Diseases of larynx I&II

Objectives:

- To know the basic larynx anatomy and physiology.
- To recognize assessment and management of common laryngeal diseases, include ability to obtain patients' history, perform comprehensive physical and mental status assessment, interprets findings.
- To know how to handle common laryngeal emergencies.
- To be aware of common laryngeal operations.

Larynx I:

- anatomy and physiology of the larynx
- gross anatomy , blood and nerve supply
- congenital diseases of the larynx (in brief) (laryngomalacia, web, subglottic stenosis, and hemangioma)
- benign swelling of larynx (Singer's nodule, polyps, granuloma, J. L. papillomatosis)

Larynx II:

- acute and chronic laryngitis
- non-specific laryngitis
- specific laryngitis (acute epiglottitis, croup)
- laryngeal paralysis (unilateral and bilateral)

Resources: Team 435, Slides, team 436 group A

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Larynx I

Case: 35 years old female has dysphonia (Hoarseness)?

What is the meaning of dysphonia or hoarseness?

It could be due to what?

Definitions

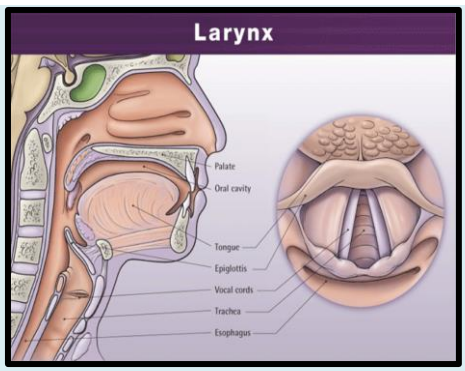
Dysphonia: is a descriptive medical term meaning disorder of voice.

Hoarseness[1]: is a subjective term, and usually refers to a weak or altered voice.

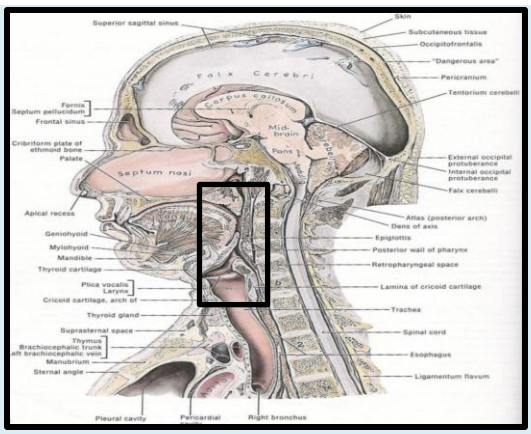
Voice change are: breathy, harsh, tremulous, weak, reduced to a whisper, or vocal fatigue (voice deteriorates with use). **Breathy voice** means that the vocal cords are not completely closed, there is a gap and air escaping. E.g. due to tremors or spasms.

Anatomy:

- The larynx or voice-box is part of the upper respiratory tract.
- It is lined with ciliated columnar epithelium except over the vocal folds or 'cords' which are covered with squamous epithelium.
- It is made of a series of cartilages, the main ones being the epiglottis, the cricoid cartilage (a complete ring just above the trachea) and the thyroid cartilage, which you can palpate as the 'Adam's Apple' externally in the neck.
- Various membranes, muscles and ligaments complete the structure of the larynx.
- The Larynx extends from the epiglottis to the cricoid cartilage.
- The epiglottis is on top behind the Arytenoid cartilages and the hyoid bone.



Larynx is from the epiglottis down to the lower border of cricoid.



[1] Dysphonia and Hoarseness both terms are the same.

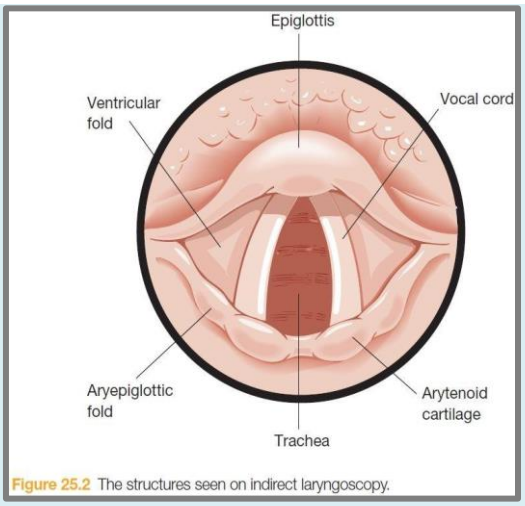


Figure 25.2 The structures seen on indirect laryngoscopy.

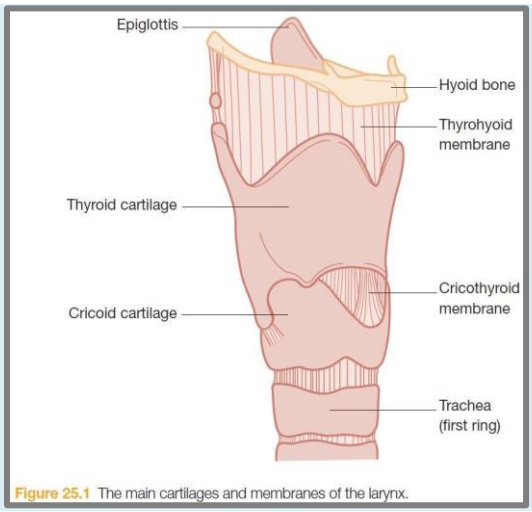


Figure 25.1 The main cartilages and membranes of the larynx.

Skeletomembranous framework of larynx:

- Thyroid cartilage
- Cricoid cartilage
- Paired arytenoids cartilage
- Epiglottis
- Hyoid bone

Thyroid cartilage: It's open, that means it's not the narrowest area in the airway.

- Shield like
- Thyroid cartilage is opened posteriorly.
- In men it is noted as Adam's apple. it's more prominent in men
- It is attached to the cricoid.

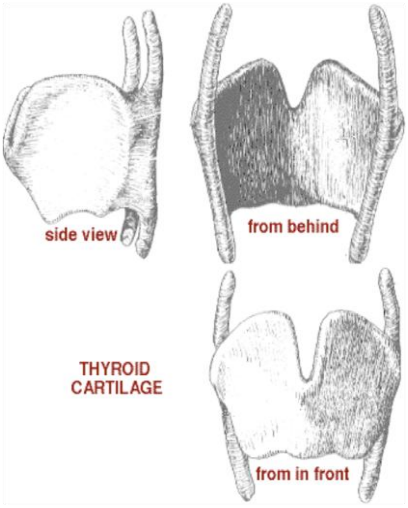
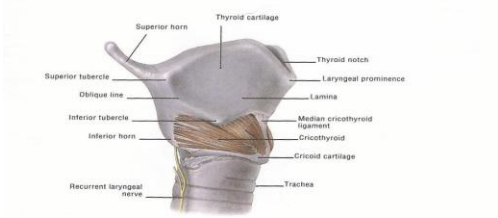


Figure 8-53. Lateral view of the skeleton of the larynx. The larynx extends vertically from the tip of the epiglottis to the inferior border of the cricoid cartilage. The hyoid bone is not part of the larynx.

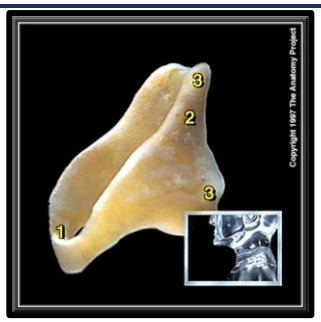


Cricoid cartilage: Cricoid is a complete ring, that means it's the narrowest area in the airway. If there is edema in the sub-epiglottic area at the level of cricoid, there will no space because it's the narrowest.

