LARYNX 2

Objectives:

- Congenital diseases of the larynx.
- Benign swelling of the larynx.
- Acute and chronic laryngitis.
- non-specific and specific laryngitis.
- Laryngeal paralysis.

[Color index : Important | Notes | Extra]

Resources: Slides+Notes+Lecture notes of ENT+433team.
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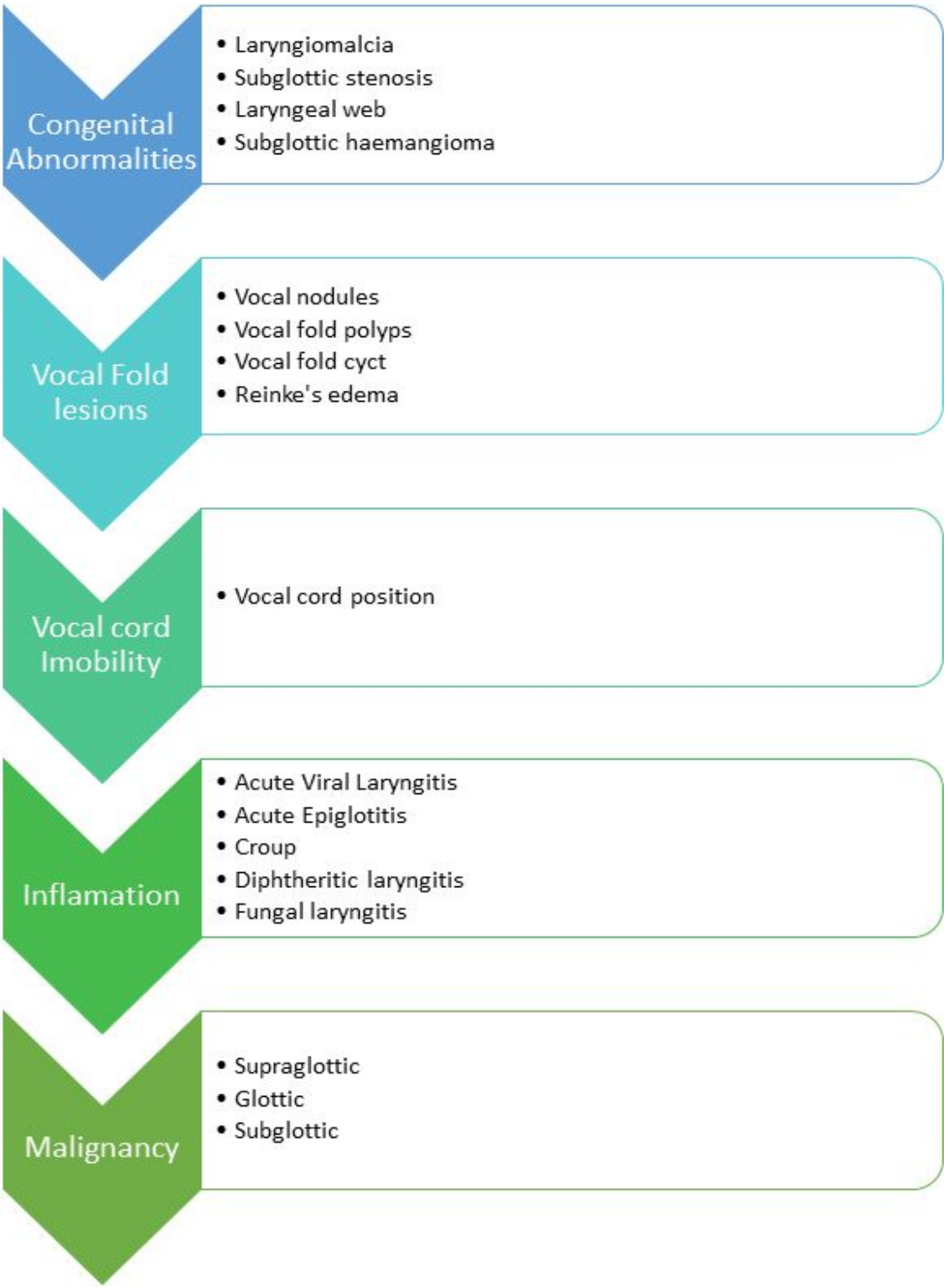
Mind Map


Congenital Abnormalities
• Laryngiomalcia
• Subglottic stenosis
• Laryngeal web
• Subglottic haemangioma
Vocal Fold lesions
• Vocal nodules
• Vocal fold polyps
• Vocal fold cyct
• Reinke's edema
Vocal cord Imobility
• Vocal cord position
Inflamation
• Acute Viral Laryngitis
• Acute Epiglotitis
• Croup
• Diphtheritic laryngitis
• Fungal laryngitis
Malignancy
• Supraglottic
• Glottic
• Subglottic

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.

