



# 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

- Laryngomalacia
- Subglottic stenosis
- Laryngeal web
- Subglottic haemangioma

### Vocal Fold Lesions

- Vocal nodules
- Vocal fold polyps
- Vocal fold cyst
- Reinke's edema

### Vocal cord Imobility

- Vocal cord position

### Inflammation

- Acute Viral Laryngitis
- Acute Epiglottitis
- Croup
- Diphtheritic laryngitis
- Fungal laryngitis

### Malignancy

- Supraglottic
- Glottic
- Subglottic

## Introduction:

### ❖ Symptoms and signs of laryngeal disease:

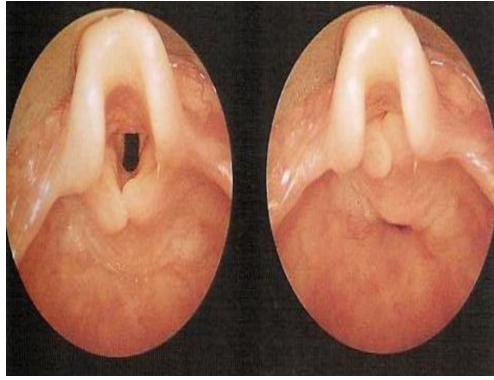
- Lesions on or around the vocal cords cause hoarseness.
- Failure of the laryngeal inlet to close on swallowing causes aspiration; the patient will cough and splutter on swallowing – food ‘going down the wrong way’.
- The most dangerous laryngeal pathology is narrowing of the airway. This causes reduced 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:

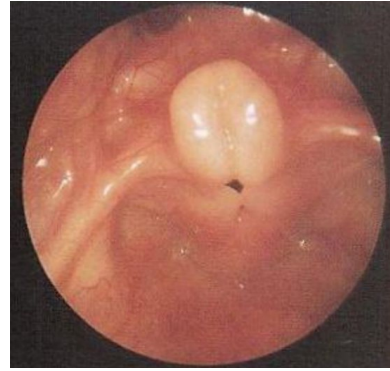
### ❖ Laryngomalacia

- **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 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
  - Supraglottoplasty
  - Epiglottoplasty
  - Tracheostomy

**Most common laryngeal anomaly**  
Pathophysiology: immature cartilage, omega shaped epiglottis  
Management: observation, epiglottoplasty, correct GERD if present.



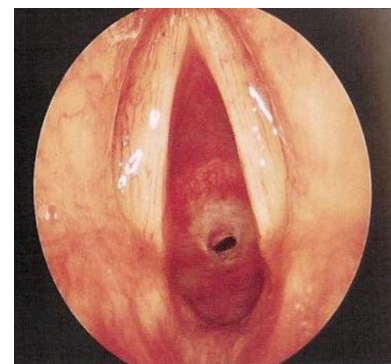
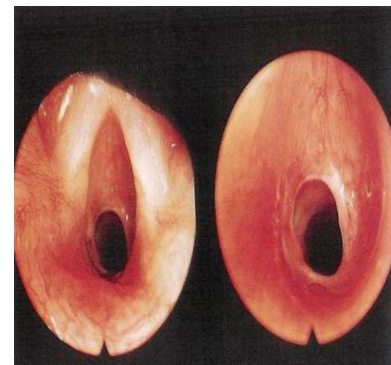
Omega shaped epiglottis



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

### ◆ Subglottic stenosis

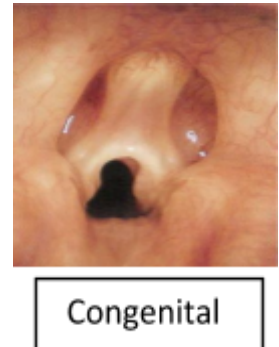
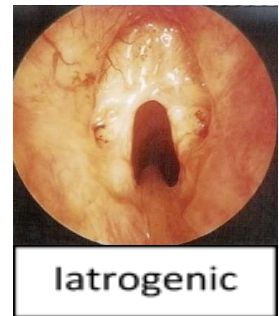
- Incomplete recanalization, small cricoid ring
- Can be acquired or congenital, acquired due to prolonged intubation.
- Types:
  - Membranous
  - Cartilaginous
  - Mixed
- Grades:
  - I <50%
  - II 51--70%
  - III 71--99%
  - IV complete obstruction (no detectable lumen)
- SSx:
  - Biphasic stridor “during inspiration and expiration “
  - Failure to thrive
- Dx:
  - Chest and neck X-ray, flexible endoscope
- Rx: tracheotomy