- Signet ring shaped.
- the only complete skeletal ring for the air way.
- Both thyroid and cricoid cartilage ► hyaline ► calcification
- Cricothyroid joint

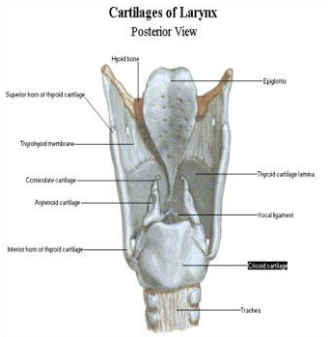
Synovial joint ► hinge motion

- Cricoid Cartilage is the narrowest area where the airway obstruction usually happens because it is a complete ring.
- Thyroid and cricoid might be seen as bones (calcified) in an X-Ray of a 40--year old patient.



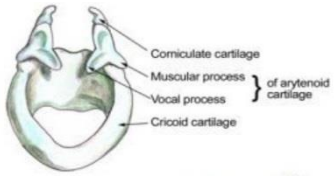
Arytenoid Cartilage: Cricoid cartilage is connected with thyroid cartilage and above the cricoid cartilage there is two paired cartilage which is arytenoid.

- Pyramidal shaped
- Apex, vocal & muscular **process**. Vocal process is where vocal cords attached.
- Cricoarytenoid joint
  - Synovial
  - Rocking motion



Corniculate and cuneiform cartilage: These two cartilages are above the cricoid and have no significant function.

Above the arytenoid cartilage is another small cartilage called corniculate cartilage.

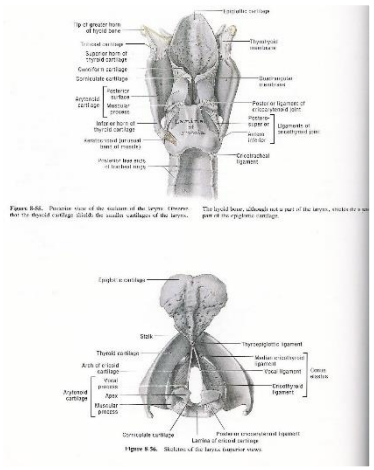


Epiglottic cartilage: Never to be calcified as it's an **elastic**, while the thyroid cartilage may be get calcified with age.

- Leaf like structure
- Elastic cartilage
- Its ligaments and fold:

- Thyroepiglottic ligament
- Hyoepiglottic ligament
- Glossoepiglottic fold ► valleculae[2].

- Epiglottis closed when we swallow and open when we breath. It's attached to the inner part of thyroid cartilage. It also has attachments with the tongue, Thyroepiglottic ligament, Hyoepiglottic ligament and glossoepiglottic.
- The epiglottis on top is attached to the thyroid cartilage midline, inner margin of thyroid, it's an elastic cartilage while swallowing it covers the airway and directs the food to cricopharaynegus.
- Thyroid, cricoid and epiglottis are all single cartilages unlike the others are paired.



[2] Valleculae is the base of the tongue where the tongue is attached to the epiglottis

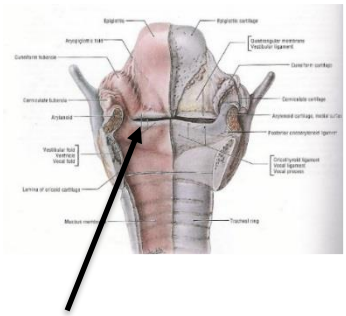
Laryngeal membranes:

- Quadrangular membrane. (Upper membrane)
  - Upper and lower border ►thickened
  - aryepiglottic fold (it goes up covering the epiglottis)
  - Vestibular fold (or ventricular fold inferiorly also called false vocal cord)
- Triangular membrane or conus elasticus. (Lower membrane)
  - Medial and lateral border is free► thickened ►vocal ligament
  - Covers the trachea going up and ends at the level of vocal ligaments or fold.

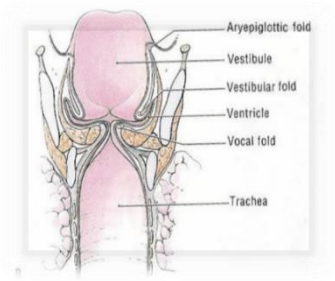
- Between the upper membrane (quadrangular m) and the lower membrane (triangular m) there is a very weak area (in the larynx) which is not covered by any membrane we call it the ventricle or vestibule or saccule.

***** As the upper membrane end at the vestibular fold and the lower membrane end at the two vocal cords, that's mean there is area with NO membrane which is the weakest point in the larynx.

Inner posterior view of larynx



Weakest point

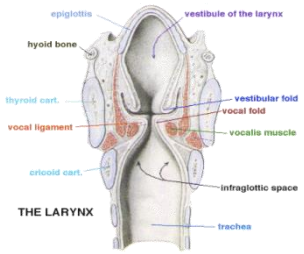


Laryngeal mucosa:

- All mucosa from trachea to aryepiglottic fold ► ciliated **columnar epithelium**.
  - Common tumor is Adenocarcinoma
- Except vocal cord and aryepiglottic fold ► **squamous epithelium**
  - Commonest tumor in larynx is Squamous Cell Epithelium
  - Most common tumor of vocal cords is squamous cell carcinoma

Cavity of larynx:

- We divide the larynx into cavity, the area between the Vocal Cords is Glottis. The area above the Vocal Cords is Supraglottis or Epiglottis. The area below the vocal Cords is Subglottis.

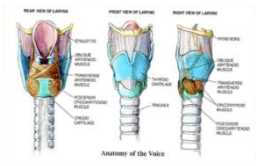


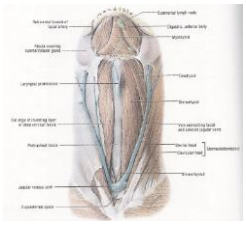
Laryngeal Musculature:

◆ Extrinsic

- **Extrinsic depressors** (C1-C3):
  - Sternohyoid sternothyroid thyrohyoid, omhyoid.
- **Extrensic elevators**:
  - Genohyoid (C1), diagastric (CNV-CNVII) mylohyoid (v) stylohyoid (VII).

- All elevators attachments are above
- Depressors attachments are below to suit their function
- When we swallow, the larynx goes up and down, So the muscles that elevate the larynx up > elevator. The muscles that move the larynx down > depressors.
- These extrinsic muscles have NO role in the movement of vocal cords. Intrinsic

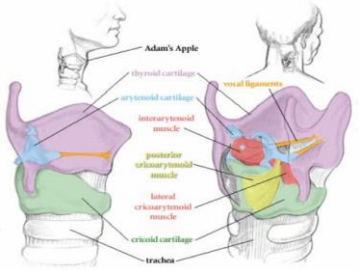


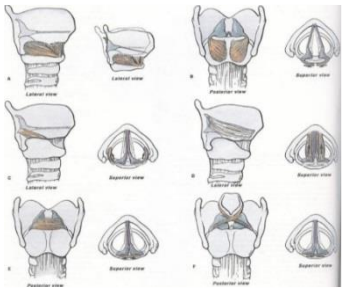


muscles responsible for vocal cords movement.