Congenital Abnormalities:

[1]

❖ Laryngomalacia[2]:

Most common laryngeal anomaly

Pathophysiology: immature cartilage, omega shaped epiglottis

Management: observation, epiglottoplasty, correct GERD if present.

- Most common cause of stridor in neonate and infants very common.
- Laryngeal finding:
  - Inward collapse of aryepiglottic fold (short) into laryngeal inlet during inspiration (**inspirational stridor**).
  - Epiglottis collapses into laryngeal inlet.
- **SSx**:Intermittent inspiratory stridor that improve in prone position.
- **Dx**:
  - HX and endoscopy "flexible endoscope through the nose" it can't be diagnosed in the OR when the patient is sedated
- **Rx**:
  - Observation most of the time cause the condition will improve with time.[3]
  - Supraglottoplasty[4](we will consider this surgery in case of severe laryngomalacia, when there is signs of growth retardation, signs of airway obstruction like: cyanosis, sleep apnea, and desaturation).

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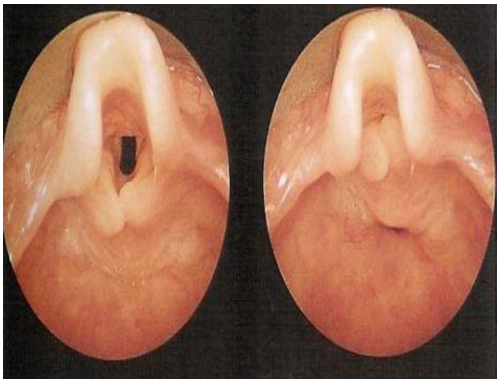
[1] supraglottic collapse when air enter (during inspiration)

[2] ليونة الحنجرة.

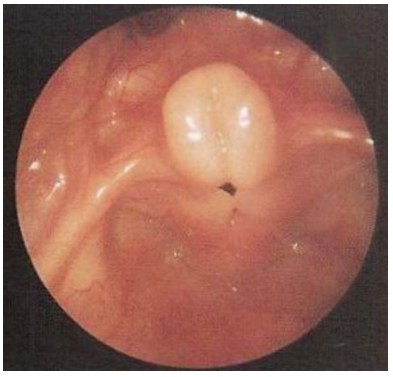
[3] the peak of it when baby reach 2-4month why? because the RR increases so it will be more prominent after it will improve because the larynx will grow bigger and the problem will be solved (subside at 12-18 months)

[4] Supraglottoplasty is a microscopic surgical procedure to alter malformed structures of the upper larynx. This allows a child with certain conditions (such as severe laryngomalacia) to breathe more easily.

- Tracheostomy old method



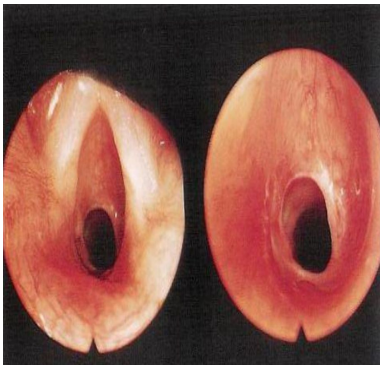
Omega shaped epiglottis



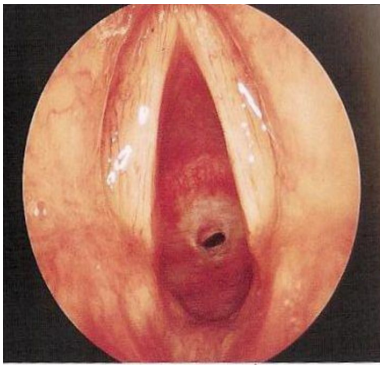
Normally in inspiration: the epiglottis is open and vocal cords are abducted.

❖ Subglottic stenosis

- Incomplete recanalization, small cricoid ring
- Can be acquired or congenital, acquired due to prolonged intubation[5] and it's more common than the congenital.
- Congenital Types:
  - Membranous
  - Cartilaginous
  - Mixed



- **Grades(Cotton-Myer grading system):**
  - I <50%.
  - II 51--70%.
  - III 71--99%.
  - IV complete obstruction (no detectable lumen).



- **SSx**:
  - Biphasic stridor "during inspiration and expiration " because of a **fixed stenosis** unlike laryngomalacia which is dynamic.
  - Failure to thrive.
- **Dx**:
  - Chest and neck X-ray, flexible endoscope
- **Rx**: tracheostomy in severe cases.