Grade 1-2	Grade 3-4
Endoscope (CO2 or excision with dilation)	Open procedure: <ul style="list-style-type: none"> <li>- LTR (Laryngotracheal reconstruction)</li> <li>- Ant cricoid split</li> </ul>

## ❖ Laryngeal web

- Incomplete decanalization.
- Types:
  - 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



### ★ Patient with Anterior laryngeal web

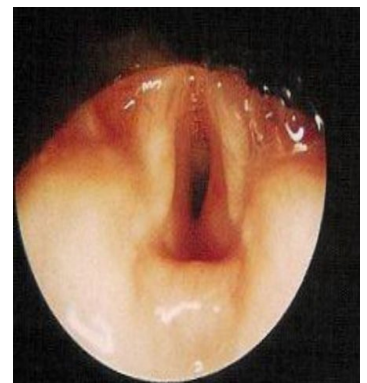
- dysphonia

### ★ Patient with Posterior laryngeal web

- dysphonia and stridor

## ❖ Subglottic hemangioma

- 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
  - **Propranolol** (to decrease neovascularization)
  - CO2 Laser



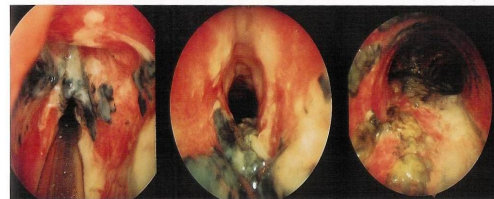
## Traumatic Conditions of the Larynx :

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

### → Intubations injuries:

- Prolonged intubation
- Blind intubation
- Too large tube

- Inhalation “sloughing and carbonized tissue”
  - Give steroid, antibiotic and Anti-Reflux Drugs

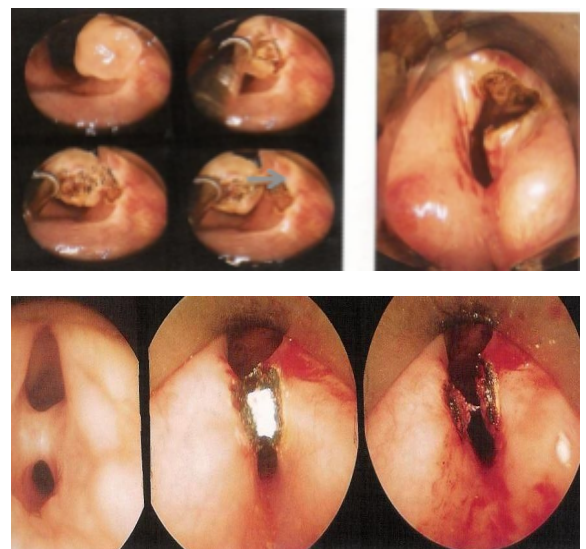
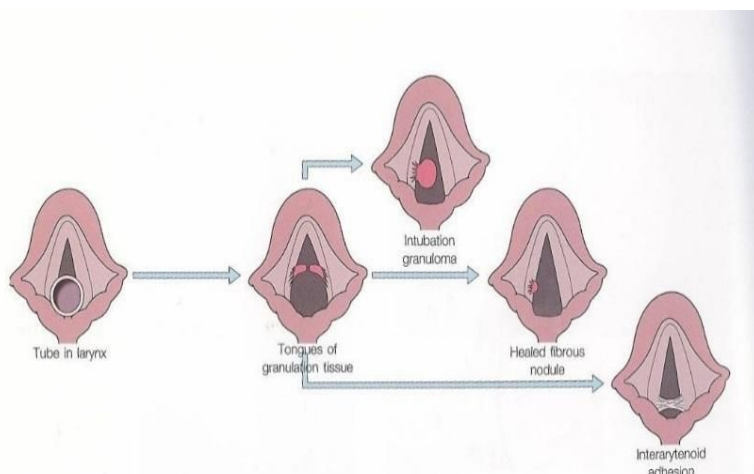


### Pathology:

- Abrasion → granulomatous formation → subglottic stenosis.
- **SSx**: hoarseness, dyspnea
- 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”