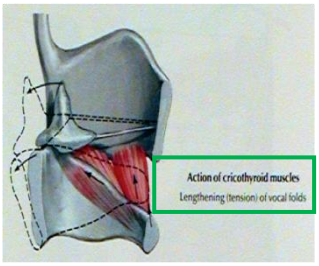
- **Intrinsic**[3]:

- **Abductors**: Only one muscle opens the vocal cords (for breathing).
  - Posterior cricoarytenoid (PCA)
- **Adductors**: four
  - Thyroarytenoid (TA), lateral cricoarytenoid (LCA), cricothyroid, interarytenoid
- Vocal cords have 2 movements:
  - Adductors (4 muscles) are used for speaking, Abductor (1 muscle) used for breathing and located Posteriorly.
  - Cricoidthyroid is an adductor muscle. But mainly it is responsible for the Vocal Cord tension of the vocal cords and supplied by the Superior Laryngeal Nerve (SLN).

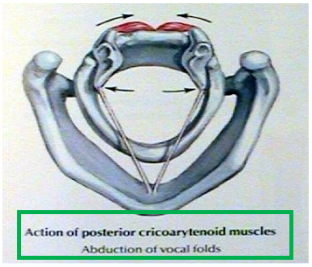




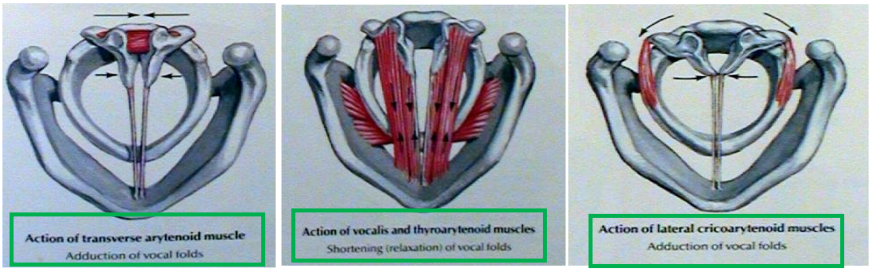
Important pictures ***



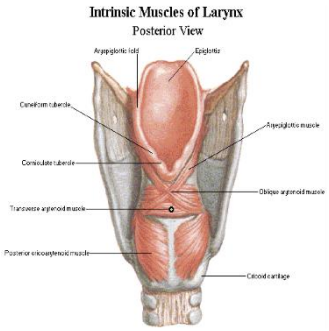
The only muscle that supplied by superior laryngeal nerve.

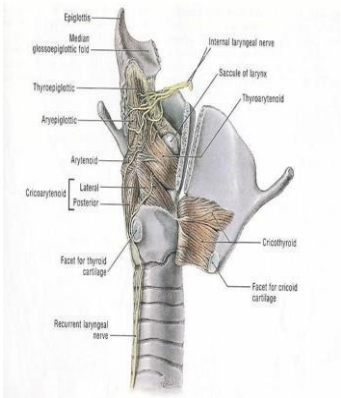


The only abductor muscle (the only muscle that opens vocal cords/the only for breathing).



(transverse or Interarytenoid)





[3] The functions of vocal cords are Adduction (phonation) abduction and Abduction (breathing), which one you think need more muscles?

Histology, Blood Supply, and Nerve supply

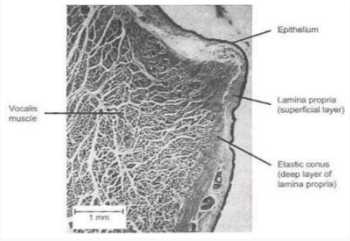
Vocal cord layers:

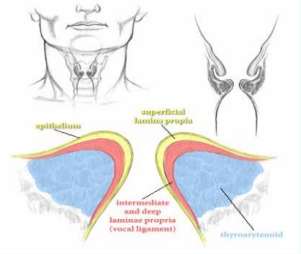
- Histology:
  - Squamous epithelium
  - Lamina propria:
  - Superficial layer Reink's space
  - Intermediate layer.
  - Deep layer.

Intermediate + deep layers = vocal ligament

- Vocalis (thyroarytenoid muscle)

*The two pictures are important





Blood supply:

- Superior and inferior laryngeal artery and veins. The good thing about larynx SC is that it's rarely to be metastasis.

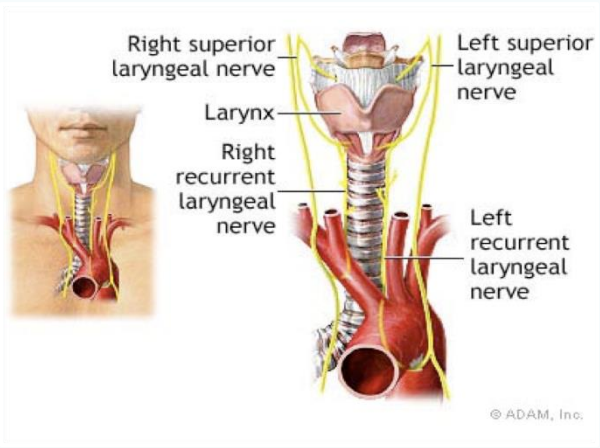
Lymphatic drainage

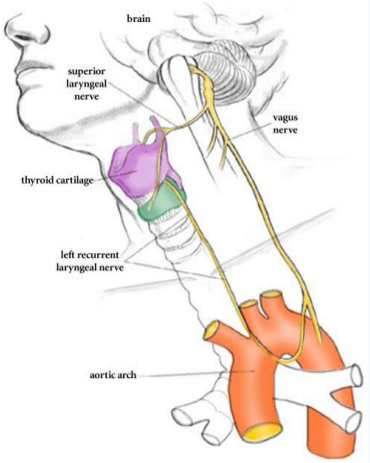
- above vocal cord ► up deep cervical lymph node.
- Below vocal cord lower ►deep cervical node

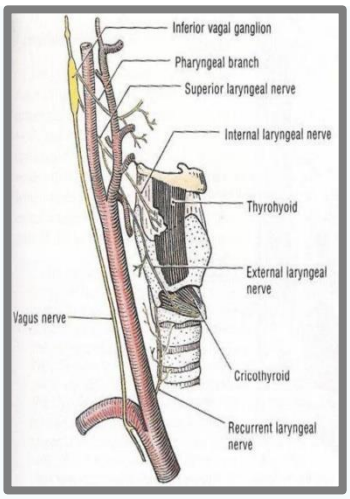
Nerve supply

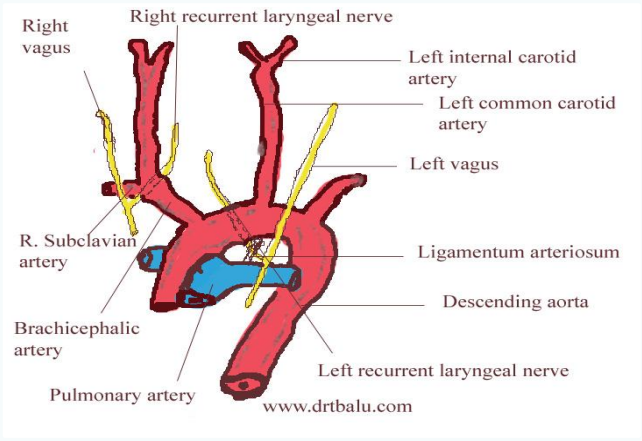
- Superior laryngeal nerve:
  - Internal branch (sensory) + superior laryngeal artery.
  - External branch ► Cricothyroid muscle
- Recurrent laryngeal nerve:
  - RT side: crosses the subclavian artery
  - LT side: arises on the arch of the aorta deep to ligamentum arteriosum
- It is divided behind the cricothyroid joint
  - Motor ► all the intrinsic muscles except?
  - Sensory

Vagus nerve (CN X) gives two branches:
Superior laryngeal > motor: cricothyroid muscle. Sensory: All the sensation above the vocal cords.
Recurrent laryngeal > motor: all muscles, except cricothyroid. Sensory: All sensation below the vocal cords.









