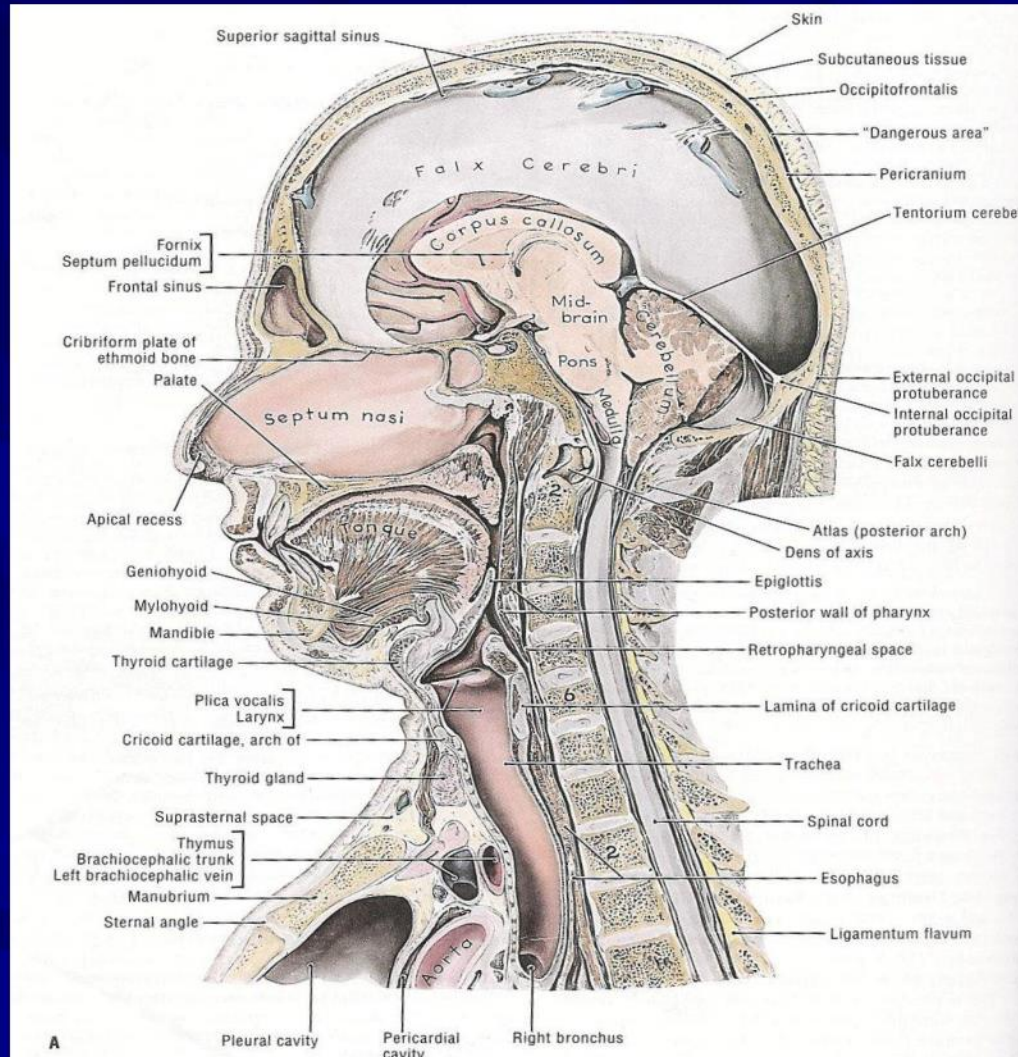


Larynx

Larynx



Skeletomembranous framework of larynx

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

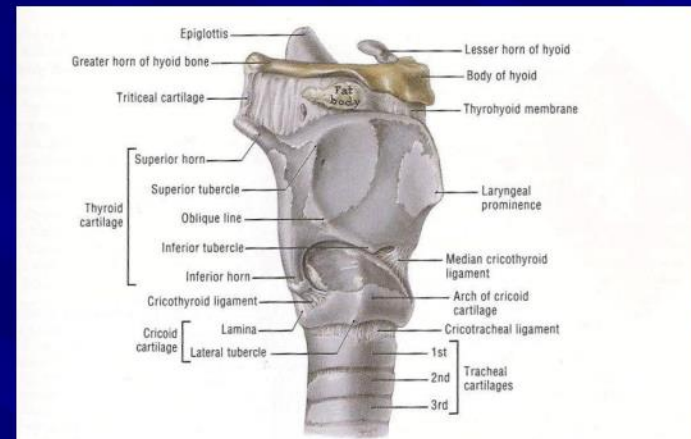
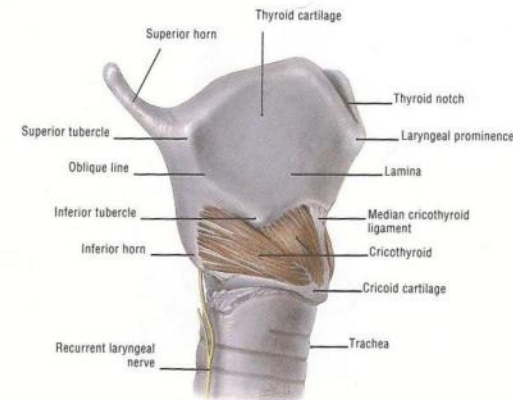


Figure 8-53. Lateral view of the skeleton of the larynx. The larynx extends vertically from the tip of the epiglottis to the inferior border of the cricoid cartilage. The hyoid bone is not part of the larynx.



■ Thyroid cartilage :