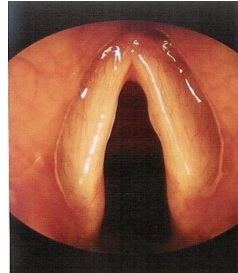
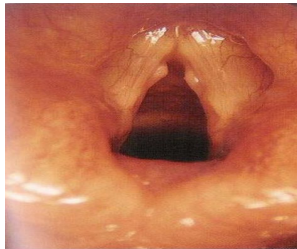
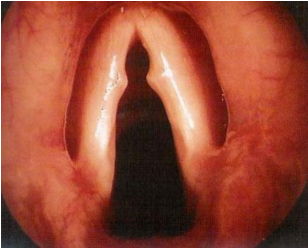




## Vocal Fold Lesions Secondary To Vocal Abuse :

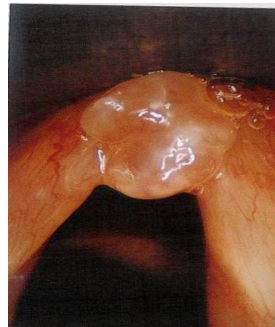
### ◆ Vocal nodules (singer's nodules)

- At junction of ant 1/3 and mid 1/3
- Rx :
  - voice therapy
  - surgical excision (microlaryngoscopy)



### ◆ Vocal fold polyp:

- Middle and ant 1/3, free edge, **unilateral** (Usually anterior)
- Mucoid, hemorrhagic
- Rx: surgical excision



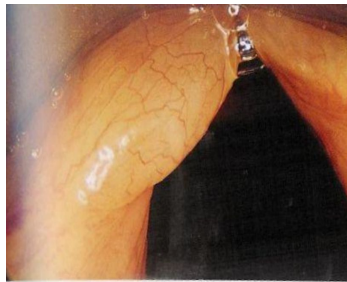
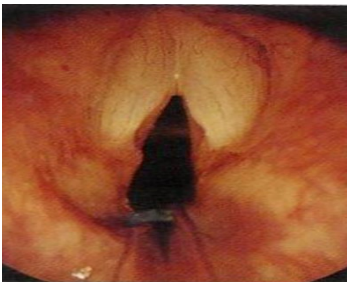
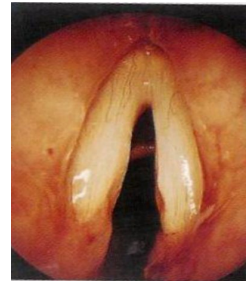
### ◆ Vocal fold cyst:

- Congenital dermoid cyst
- Mucus retention cyst
- Rx: surgical excision



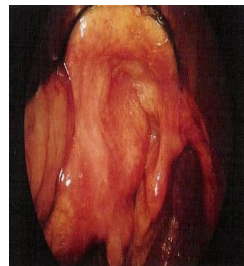
## ◆ Reinke's edema

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



## ◆ Laryngocele

- Air filled dilation of the appendix of the ventricle, communicates with laryngeal lumen.
- Congenital or acquired.
- Common site: ventricle.
- Types:
  - External: through thyrohyoid membrane.
  - Internal.
  - Combined
- Rx: Marsupialization





# Vocal Cord Immobility :

## → Causes:

Adult	
<b>“Iatrogenic” Trauma</b>	Non-iatrogenic trauma
<ul style="list-style-type: none"><li>● cervical surgery</li><li>● Thoracic surgery</li><li>● Skull base surgery</li><li>● Other medical procedure</li></ul>	<ul style="list-style-type: none"><li>● Tumor</li><li>● Medical disease</li><li>● CVD</li><li>● Neurological</li><li>● Developmental abnormalities</li><li>● Drug neurotoxicity</li><li>● Granulomatous disease</li><li>● Idiopathic</li></ul>

Children	
<ul style="list-style-type: none"><li>● Arnold chiari malformation</li></ul>	<ul style="list-style-type: none"><li>● Birth trauma “Forceps delivery”</li></ul>

## → SSx:

- Dysphonia
- Choking
- Stridor

## Vocal Cord Position :

→ Median, paramedian, cadaveric

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

★ For medialization:

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

★ For lateralization:

- Cordotomy
- Arytenoidectomy
- Tracheotomy

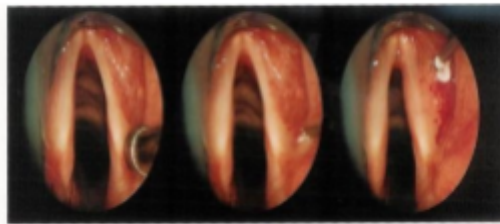
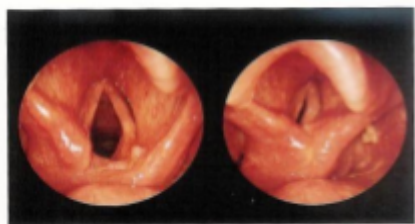
- Vocal cord paralysis can be unilateral or bilateral.