For the recurrent laryngeal nerve, it has a pathway different in the right from the left;
In the left it has longer course looping around the arch of **aorta**. While in the right it's just around the **subclavian** artery.
Then it enters the larynx again between the trachea and esophagus.

What's the clinical relevance?

Pt presented with Dysphonia or recurrent laryngeal nerve injury after: patent ductus arteriosus repair, Aortic arch surgery, removal of esophageal cancer; I would recognize from anatomy that's it's due to nerve injury.
Pt underwent Heart surgery > Left Recurrent nerve injury, as a consequence > vocal cord paralysis.

Pediatric airway anatomy:

- The neonates are obligate nasal breathers until 2 months.
- The epiglottis at birth is omega Ώ shaped
- the infants have high larynx C1-C4

Applied physiology of the larynx:

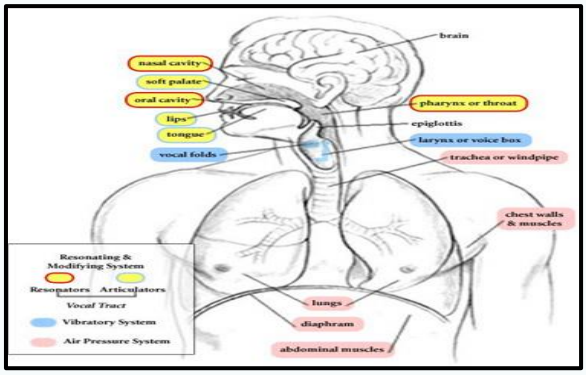
- Protection of the lower air passages (cough reflex)
  - Closure of the laryngeal inlet
  - Closure of the glottis
  - Cessation of respiration
  - Cough reflex (forced expiration is made against a closed larynx).
  - Closure of the airways during swallowing the bolus.
- Phonation
  - Voice is produced by **vibration** of the vocal cord
  - Source of energy is the airflow
  - Normal vocal fold vibration occurs vertically from **inferior to superior**.
  - The mouth, pharynx, nose, chest (**resonating chambers**).
  - We talk during expiration (we take deep breath feel pressure in subglottic area this pressure helps in pushing the air between the vocal cords and start vibrating them).
  - If I have bronchial asthma it means that the amount of air is little, I won't be able to talk for long time because the pressure was so little.

- COPD, Smoker → low air amount → low vocal vibration → dysphonia.

○ Respiration:

- Vocal cord in **abduction** position

Important pic



Voice Mechanism: (Important to be understood)

Speaking involve a voice mechanism that is composed of three subsystems.

- Air pressure system
- Vibratory system
- Resonating system

The "spoken word" result from three components of voice production: Voiced sound, resonance, and articulation.

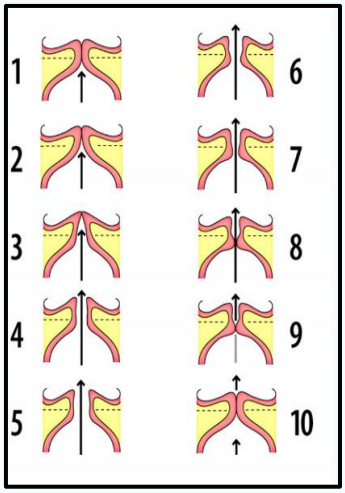
- **Voiced sound**: the basic sound produced by vocal fold vibration "buzzy sound".
- **Resonance**: voiced sound is amplified and modified by the vocal tract resonators (throat, mouth cavity, and nasal passages)
- **Articulation**: the vocal tract articulators (the tongue, soft palate, and lip) modify the voiced sound
- **Vocal folds vibrate** rapidly in sequence of vibratory cycles with a speed of about:
- 110 cycles per second (men)= lower pitch
- 180 to 220 cycles per second (women)=medium pitch
- 300 cycles per second (children)= higher pitch
- Louder voice: increase in amplitude of vocal fold vibration

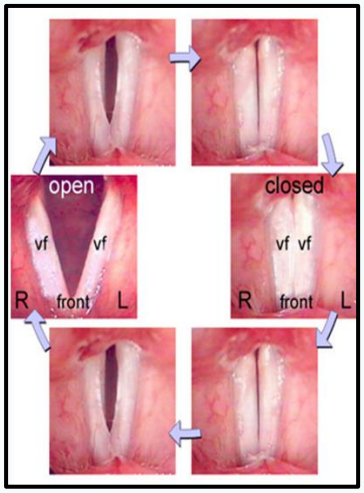
Vocal cord vibration

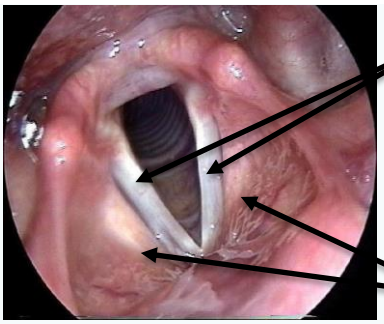
- Bernoulli effect. Air come from down, then the vocal cords open from lower to mid to upper ↓

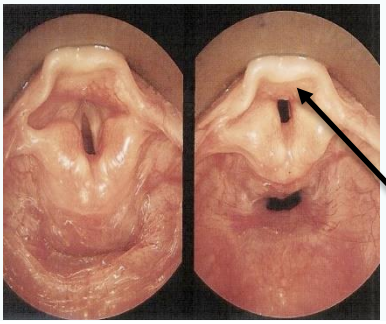
Laryngeal sphincters

- True vocal cord.
- False vocal cord/Ventricular/Vestibular folds.
- Aryepiglottic sphincter.









Evaluation of the dysphonic patient:

History of Dysphonia (hoarseness):

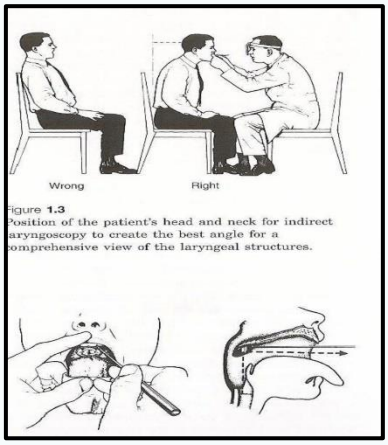
Onset, progression, timing[4], duration, severity, URTI, fever, cough, (voice abuse (job[5]), tobacco or alcohol), dysphagia, aspiration, breathing difficulty, wt lost, GERD, trauma, previous surgery[6] neck mass.

