosis.
- **Definitive management steps** will then vary between the underlying causes.

HOARSENESS OF VOICE

- A **hoarse voice** refers to a weak or altered voice. It is a relatively common presentation, and can represent a wide range of pathologies.
- Patients with hoarse voice should undergo a full investigation to identify the cause of the symptom and should be treated accordingly.
- Change of voice more than 6 weeks need investigations

INVESTIGATIONS

flexible nasal endoscopy

- Any patient presenting with a hoarse voice should undergo a flexible nasal endoscopy (FNE). FNE allows visualisation of the larynx and the vocal cords

Microlaryngobronchoscopy

- Another procedure that allows for visualize the larynx, vocal cords, and the bronchi. Similar to FNE, however MLB is performed in a theatre setting under general anesthesia.

Stroboscopy

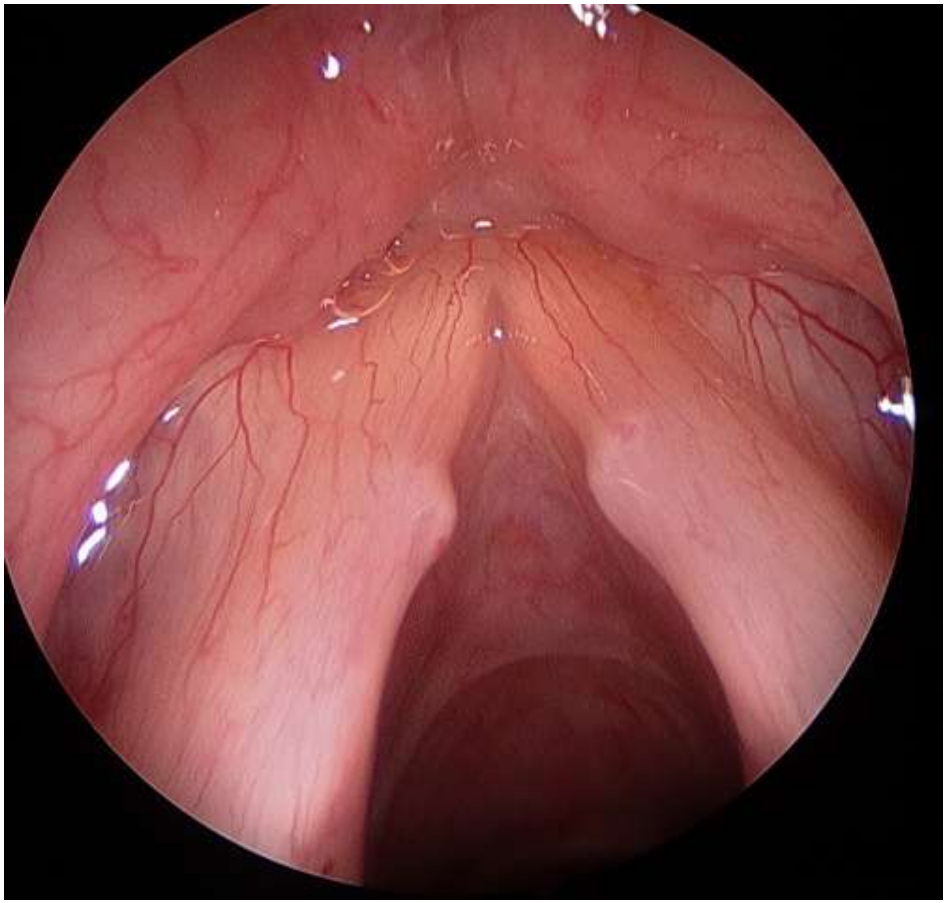
- Used in specialist voice clinics and can be a very useful diagnostic test in vocal cord dysfunction. It involves the use of synchronised flashing lights to make vocal fold movements appear slower, allowing for complete assessment of their movement.