→ **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 stridor, voice is fine.

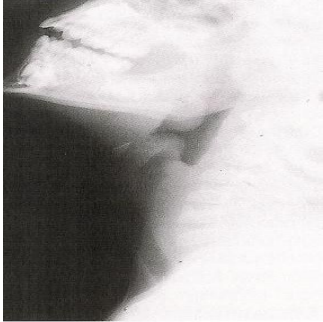

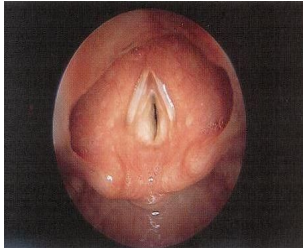
- Treatment: lateralization.



Arytenoidectom



Inflammation of the larynx :

Acute Laryngitis	Acute Epiglottitis (IMP)	Croup (Laryngotracheobronchitis)
<ul style="list-style-type: none"> <li>● Rhinovirus</li> <li>● Parainfluenza</li> </ul> <p><b>SSx:</b></p> <ul style="list-style-type: none"> <li>● Dysphonia</li> <li>● Fever</li> <li>● Coughing</li> </ul> <p><b>Rx:</b></p> <ul style="list-style-type: none"> <li>● Conservative</li> </ul>	<ul style="list-style-type: none"> <li>● Haemophilus influenza B (2-6 years)</li> </ul> <p><b>SSx:</b></p> <ul style="list-style-type: none"> <li>● <b>Dysphonia</b></li> <li>● <b>No cough</b></li> <li>● <b>Normal voice</b></li> <li>● Fever</li> <li>● Drooling</li> <li>● Dyspnea</li> <li>● Sniffing position</li> </ul> <p><b>Dx:</b></p> <ul style="list-style-type: none"> <li>● Xray (<b>Thumbprint sign</b>)</li> </ul>  <p><b>Rx:</b></p> <ul style="list-style-type: none"> <li>● <b>Do not Examine in the ER.</b></li> <li>● <b>Intubate in the OR.</b></li> <li>● IV Antibiotics.</li> <li>● Corticosteroids (For the Edema).</li> </ul> 	<ul style="list-style-type: none"> <li>● Primarily involves the subglottic region.</li> <li>● Parainfluenza (1-5 years)</li> </ul> <p><b>SSx:</b></p> <ul style="list-style-type: none"> <li>● Biphasic stridor</li> <li>● Fever</li> <li>● Brassy cough</li> <li>● No Dysphagia</li> <li>● Hoarseness</li> </ul> <p><b>Dx:</b></p> <ul style="list-style-type: none"> <li>● Xray (<b>Steeple sign</b>)</li> </ul> <p><b>Rx:</b></p> <ul style="list-style-type: none"> <li>● Humidified O2.</li> <li>● <b>Racmic Epinephrine (IMP).</b></li> <li>● Steroids.</li> </ul> 

## ❖ Diphtheric Laryngitis

### → 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

- Immunocompromised
- Candidiasis, aspergillosis

### → SSx:

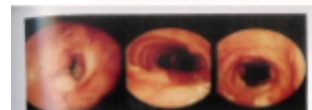
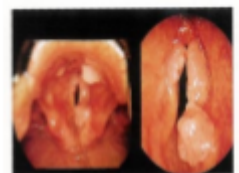
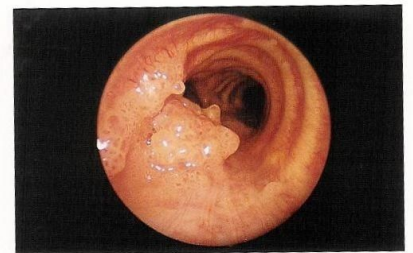
- Dysphonia.
- Cough.
- Odynophagia.