Examination:

- Complete ENT examination
- Laryngeal examination and voice assessments:
- Indirect laryngoscopy (mirror)
- Direct laryngoscope
- Fibreoptic flexible scope
- Stroboscope
- Acoustic analysis
- Cranial nerve
- Neck examination

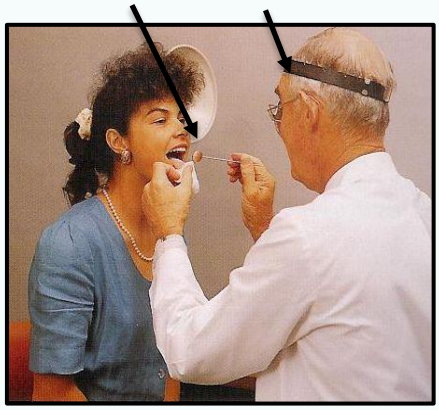
[4] Timing of dysphonia? Morning dysphonia (mainly acidity reflex), end of the day dysphonia (mainly due to voice abuse).
[5] Professional voice abusers: محامي، معلم، خطيب، مؤذن
[6] Type of surgery (injury to nerves); like thyroidectomy or oesophageal or breast cancer removal. Or maybe surgery in the legs but after the pt wake up from anaesthesia he starts to have dysphonia (intubation trauma or injury to larynx).

The Mirror or Indirect laryngoscope



igure 1.3
Position of the patient's head and neck for indirect aryngoscopy to create the best angle for a omprehensive view of the laryngeal structures.

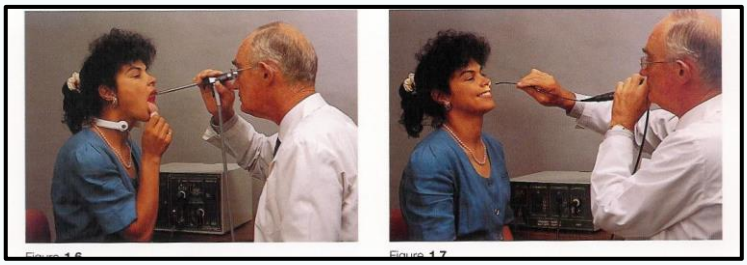
Mirror and source of light

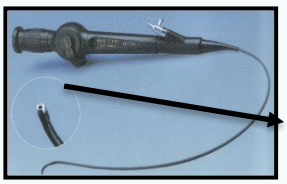


In the past they use this method. Using mirror and source of light. Pt opens his mouth we will see the tongue and tonsils, so they pull the tongue and enter the mirror on the soft palate to visualize the larynx (epiglottis and vocal cords).

Rigid scope

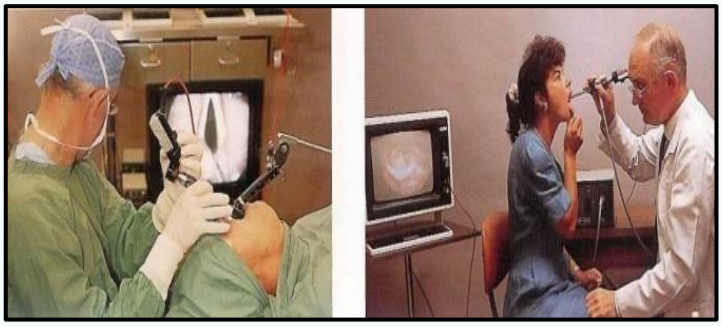
Fiberoptic flexible scope

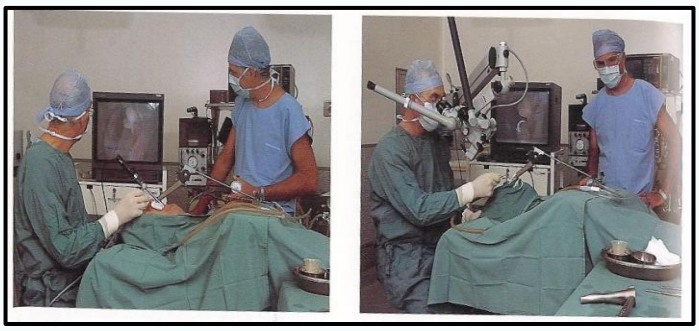




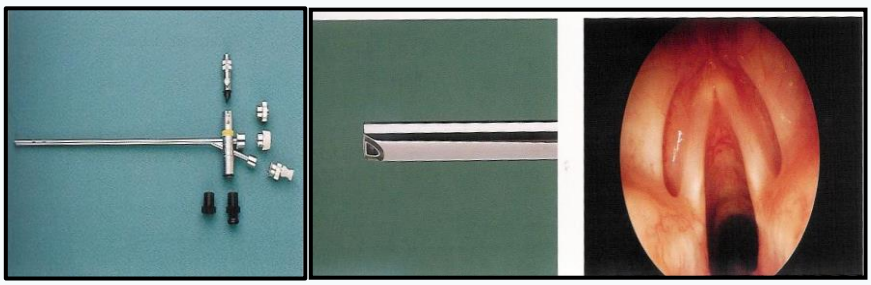
What are the **indications** of Fiberoptic flexible scope?
Examination of the nose, nasopharynx, pharynx and larynx.
By this hole we can pass small needle or forceps to take a biopsy.

The surgery in larynx is called: Micro-laryngoscopy





Rigid Bronchoscope



Laryngoscope

First pic: There are two ports, one for ventilation and one for breathing.
Second pic: Tip of the scope.
It comes in the exams, we ask you What is this instrument?
What are the indications?
• Examination of trachea • Bronchi
• Foreign body removal • Biopsy

Larynx II

Introduction:

Symptoms and signs of laryngeal disease:

- Lesions on or around the vocal cords cause hoarseness.
- Failure of the laryngeal inlet to close on swallowing causes aspiration; the patient will cough and splutter on swallowing – food 'going down the wrong way'.
- The most dangerous laryngeal pathology is narrowing of the airway. This causes reduced air entry and turbulent flow so that the patient makes a high-pitched noise when breathing (stridor).
- Increasing difficulty causes a rise in respiratory rate (tachypnoea), and the patient will struggle to breathe and become distressed as he uses the accessory muscles of respiration to maintain airflow.
- In severe cases there may be cyanosis, cessation of air entry (apnoea) and death.

Disease of the larynx:

Congenital abnormalities of the larynx:

◆ Laryngomalacia

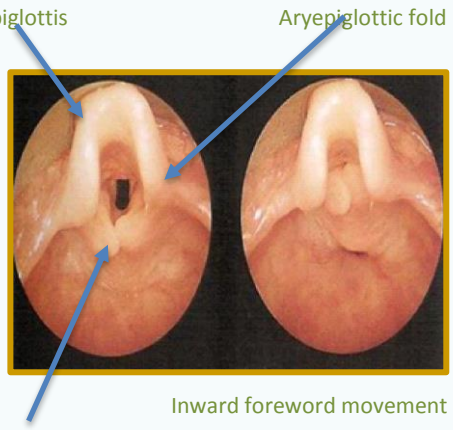
Scenario: Baby born with normal breathing in the first month, in the second month the mother complained that her baby has abnormal breathing (strider).

- Most common cause of stridor in neonate and infants
- Laryngeal finding:
  - Inward collapse of aryepiglottic fold (short) into laryngeal inlet during inspiration.
  - Epiglottis collapses into laryngeal inlet.
- SSX:
  - intermittent inspiratory stridor[7] that improve in prone position.
- DX:
  - HX and endoscopy, Fiberoptic scope (I need the
  - baby to be awake and cry).

So, the findings in Laryngomalacia are:
-Omega shape epiglottis
-Short aryepiglottic fold
-Collapsing epiglottis
-Inward foreword movement of Arytenoid During inspiration.