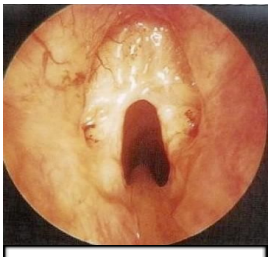
[5] can occur especially in pediatric patients when we use a bigger tube size, it will cause pressure necrosis and will lead to scarring.

treatment depends on the symptoms not the age of the baby, the problem with subglottic stenosis is when the baby has upper respiratory tract infection he will have airway obstruction and stridor.

Grade 1-2	Grade 3-4
Endoscope (CO2 or excision with dilation using a balloon). more commonly done nowadays. esophageal atresia is more common than laryngeal atresia, both same concept of treatment.	**Open procedure:** - **LTR (Laryngotracheal reconstruction** - **Ant cricoid split**

❖ Laryngeal web (vocal cord web)

- Incomplete canalization. (didn't open completely)
- Types: [6]
  - Supraglottic
  - Glottis
  - Subglottic
- **SSx**:
  - Weak cry at birth
  - Variable degrees of respiratory obstruction
  - On and off stridor
- **Dx**:
  - **Flexible endoscope**
- **Rx**:
  - No treatment
  - Laser excision
  - Open procedure + tracheostomy


Iatrogenic


Congenital

★ **Patient with Anterior laryngeal web**
  - **dysphonia**

★ **Patient with Posterior laryngeal web**
  - **dysphonia and stridor**

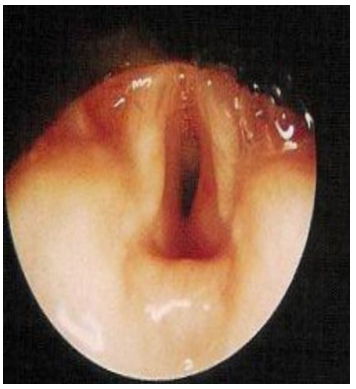
picture: fusion of the vocal cords could be cartilaginous , membranous or mixed. how to treat? we can't do simple incision in the middle only because of high recurrence

[6] according to glottic level.

rate so we do also flap and put steroid injection.

❖ Subglottic hemangioma[7]

- **The most common congenital pediatric tumor, and it is most common in subglottic space.**
- 50% of subglottic hemangiomas associated with cutaneous involvement.
- Types:
  - Capillary (typically resolve)
  - Cavernous.
- **SSx**: biphasic stridor.
- **Dx**: endoscope.
- **Rx**:
  - Observation.
  - Corticosteroid (old treatment).
  - Propranolol (to decrease neovascularization).very effective.
  - CO2 Laser.



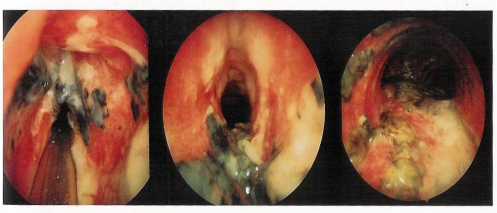
Traumatic Conditions of the Larynx :

- Direct injuries (blows).
- Penetration (open). knife
- Burns (inhalation, corrosive fluids).
- Inhalation foreign bodies. common in pediatric

➔ **Intubations injuries:**

- Prolonged intubation(more than 2 weeks in adults, more than 3 weeks in pediatrics).
- Blind intubation.
- Too large tube.

- **Inhalation "sloughing and carbonized tissue"[8]**
  - Give steroid, antibiotic and Anti-Reflux Drugs



Pathology:

- Abrasion (injury to the mucosa) ➔ granulomatous formation[9] ➔ subglottic stenosis.
- **SSx**: hoarseness, dyspnea

[7] most commonly unilateral
[8] could cause necreosis.
[9] if it is formed bilaterally it may cause adhesions.

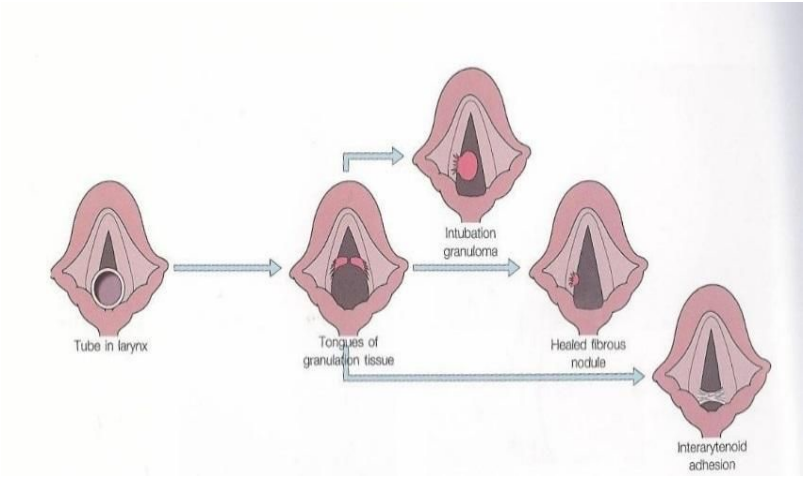
- Rx:
    - Voice rest.
    - Endoscopic removal.
    - Prevention.