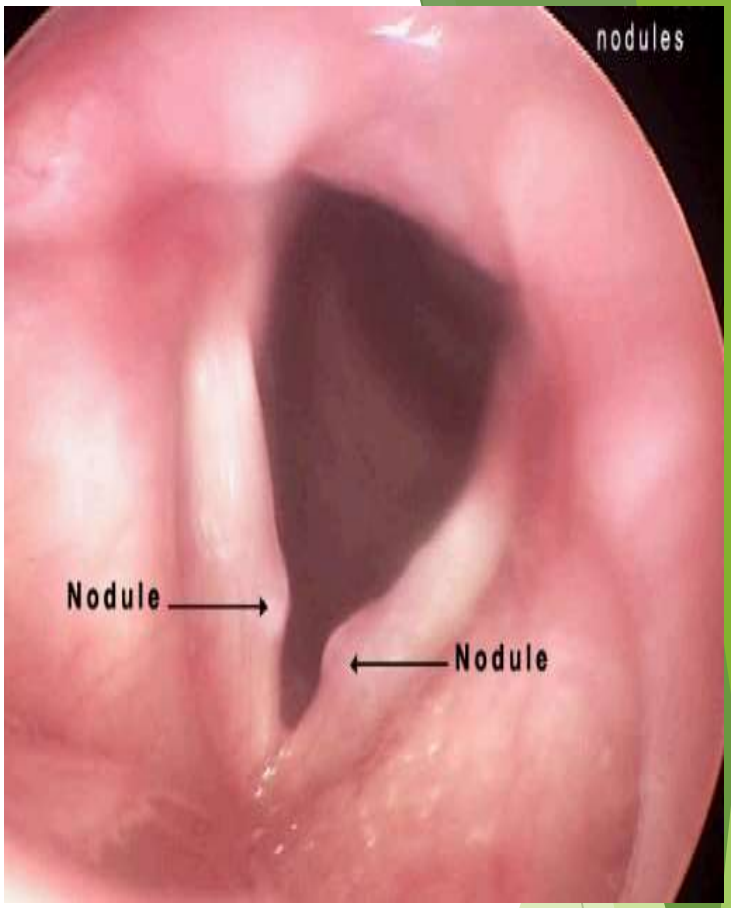
DIFFERENTIAL DIANGOSIS

BENIGN LARYNGEAL CONDITIONS

Vocal cord nodules (singer teacher nodules)

- Commonly secondary to chronic phonotrauma (vocal abuse)They are benign lesions that are frequently bilateral, occurring at the junction of the anterior 1/3rd and posterior2/3rd.
- Management is mainly from the Speech and Language Therapy (SALT) team, however in severe or resistant cases, surgical intervention may be warranted.
- Less than 3 mm and symmtrical