- Shield like

■ Cricoid cartilage :

- 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

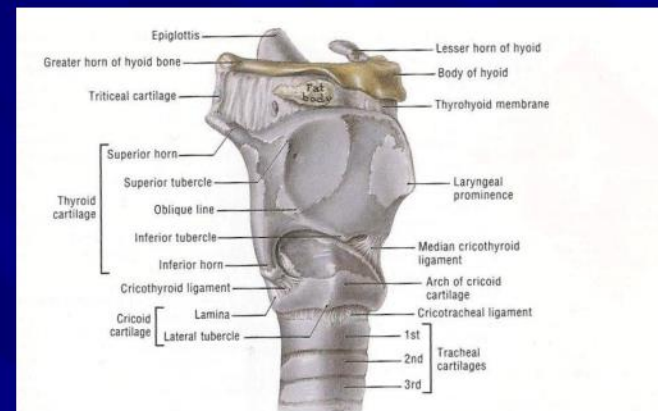
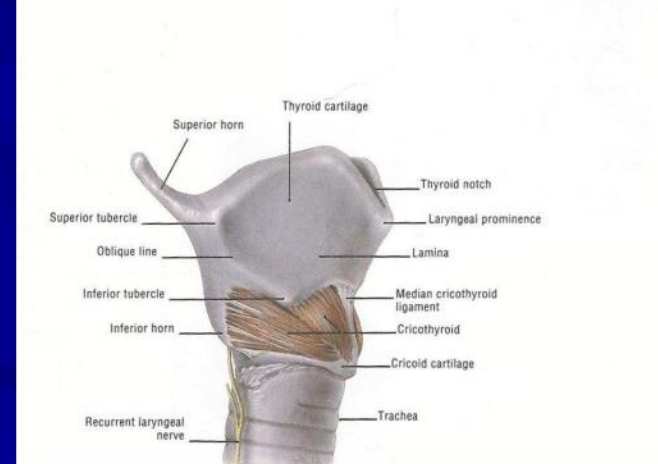


Figure 8-53. Lateral view of the skeleton of the larynx. The larynx extends vertically from the tip of the epiglottis to the inferior border of the cricoid cartilage. The hyoid bone is not part of the larynx.



■ Arytenoid cartilage :

- Pyramidal shaped
- Apex ,vocal & muscular process.