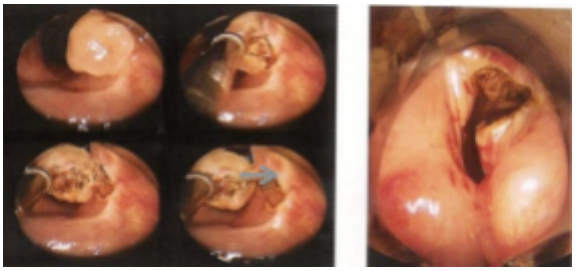
    ★ Big granuloma
    - Usually they don't remove it If we remove it -> 40% recurrent.

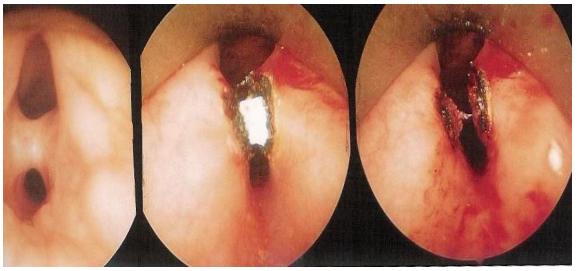
Treatment:

- 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"



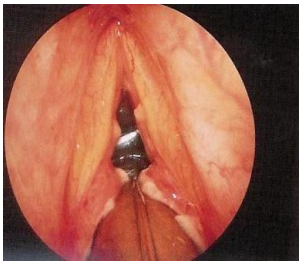


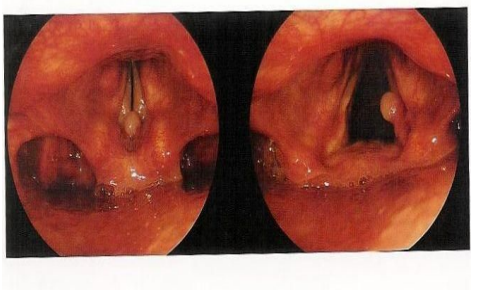


laser excision.

middle picture: granuloma in one side

left picture: two sided adhesions.

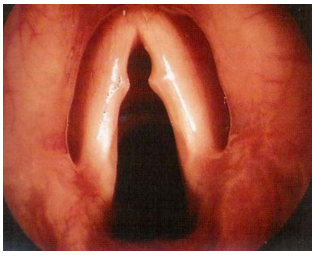
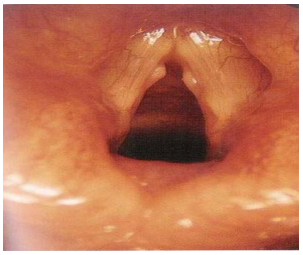
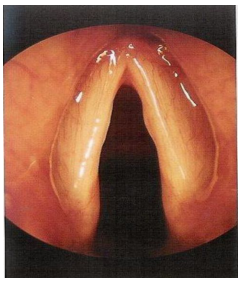




Vocal Fold Lesions Secondary To Vocal Abuse :

❖ Vocal nodules (singer's nodules).

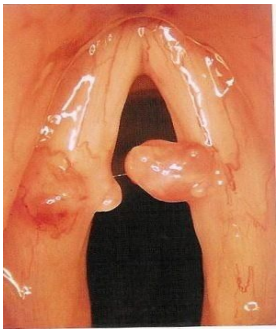
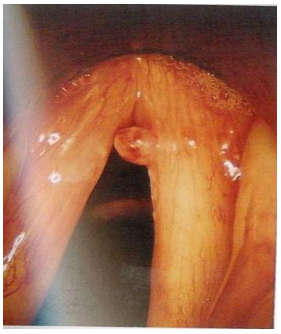
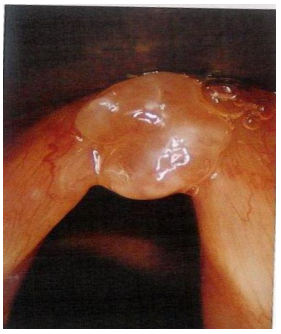
- At junction of ant ⅓ or mid ⅓. **(Ant1\3 and post ⅔)**
- **Rx** :
  - voice therapy refer to speech therapy to learn who to not stress on voice.
  - surgical excision (microlaryngoscopy) if large but therapy is usually affactive.