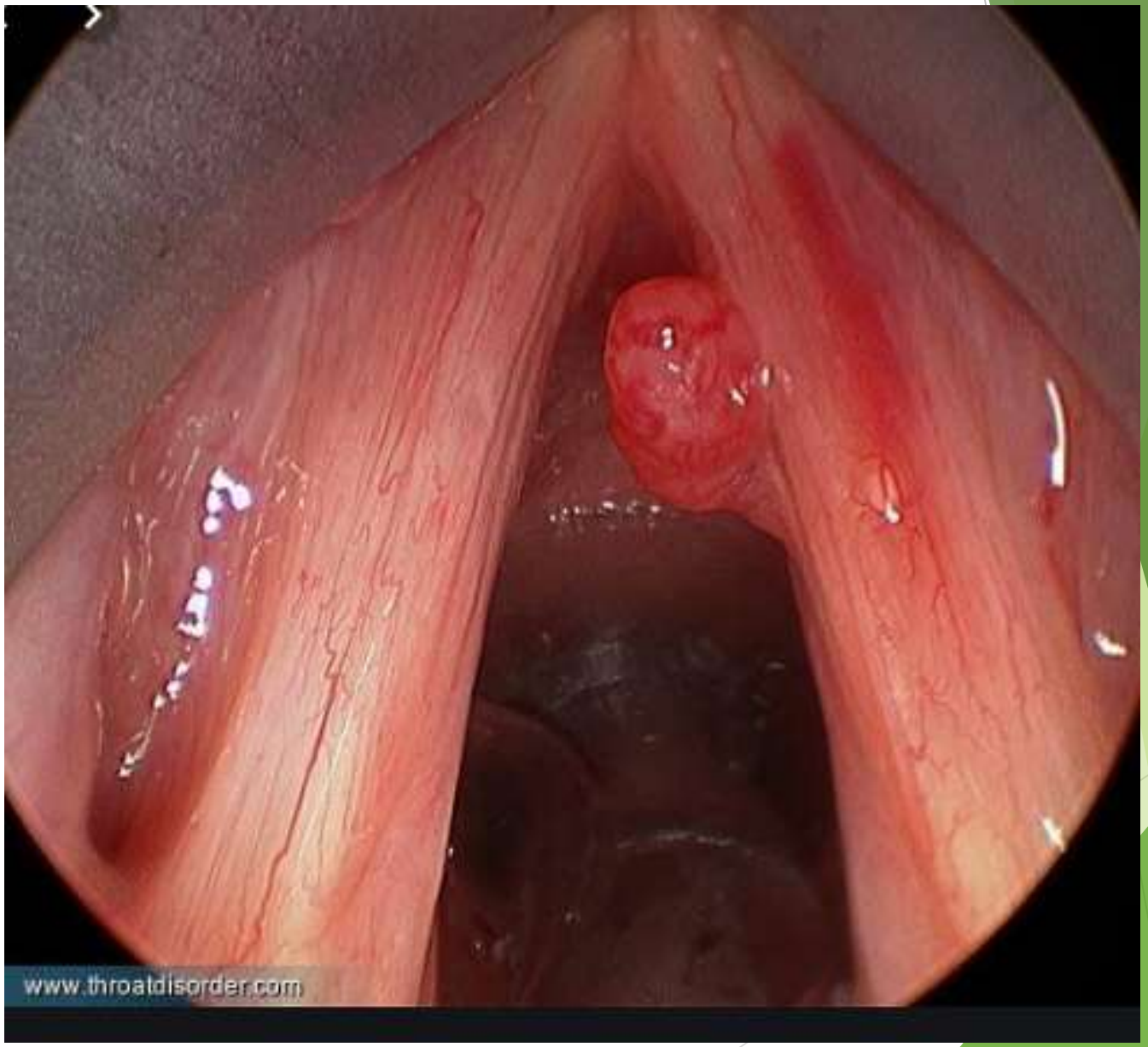
Pathophysiology : abuse (yelling), or misuse (hyperfunction) may produce excessive amounts of mechanical stress by increasing the rate and/or force with which the vocal folds collide. This may lead to trauma that is focalized to the mid-membranous vocal fold and subsequent wound formation.
Repeated or chronic mechanical stress is thought to lead to the remodeling of the superficial layer of the lamina propria.
It is this process of tissue remodeling that results in the formation of benign lesions of the vocal folds such as nodules.

Vocal cord polyps

- Benign lesions
- Differ from nodules in that :