– Cricoarytenoid joint

- Synovial
- rocking motion

■ Corniculate and cuneiform cartilage:

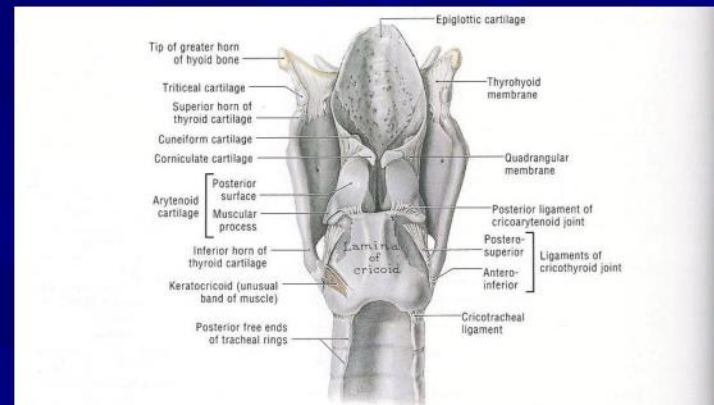


Figure 8-55. Posterior view of the skeleton of the larynx. Observe that the thyroid cartilage shields the smaller cartilages of the larynx. The hyoid bone, although not a part of the larynx, shields the superior part of the epiglottic cartilage.

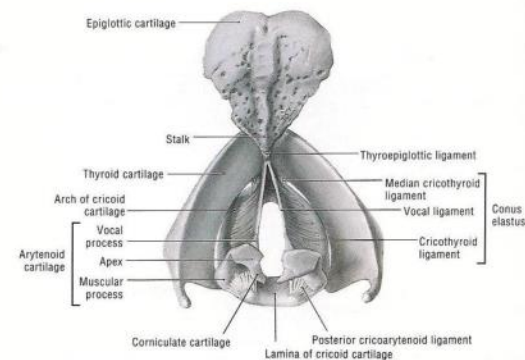


Figure 8-56. Skeleton of the larynx (superior view).

■ Epiglottic cartilage :

- Leaf like structure
- Elastic cartilage

- Thyroepiglottic ligament
- Hyoepiglottic ligament
- glossoepiglottic fold ►
valleculae

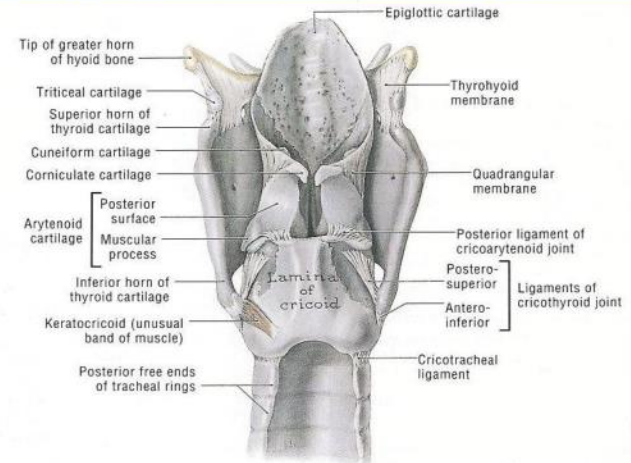


Figure 8-55. Posterior view of the skeleton of the larynx. Observe that the thyroid cartilage shields the smaller cartilages of the larynx. The hyoid bone, although not a part of the larynx, shields the superior part of the epiglottic cartilage.

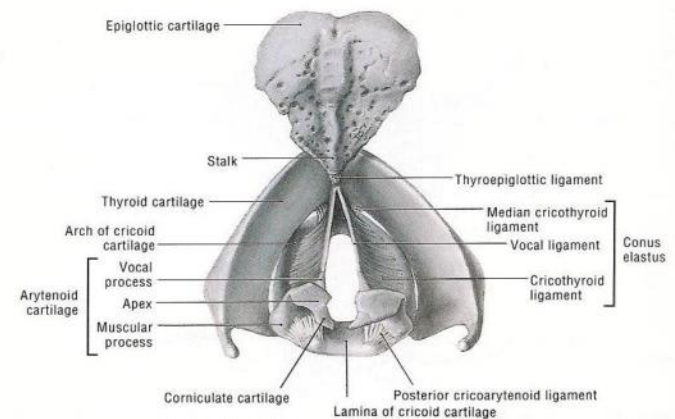


Figure 8-56. Skeleton of the larynx (superior view).