❖ Vocal fold polyp:[10]

- Middle and ant 1/3, free edge, unilateral (Usually anterior)
- Mucoid, hemorrhagic
- can occur after trauma. like concert or long speech.
- they may present with dysphonia.
- **Rx**: Conservative management first(vocal rest & good hydration & anti-reflux treatment) but if it didn't resolve we do surgical excision.

  complication :
  dysphonia , pain while talking , aphonia.

❖ Vocal fold cyst:

- Congenital dermoid cyst
- Mucus retention cyst[11]

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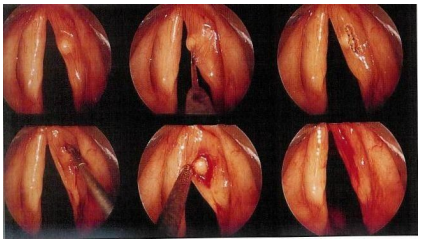
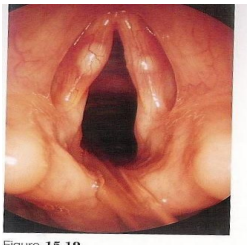
[10] it could be acute or chronic.
[11] could be in mouth , larynx or esophagus.

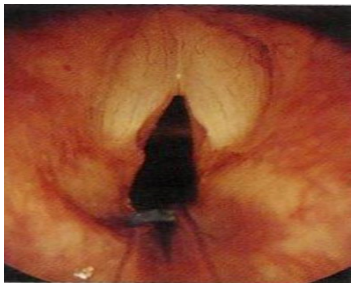
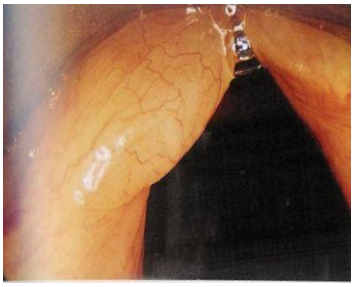
- **Rx**: surgical excision dissection

❖ Reinke's edema(al pacino's voice).

- **Rx**:
  - Voice rest, stop smoking.
  - Anti-reflux therapy.
  - Surgical excision.
  - Accumulation of fluid in Reinke's space (Common in smokers).

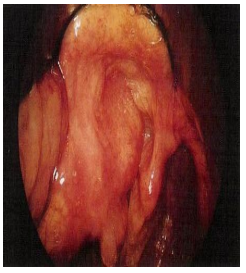
  spot dx in women who smoke (thick voice)


❖ Laryngocele (تجي للناس الي يستخدموا البوق):

air filled dilation in the larynx , could be intralaryngeal or extralaryngeal.

- Air filled dilation of the appendix of the ventricle**,** communicates with laryngeal lumen.
- Congenital or acquired.
- **Common site: ventricle.**
  - it could close the airway if happened congenital in children and may even cause dysphagia or discomfort.

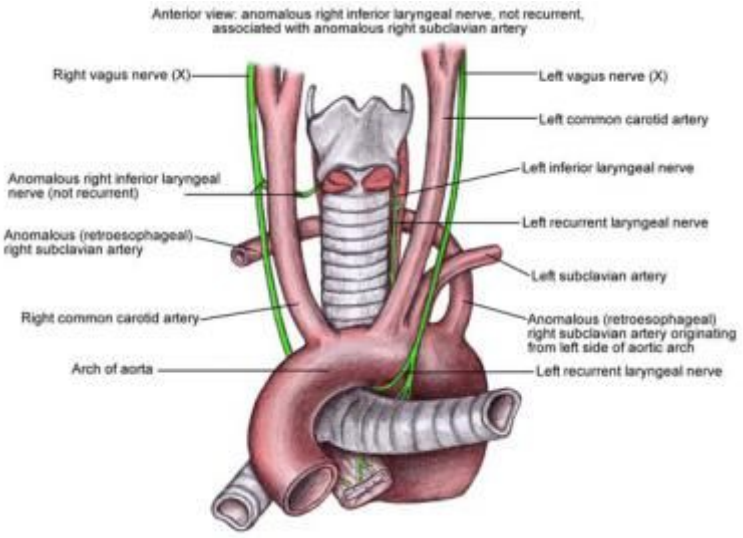
- Types:
  - **External**: through thyrohyoid membrane.
  - **Internal**.
  - Combined
- Rx: Marsupialization: partial removal of the mass.

Vocal Cord paralysis:

Vocal cord paralysis occurs when the nerve impulses to your voice box (larynx) are disrupted. This results in paralysis of the vocal cord muscles.