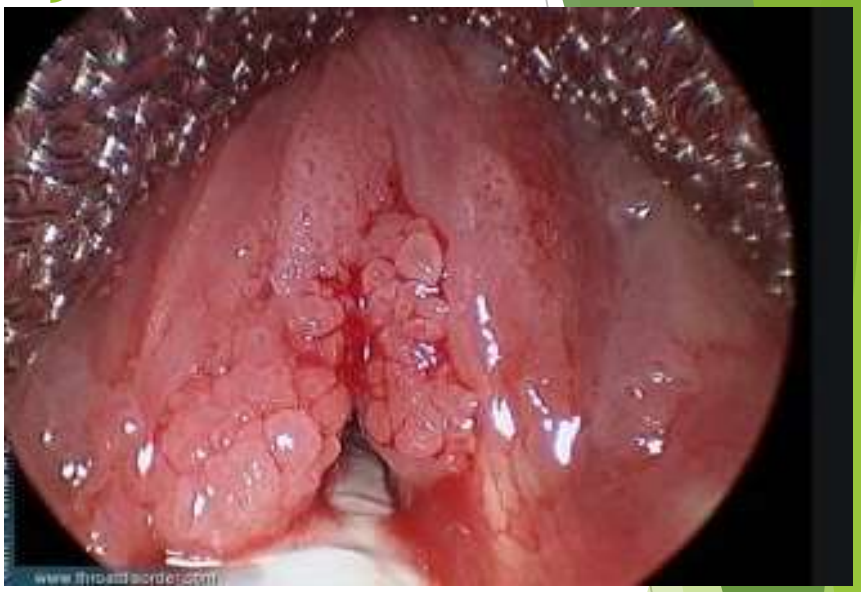
Unilateral, more vascular, usually larger.

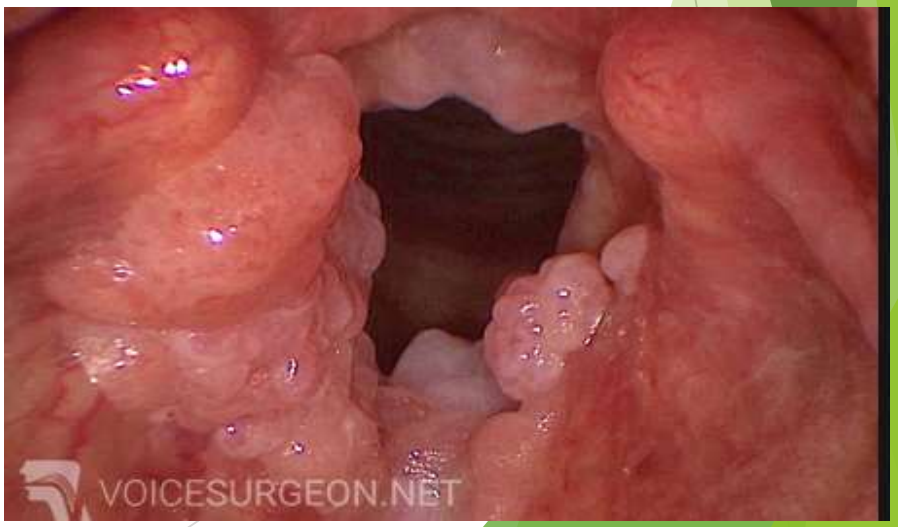
- Vocal abuse, smoking, alcohol use, sinusitis, allergies, and rarely, hypothyroidism.
- may need surgical excision to exclude malignancy.