- RX:
- Observation
- Supraglottoplasy
- Epiglottoplasty
- Tracheostomy
- The percentage of children with laryngomalacia that will need surgical intervention is 10%

When the child grows it becomes more mature and improve, so reassure and observe. But if with time the baby start to have symptoms like vomiting or cyanosis it need surgical intervention, supraglottoplasy or epiglottoplasty. If still not improving, we do tracheostomy (temporary).



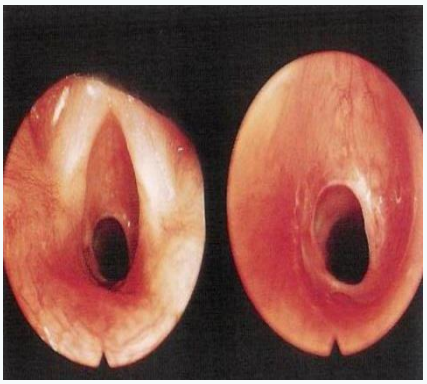
Inward foreword movement of Arytenoid closing the airway.

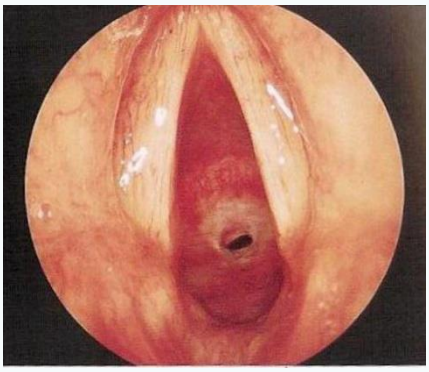
Immature and collapsing epiglottis Covering the airway.

[7] The phase of the stridor gives a hint about the site of obstruction. Inspiratory phase, so the pathology is either in the Vocal cord or supraglottic.

◆ Subglottic stenosis[8]

- Here from birth the baby is having stridor
- Incomplete recanalization, small cricoid ring.
- types:
  - Membranouse
  - Cartilaginous
  - Mixed
- Grades: (Cotton Myer Grading)
  - I <50%
  - II 51-70%
  - III 71-99%
  - IV complete obstruction (no detectable lumen)
- SSX: Biphasic stridor[9], failure to thrive.
- DX: Chest and neck X-ray, flexible endoscope and if we couldn't see the subglottic area, we do Bronchoscopy.
- RX: Tracheotomy
  - Grade I – II:
    - endoscope (CO2 or excision with dilation)
  - Grade III –IV:
    - open procedures:
      A. Ant cricoid split
      B. LTR OR CTR





Grad | and || Treated with Endoscopy and balloons dilation. **Grad ||| and |V** when it very stenotic we do first tracheostomy because the pt will not survive, then we do LaryngoTracheal Reconstruction (**LTR**) Or if the pt has long segment stenosis we do CricoTracheal Resection (**CTR**).

◆ Laryngeal web:

- Incomplete decanalization
- Types:
  - Supraglottic
  - Glottis
  - Subglottic
- SSX:
  - weak cry at birth, variable degrees of respiratory obstruction.
- DX: flexible endoscope
- Rx:
  - No treatment
  - Laser excision
  - Lpen procedure + tracheostomy

In Small web no treatment. In big web we cut it by laser or knife and put a stent, so it won't adhesive again. Sometimes in thick web and the pt is having difficulty breathing we do tracheostomy.

★ Patient with Anterior laryngeal web > dysphonia
★ Patient with Posterior laryngeal web > dysphonia and stridor

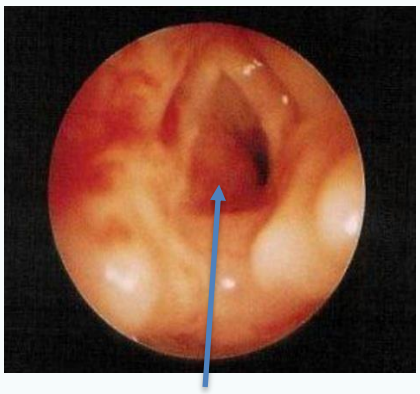
Iatrogenic web due to scaring and adhesion.

Congenital web, there are grades for web; if small web the baby will have voice problems which noticed in crying (weak crying), if the web is large and more extended posteriorly the symptoms will be stridor (inspiratory stridor).

[8] Subglottic stenosis can be congenital or acquired but the most common cause is acquired.
[9] Always in Biphasic stridor the problem is in the subglottic.

Subglottic hemangioma:

- Most common in subglottic space
- 50% of subglottic hemangiomas associated with cutaneous involvement (skin rash), (When there is facial hemangioma, 50% chance the baby will have subglottic hemangioma).
- Types:
- Capillary (typically resolve)
- Cavernous
- SSX: Biphasic[10] stridor
- DX: endoscope
- RX:
- Observation
- Crticosteroid
- Propranolol
- CO2 LASER



Subglottic hemangioma

Commonest causes of stridor in pediatric:

- 1st Laryngomalecia
- 2nd subglottic stenosis
- 3ed bilateral focal cords paralysis

Traumatic conditions of the larynx [11]:

- Direct injuries (blows) اثنين اتضاربو واحد خبط الثاني في رقبته وتغير صوته
- Penetration (open) بسكين أو مثلا كان يسوق السيكل وكان في حبل الغسيل
- Burns (inhalation, corrosive fluids) Like clorox
- Inhalation foreign bodies
- Intubations injuries:
- Prolonged intubation
- Blind intubation
- Too large tube
- Pathology:
- Abrasion ► granulomatous formation → subglottic stenosis
- SSX: hoarseness, dyspnoea
- RX:
- Voice rest
- Endoscopic removal
- prevention

If the trauma is from RTA, we have to ask is the trauma from the balloon or from head injury or from the intubation.

★ Big granuloma: Usually they don't remove it If we remove it -> 40% recurrent.

★ Treatment:

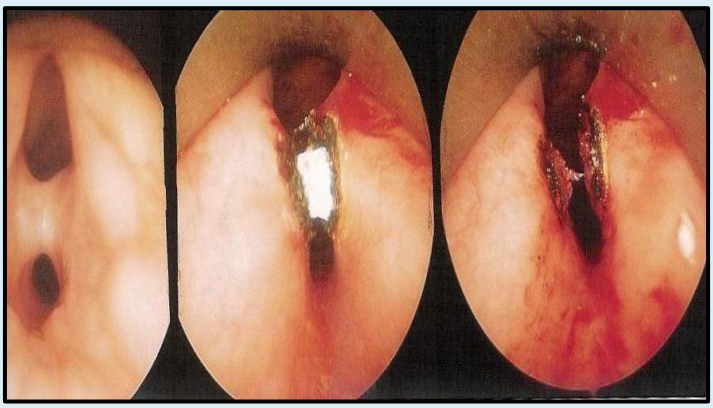
- Antireflux treatment, voice rest, lifestyle modifications, steroid therapy, no coffee or late eating.
- Granuloma, Common with intubation or reflux.
- Granulomas are benign lesions usually located on the posterior third of the vocal fold "vocal process"

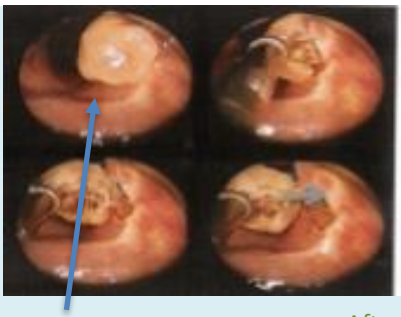
[10] so, it always means there is obstruction at the level of Subglottic whatever the cause; Hemangioma, stenosis or cyst.