Vocal cord paralysis can affect your ability to speak and even breathe. That's because your vocal cords, sometimes called vocal folds, do more than just produce sound. They also protect your airway by preventing food, drink and even your saliva from entering your windpipe (trachea) and causing you to choke.

it occurs to the left recurrent laryngeal nerve more due to its anatomical location(pass behind aortic arch).



➔ **Causes: Very common , know them all.**

Adult	
"Iatrogenic" Trauma	Non-iatrogenic trauma
• cervical surgery • Thoracic surgery • Skull base surgery • Other medical procedure	• Tumor • Medical disease RA • CVD • Neurological (like myasthenia gravis , neuritis MS) • Developmental abnormalities • Drug neurotoxicity • Granulomatous disease • trauma to neck. • Idiopathic

Children	
• Arnold chiari malformation	• Birth trauma "Forceps delivery"

➔ **SSx**:
- Dysphonia.
- Choking in recurrent laryngeal nerve injury.
- Stridor in pediatric patients or if there's bilateral paralysis.

In unilateral we have one that's moving and one not and that's usually give us voice problems but if bilateral usually respiratory problem.

Vocal Cord Position :

➔ Median, paramedian, cadaveric

- **Rx**: Self-limiting or permanent paralysis

★ For medialization: we perform it if we have a problem in the voice.

- Vocal cord injections Gelfoam, fat, Collagen and Teflon [12]
- Thyroplasty type 1 (Silicon Block “Permanent”)

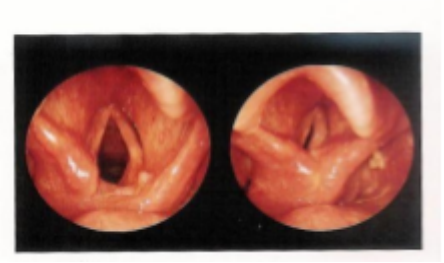
★ For lateralization: if the problem is respiratory

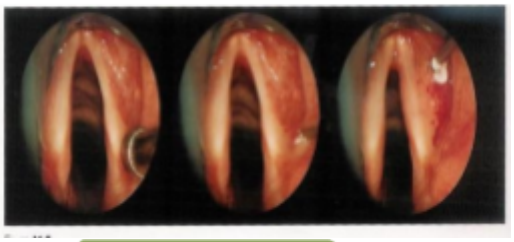
- Cordotomy
- Arytenoidectomy ‘parital’
- Tracheotomy

- Vocal cord paralysis can be unilateral or bilateral.

➔ **Unilateral:** One work and the other is paralyzed with gap in between affects voice (Breathy).
- Treatment: medialization “inject the paralyzed cord to inflate it closure of the gap.

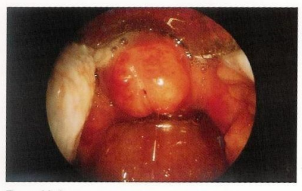
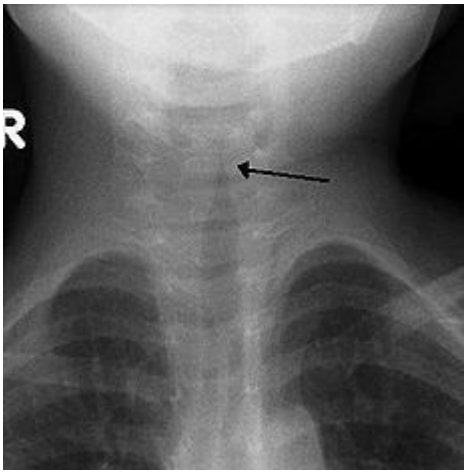
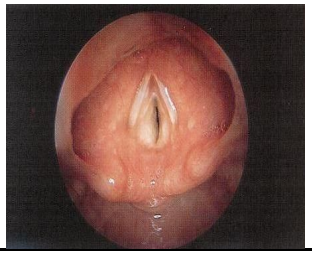
➔ **Bilateral:** Adduction of the cords can’t open and it will cause stridor, and dyspnea, voice is fine.
- Treatment: lateralization.





[12] كأننا نجيبه للنص.