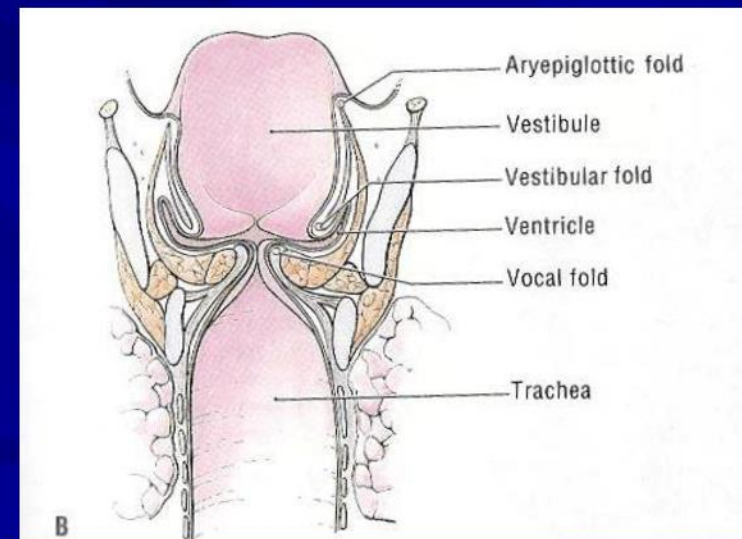
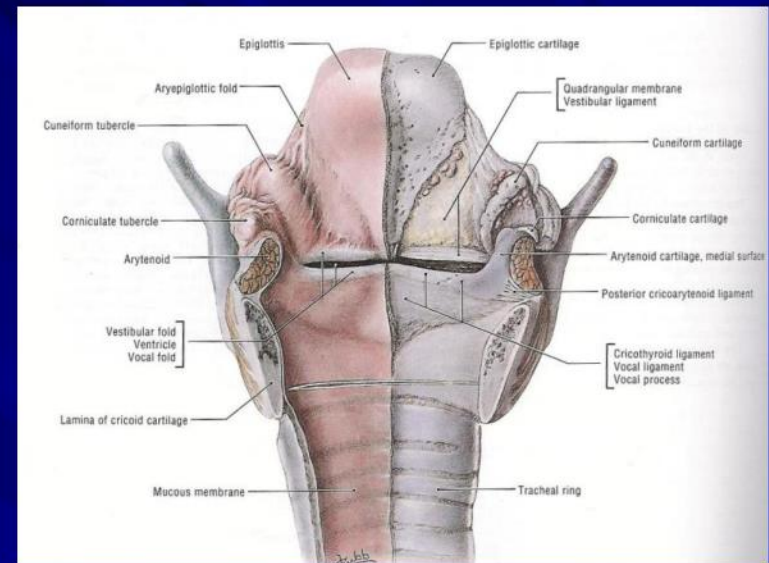
■ Laryngeal membranes :

– Quadrangular membrane.

- Upper and lower border
 - ▶ thickened
- aryepiglottic fold
- Vestibular fold

– Triangular membrane (conus elasticus).