[11] Mechanism of trauma is important when taking Hx and writing the medical report.

Inhalation injury in the trachea with black tissue, in fires who inhaled smoke

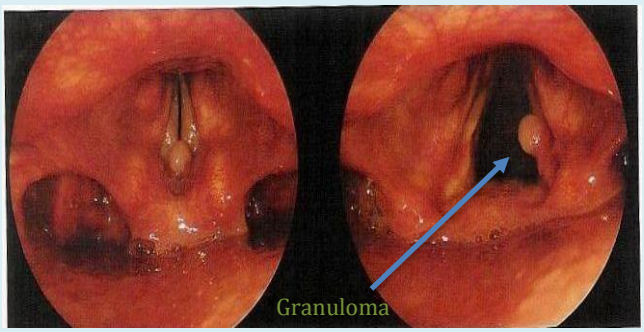
Intubation



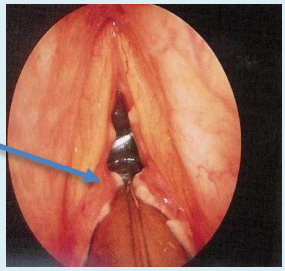


Granuloma

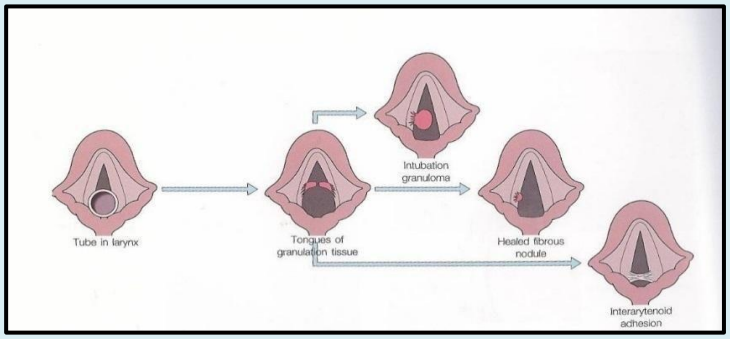
After laser removal of granuloma



Granulation tissue



The safest time to keep the Intubation tube is from 2-3 weeks maximum, after that time it has to be removed and instead put the pt on tracheostomy, because if longer than that it will cause granulation tissue, granuloma around it and scars and at the level of subglottic area it will cause narrowing and stenosis. E.g. When a comatose pt admitted after an RTA, they intubate him for long time. So, the most common cause of **subglottic stenosis** is iatrogenic (Prolonged intubation). Another scenario when the pt intubated with improper technique due to bad ventilators or improper size of tubes or bad tubes, etc.

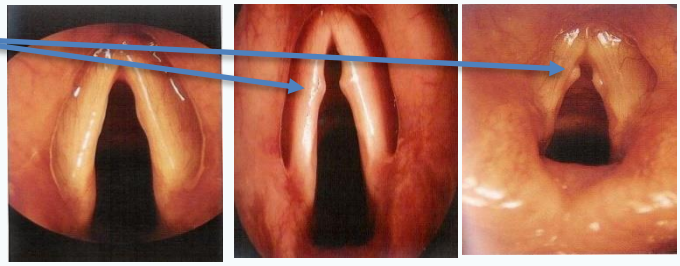


Vocal Fold Lesions Secondary to Vocal Abuse and trauma:

- Vocal nodules (singer's nodules):[12]
  - At junction of ant 1/3 and mid 1/3
  - RX:

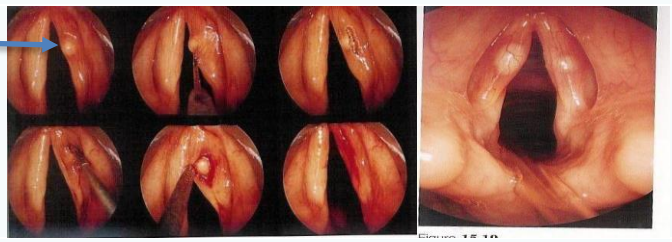
1. Voice therapy, Voice hygiene: Drink a lot of water, talk less frequently, use microphone.
2. Surgical excision (microlaryngoscopy)

We don't remove it surgically unless it very large or fibroid. But commonly it subsided with voice therapy.



- Vocal fold polyp:
  - Middle and ant 1/3, free edge, unilateral.
  - Mucoid, hemorrhagic, pedunculated.
  - RX: surgical excision. Remove it surgically: (Microlaryngoscopy Vocal cords excision).

- Vocal fold cyst
  - Congenital dermoid cyst
  - Mucus retention cyst
  - RX: surgical excision. Remove it surgically: (Microlaryngoscopy Vocal cords excision).



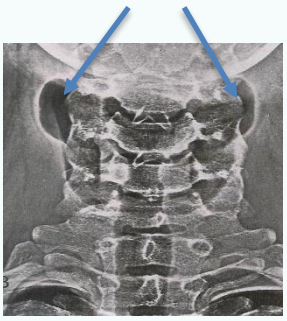
- Reinke's edema[13]
  - The causes: 1st smoking, 2nd acid reflux, 3rd voice abuse.
  - RX:

1. First conservative: voice rest, stop smoking, anti-reflux therapy.
2. Surgical excision Sometimes we need surgical excision.

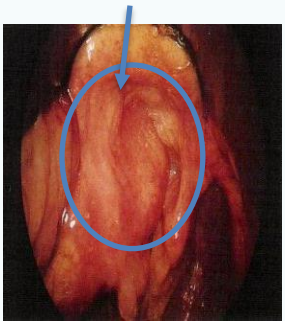
- Laryngocele[14]:
  - Air filled dilation of the appendix of the ventricle, communicates with laryngeal lumen.
  - Congenital or acquired
  - Common site: ventricle.
  - Dx: by CT scan or x ray to see if it internal or external
  - Types:

1. External: through thyrohyoid membrane
2. Internal
3. Combined

X rays: there are bilateral external laryngocele.



Internal laryngocele, pt present with stridor and dysphonia.



[12] Comes in singers, teachers and **children those who shouts**.
[13] Vocal cords filled with fluids in superficial layer of lamina propria which is called (Reinke's space)
[14] It happens in the weak area that has no mucosa which is between the vocal cords and the ventricular folds.

- Rx: marsupialization[15]

Vocal cord immobility:

Adults	
"Iatrogenic[16]" Trauma	Non-iatrogenic trauma

• cervical surgery
• Thoracic surgery
• Skull base surgery
• Other medical procedure
	• Tumor
	• Medical disease:
	  - CVD
	  - Neurological
	  - Developmental abnormalities
	  - Drug neurotoxicity
	  - Granulomatous disease
	• trauma to neck.
	• Idiopathic[17]

Children	

• Arnold chiari malformation. (Congenital Vascular abnormality in the brain that may affect Vagus nerve).
• Birth trauma. By forceps
• SSX:
  - Dysphonia
  - Chocking
  - Stridor	

[15] It means remove the whole wall to prevent its recurrence
[16] Injury to recurrent laryngeal nerve
[17] We do CT Scan for the brain, neck and chest to exclude all causes like hidden tumors. If CT scan is normal, we label it as idiopathic.