Inflammation of the larynx :

Acute Laryngitis	Acute Epiglottitis (IMP)	Croup (Laryngotracheobronchitis)
• Rhinovirus • Parainfluenza **SSx:** • Dysphonia • Fever • Coughing(barking cough due vocal cord edema). **Rx:** • Conservative • steroids	• Used to be a threatening infection but know due to vaccinations it is seen less, Haemophilus influenza B vaccine (2-6 year). **SSx:** • Dysphonia • No cough • Normal voice • Fever • Drooling • Dyspnea • Sniffing position **Dx:** • Xray (Thumbprint sign)  **Rx:** • Do not Examine in the ER. • Intubate in the OR. • IV Antibiotics. • Corticosteroids (For the Edema). now there is vaccine for it 	• Primarily involves the subglottic region. • Parainfluenza (1-5 years) Pediatric. **SSx**: • Biphasic stridor • Fever • Brassy cough • No Dysphagia • Hoarseness **Dx**: • Xray (Steeple sign)**!very imp!**  **Rx**: • Humidified O2. • Racmic Epinephrine (IMP). • Steroids. 

❖ Diphtheric Laryngitis (rare nowadays due to vaccinations).

➔ **Causes:**
- Corynebacterium diphtheriae.

➔ **SSx:**
- Cough, stridor (suggests the spread of the membrane to the larynx and trachea), dysphonia, fever.
- Greyish –white membrane.

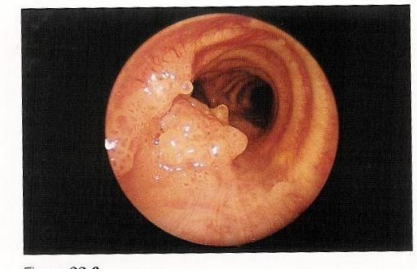
➔ **Treatment:**
- Antitoxin injection.
- Systemic penicillin.
- Oxygen.
- Tracheostomy.

❖ Fungal Laryngitis

- seen in diabetics and Immunocompromised patients.
- Candidiasis, aspergillosis

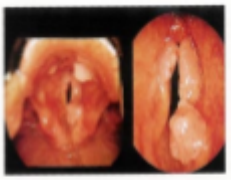
➔ **SSx:**
- Dysphonia.
- Cough.
- Odynophagia.

➔ **Rx:** Antifungal regimen

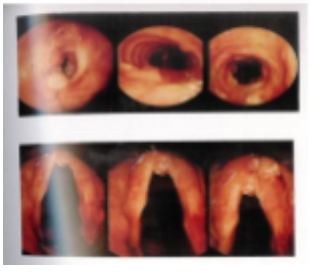


❖ Recurrent Respiratory Papillomatosis (IMP)

- 2/3 before age 15 (juvenile).
- Rarely malignant change.
- HPV 6-11 (common).
- HPV 16-18 (malignancy).
- **Risks**:
  - Younger first time mother (condyloma acuminata)
  - Lesions: wart like (cluster of grapes). in genital area.



- **Types**:
  - Juvenile “affect children and it’s very aggressive”.
  - Senile.



- **SSx**:
  - Hoarseness, stridor.

- **Rx**:
  - Laser excision, microdebrider.
  - Adjunctive therapy: Cidofovir, acyclovir interfero(new treatment :**Avastin)**
  - on average they go to OR 4-5 times a year.

Malignant Neoplasm Of The Larynx :

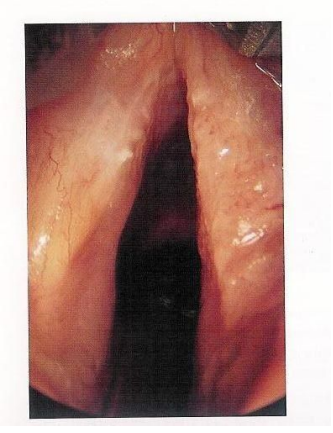
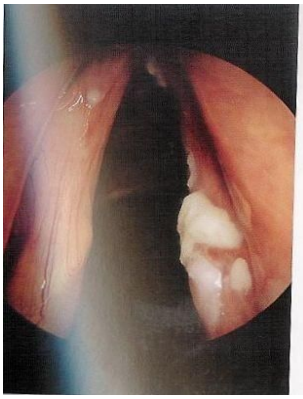
- 1-5 % of all malignancies.
- All are **squamous cell carcinomas**.
- **SSx**: Hoarseness, **aspiration, dysphagia(functinal issue)**, stridor, weight lost.
- Risks: Smoking, alcohol, radiation exposure.
- **Rx**:

depend on stage(TNM)

  - Radiotherapy.
  - Hemilaryngectomy.
  - Total Laryngectomy + Neck dissection (lymphadenectomy.

Supraglottic	Glottic	Subglottic
○ 30-40% of Laryngeal Ca. ○ 25-75% Nodal metastasis.	○ 50-75%. ○ Limited regional metastasis.	○ Rare. ○ 20% regional metastasis.

most common place is the vocal cord because it's squamous epithelium.