### → Rx: Antifungal regimen



## ❖ Recurrent Respiratory Papillomatosis (IRP)

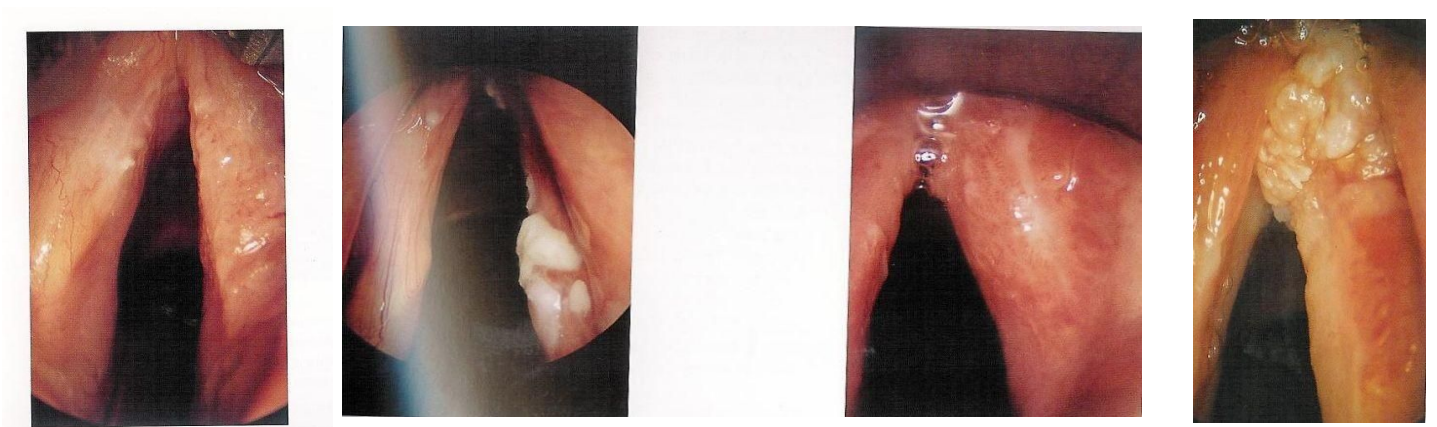
- 2/3 before age 15.
- Rarely malignant change.
- HPV 6-11 (common).
- HPV 16-18 (malignancy).
- Risks:
  - Younger first time mother (condyloma acuminata)
  - Lesions: wart like (cluster of grapes).
- Types:
  - Juvenile “affect children and it’s very aggressive”.
  - Senile.
- SSx:
  - Hoarseness, stridor.
- Rx:
  - Laser excision, microdebrider.
  - Adjunctive therapy: Cidofovir, acyclovir interferon



## Malignant Neoplasm Of The Larynx :

- 1-5 % of all malignancies.
- All are **squamous cell carcinomas**.
- **SSx**: Hoarseness, aspiration, dysphagia, stridor, weight lost.
- Risks: Smoking, alcohol, radiation exposure.
- **Rx**:
  - Radiotherapy.
  - Hemilaryngectomy.
  - Total Laryngectomy + Neck dissection (lymphadenectomy).

Supraglottic	Glottic	Subglottic
<ul style="list-style-type: none"> <li>○ 30-40% of Laryngeal Ca.</li> <li>○ 25-75% Nodal metastasis.</li> </ul>	<ul style="list-style-type: none"> <li>○ 50-75%.</li> <li>○ Limited regional metastasis.</li> </ul>	<ul style="list-style-type: none"> <li>○ Rare.</li> <li>○ 20% regional metastasis.</li> </ul>





## 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	<ul style="list-style-type: none"> <li>- Observation</li> <li>- Supraglottoplasty</li> <li>- Epiglottoplasty</li> <li>- Tracheostomy</li> </ul>
Subglottic stenosis	Incomplete recanalization, small cricoid ring	Biphasic stridor Failure to thrive	Chest and neck X-ray, flexible endoscope	Tracheotomy <ul style="list-style-type: none"> <li>- Grade I &amp; II: Endoscope (CO2 or excision with dilation)</li> <li>- Grade III &amp; IV: Open procedures: -LTR or CTR - Ant cricoid split</li> </ul>
Laryngeal web	Incomplete decanalization	<ul style="list-style-type: none"> <li>- Weak cry at birth</li> <li>- Variable degrees of respiratory obstruction</li> <li>- On and off stridor</li> </ul>	Flexible endoscope	<ul style="list-style-type: none"> <li>- No treatment</li> <li>- Laser excision</li> <li>- Open procedure + tracheostomy</li> </ul>
Subglottic hemangioma	<ul style="list-style-type: none"> <li>- Most common in subglottic space</li> <li>- 50% of subglottic hemangiomas associated with cutaneous involvement</li> </ul>	Biphasic stridor	Endoscope	<ul style="list-style-type: none"> <li>- Observation</li> <li>- Corticosteroid</li> <li>- Propranolol</li> <li>- CO2 LASER</li> </ul>

### 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