Vocal cord position:

- Median, paramedia, cadaveric
- Rx:

- Self-limiting or permanent paralysis
- For <u>medialization</u> (In case of UNILATERAL paralysis):

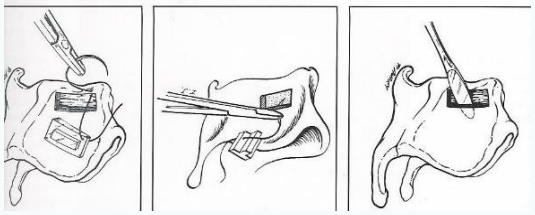
1. Vocal cord **injections**[18] > Gelfoam, fat, collagen, Teflon.
2. **Thyroplasty**[19] type1.

- For <u>lateralization</u> (In case of BILATERAL paralysis):
  - Cordotomy
  - Arytenoidectomy
  - Tracheotomy

There is gap during addiction, it supposed to be complete closure. Managed by Medialization.

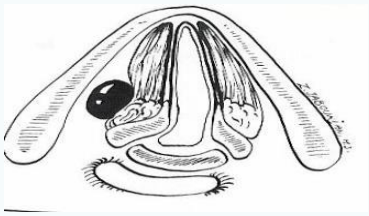
Thyroplasty

Make a window in the thyroid and insert a silicone block under local anaesthesia.

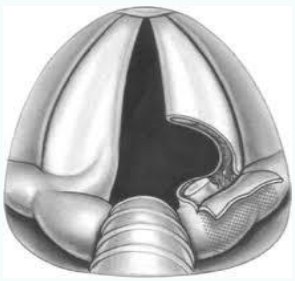


Injection

Some injected materials stay for 6 months and other for 1 year



Arytenoidectomy



[18] مواد تنفخ الحبال الصوتية نفس مفهوم البوتوكس بس شيء خاص بـال Larynx

[19] Permanent solution

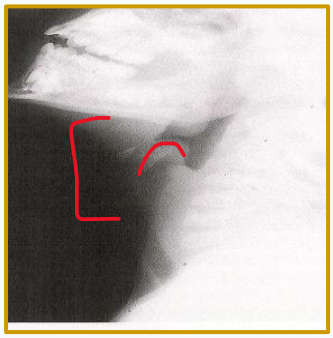
Inflammation of the larynx:

Acute viral laryngitis

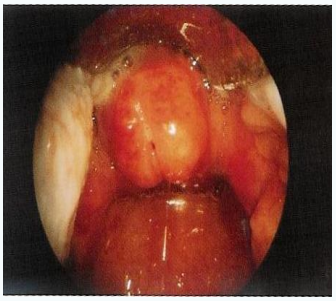
- Rhinovirus, parainfluenza
- SSX: dysphonia, fever cough.
- Rx:
  - Cconservative (Voice rest, hot drinks, air humidification).
  - Steroids

Acute epiglottis

Used to be a threatening infection but know due to vaccinations it is seen less,
- Haemophilus influenza B
- vaccine (2-6 year).
- SSX:
  - fever, dysphagia, drooling, dyspnea, sniffing position[20], no cough, normal voice.
- DX:
  - x-ray (thumbprint sign)
- Rx: Secure the airway+IV antibiotic
  - DO NOT EXAMINE THE CHILD IN ER Don't touch the child even with tongue depressor
  - Intubation in OR
  - IV abx
  - Corticosteroid



Lateral neck x Ray: **thumb sign** indicates acute epiglottitis.

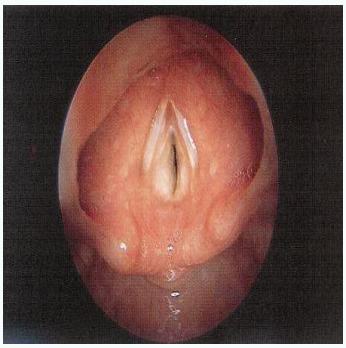


Inflamed epiglottis closing the airway.

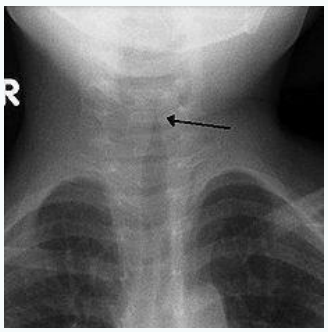
عشان

Croup (Laryngotracheobronchitis)

- Croupy cough in children
- Primary involves the subglottic
- **Parainfluenza 1-3**
- 1-5 years
- SSX[21]:
  - Biphasic stridor, fever, brassy cough, hoarseness, no dysphagia.
- DX:
  - x-ray, steeple sign
- RX:
  - **Humidified oxygen**, racmic epinephrine, **steroid**.



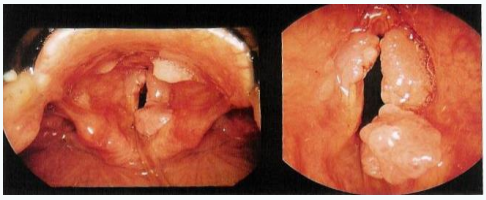
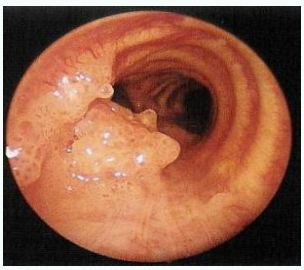
Edema in the vocal cords and subglottic area.



Extra pic

[20] The child presented to ER binding forward

[21] If How to differentiate it with subglottic stenosis? History. By the symptoms and the onset, here it is acute with fever and cough. While in subglottic stenosis it's chronic.

Diphtheritic laryngitis	Fungal laryngitis	Recurrent respiratory papillomatosis[22]
- Causes: • Corynebacterium diphtheriae - SSX: • Cough, stridor, dysphonia, fever. • Greyish – white membrane. - Treatment: 1. Antitoxin injection 2. Systemic pencillin 3. Oxygen 4. Tracheostomy > If there is edema, we need to secure the airway.	- Causes: • Immunocompromised or the pt is taking steroid • Candidiasis • Aspergillosis - SSX: • dysphonia, cough odynophagia. - RX: • Antifungal regimen  Whiteish patch on the vocal cords (leukoplakia)	- 2/3 before age 15 - Rarely malignant change - HPV 6-11 common - HPV 16-18 (malignancy) - Risks: • younger first-time mother (condyloma acuminata) • Lesions: wart like (cluster of grapes) - Types: 1. Juvenile: affecting Pediatric, very aggressive. 2. Senile: Less aggressive. - SSX: Hoarseness, stridor - RX: • laser excision or microdebrider • Adjunctive therapy[23]: **Cidofovir**, acyclovir, interferon.    **Warts** everywhere, trachea, vocal cords....

[22] The mother is having HPV, delivered the baby through normal vaginal, the baby gets the infection and after months to one year he started to have dysphonia. (Even with c.s. the child will Cary the risk of infection, so vaccination is the best).
[23] to decrease the recurrence.

Malignant neoplasms of the larynx

- Smoker pt with dysphonia, with unhealthy mucosa in examination, mass and leukoplakia this is could be cancer > take biopsy.
- 1-5 % of all malignancies
- All are squamous cell carcinomas
- **SSX:**
    - Hoarseness, aspiration, dysphagia, stridor, weight lost
- **Risks:**
    - Smoking, alcohol, radiation exposure.

- **Classification:**
    - ★ Supraglottic:
    - 30-40-% of laryngeal Ca
    - 25-75% nodal metastasis
    - ★ Glottic:
    - 50-75%
    - Limtted regional metastasis
    - ★ Subglottic:
    - Rare
    - 20% regional metastasis

- RX:

1. Radiotherapy
2. Hemilaryngectomy. Total laryngectomy + neck dissection.

All these are malignant