Summary & Extra Notes

Congenital abnormality	Pathophysiology	Symptoms	Diagnosis	Management
Laryngomalacia	Most common cause of stridor in neonate and infants	Intermittent inspiratory stridor that improve in prone position.	HX and flexible endoscope	- Observation - Supraglottoplasty - Epiglottoplasty - Tracheostomy
Subglottic stenosis	Incomplete recanalization, small cricoid ring	Biphasic stridor Failure to thrive	Chest and neck X-ray, flexible endoscope	Tracheotomy - Grade I & II: Endoscope (CO_2 or excision with dilation) - Grade III & IV: Open procedures: -LTR or CTR - Ant cricoid split
Laryngeal web	Incomplete decanalization	- Weak cry at birth - Variable degrees of respiratory obstruction - On and off stridor	Flexible endoscope	- No treatment - Laser excision - Open procedure + tracheostomy
Subglottic hemangioma	- Most common in subglottic space - 50% of subglottic hemangiomas associated with cutaneous involvement	Biphasic stridor	Endoscope	- Observation - Corticosteroid - Propranolol - CO_2 LASER

Vocal Cords: Polyps vs. Nodules (from Toronto notes)

Polyps	Nodule
Unilateral, asymmetric	Bilateral
Acute onset May resolve spontaneously	Gradual onset Often follow a chronic course
Subepithelial capillary breakage	Acute: submucosal hemorrhage or edema Chronic: hyalinization within submucous lesion
Soft, smooth, fusiform, pedunculated mass	Acute: small, discrete nodules Chronic: hard, white, thickened fibrosed nodules
Surgical excision if persistent or in presence of risk factors for laryngeal cancer	Surgical excision if refractory

Vocal Cord Paralysis:
Unilateral: affected cord lies in the paramedian position, inadequate glottic closure during phonation > weak, breathy voice.
Usually medializes with time whereby phonation and aspiration improve.
Treatment options include voice therapy, injection laryngoplasty (Radiesse), medialization using silastic block.

Bilateral: cords rest in midline therefore voice remains good but respiratory function is compromised and may present as stridor.
If no respiratory issues, may monitor closely and wait for improvement. If respiratory issues, intubate and will likely require a tracheotomy.

Benign Laryngeal Papillomas (from Toronto notes):

Etiology

HPV types 6, 11
- ❏ possible hormonal influence, possibly acquired during delivery

Epidemiology

Biphasic distribution:
- ❏ Birth to puberty (most common laryngeal tumour) and adulthood

Clinical Features

- ❏ hoarseness and airway obstruction
- ❏ can seed into tracheobronchial tree
- ❏ highly resistant to complete removal
- ❏ some juvenile papillomas resolve spontaneously at puberty
- ❏ may undergo malignant transformation
- ❏ laryngoscopy shows wart--like lesions in supraglottic larynx and trachea

Treatment

- ❏ microdebridement or CO2 laser
- ❏ adjuvants under investigation: interferon, cidofovir, acyclovir
- ❏ HPV vaccine may prevent/decrease the incidence but more research is needed

Laryngeal Carcinoma (from Toronto notes):

Etiology

SCC most common 3 sites:

1. Supraglottic (30 to 35%)
2. Glottic (60 to 65%)
3. Subglottic (1%)

Mean age: 45 to 75 M:F = 10:1

Risk factors:

- ❏ Smoking/EtOH
- ❏ HPV 16 infection strongly associated with the risk of laryngeal squamous cell cancers

Clinical Features:

- ❏ Dysphagia,
  odynophagia, globus
  Otalgia, hoarseness,
  Dyspnea/stridor
  Cough/hemoptysis

Cervical nodes: rare w/glottic CA

Diagnosis: Laryngoscopy CT/MRI

Treatment: 1ry radiation -2ry surgery -1ry surgery for bulky T4 disease

MCQS:

(from the scientific books)

1- X- ray with steeple's sign, what is the diagnosis?
A- Laryngomalacia
B- Croup
C- laryngitis
D- congenital incomplete canalization

Ans: B

1- What is the percentage of children with laryngomalacia that will need surgical intervention?
A- 10%
B- 30%
C- 50%
D- 90%

Ans: A

1- Newborn with normal vaginal delivery, presented with cyanosis which disappears when he cries, what is your initial management?
A- Tracheostomy
B- Endotracheal tube
C- Cricothyroidotomy
D- Oral tube

Ans: D

1- 15 y\o boy came to the voice clinic complaining of change in voice, after laryngostroboscopy it shows bilateral small edematous vocal cord lesions at the junction of the Anterior third and the posterior 2 thirds. what is the treatment?
A- Voice therapy
B- Surgical excision
C- Observation
D- Proton pump inhibitor

Ans: A