www.throatdisorder.com

Recurrent respiratory papillomatosis

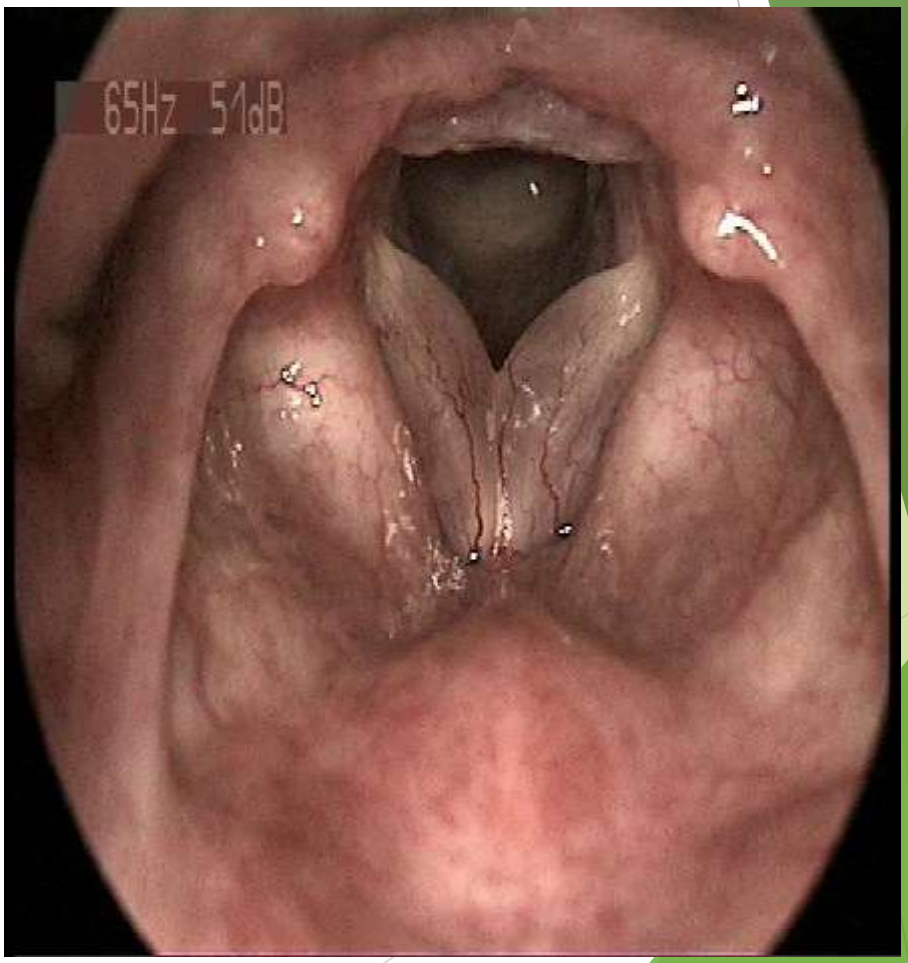
- benign lesions in the larynx, commonly caused by HPV infection. If left untreated, papillomas can grow to cause airway obstruction and hence need surgical excision or debulking. It is common for patients to need repeat procedures as papillomas can recur.

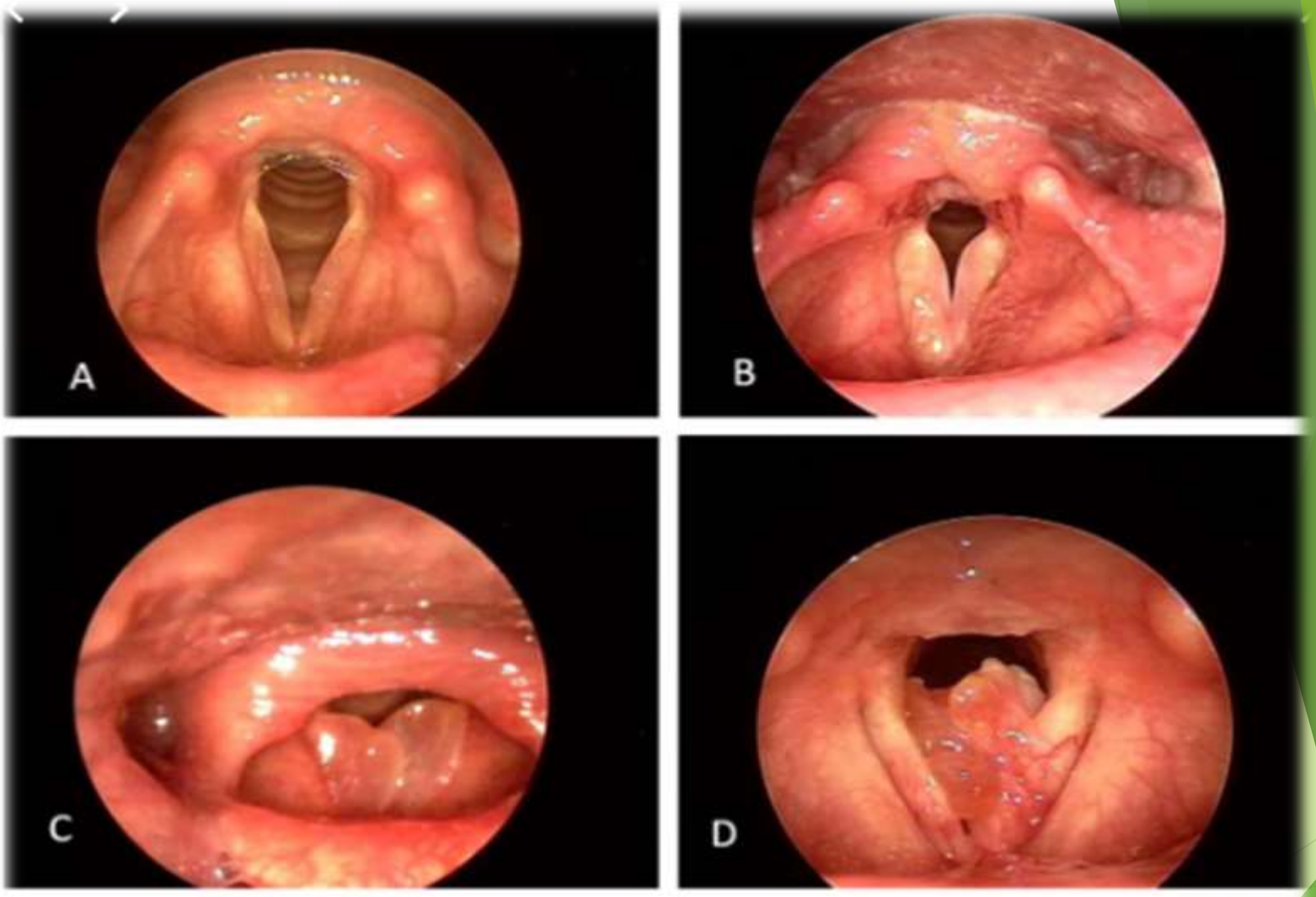




Reinke's edema

- Reinke's edema almost always occurs due to **longstanding smoking.**
- Literature suggests that it may occur secondary to thyroid disease, hormonal change, stomach acid reflux, or voice overuse.
- Reinke's edema does not disappear after smoking cessation, however it may stop growing in size.
- chordectomy



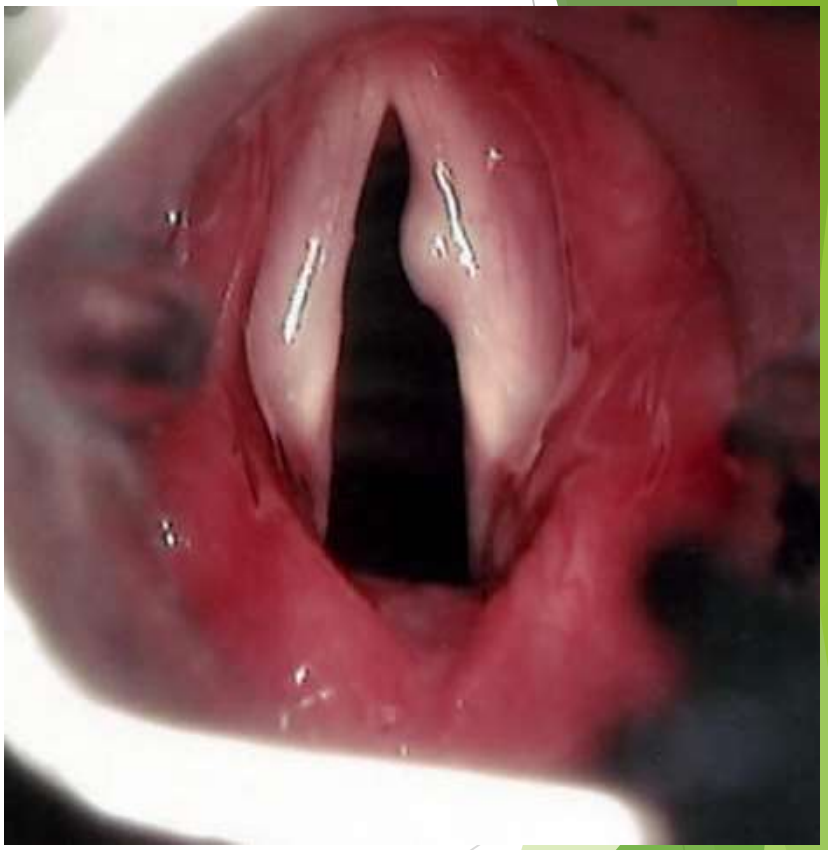


The edema develops by degrees, as a nonspecific reaction of the vocal folds to various irritative noxious agents

Treatment : stop smoking, control reflux, microlaryngoscopic surgery

Vocal fold cysts

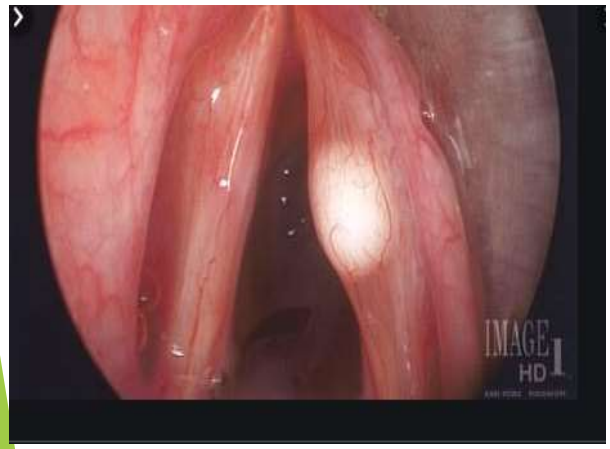
- benign masses of the membranous vocal folds.
- These cysts are enclosed, sac-like structures that are typically of a yellow or white colour and deep.
- They occur unilaterally on the midpoint of the medial edge of the vocal folds
- Initial treatment of the cysts involves voice therapy to reduce harmful vocal behaviours. If symptoms remain after voice therapy, patients may require surgery to remove the cyst. Surgery is typically followed by vocal rest and further voice therapy to improve voice function. Cysts may also be treated using vocal fold steroid injection.

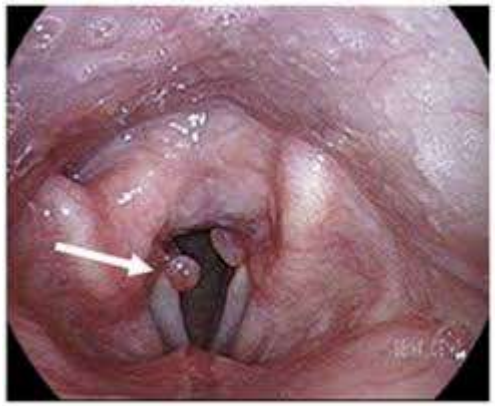


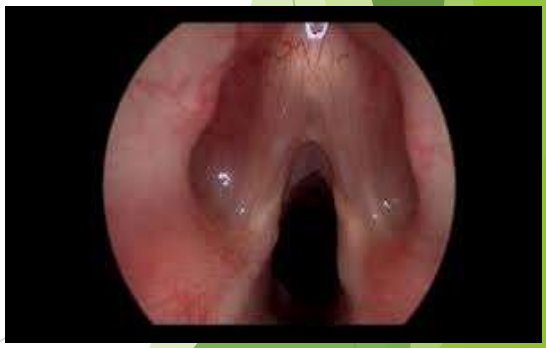
Vocal cord cysts

- There are several possible causes of vocal fold cysts:

1. They can be congenital.
2. They can result from the blockage of a mucous gland's excretory duct. In this case, they are sometimes referred to as retention cysts.
3. They can be the result of phonotrauma







Thank you !