- Medial and lateral border is free
 - ▶ thickened
 - ▶ vocal ligament



■ Laryngeal mucosa :

- All mucosa from trachea to aryepiglottic fold ► **ciliated columnar epithelium.**
- ☀ except vocal cord and aryepiglottic fold
► squamous epithelium

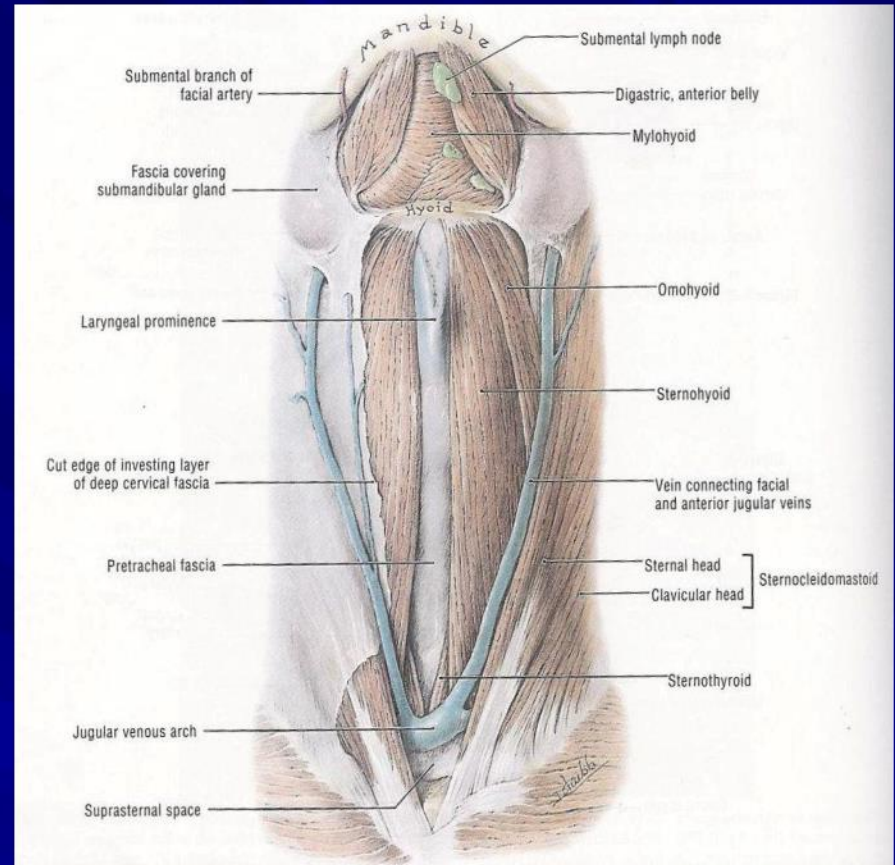
■ Laryngeal musculature:

– Extrinsic depressors. (C1-C3)

- Sternohyoid sternothyroid
thyrohyoid, omohyoid.

– Extrinsic elevators.

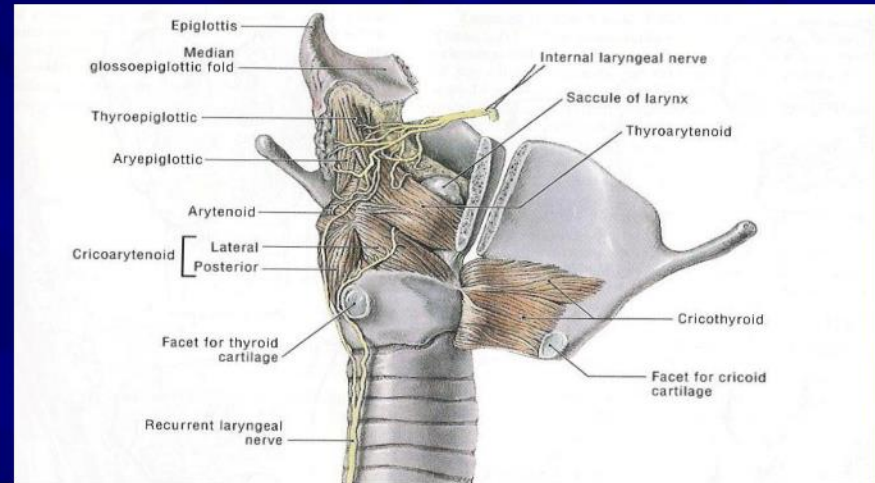
- Genohyoid (C1),
diaphragm (CNV-CNVII)
mylohyoid (v) stylohyoid
(VII)



Intrinsic musculature

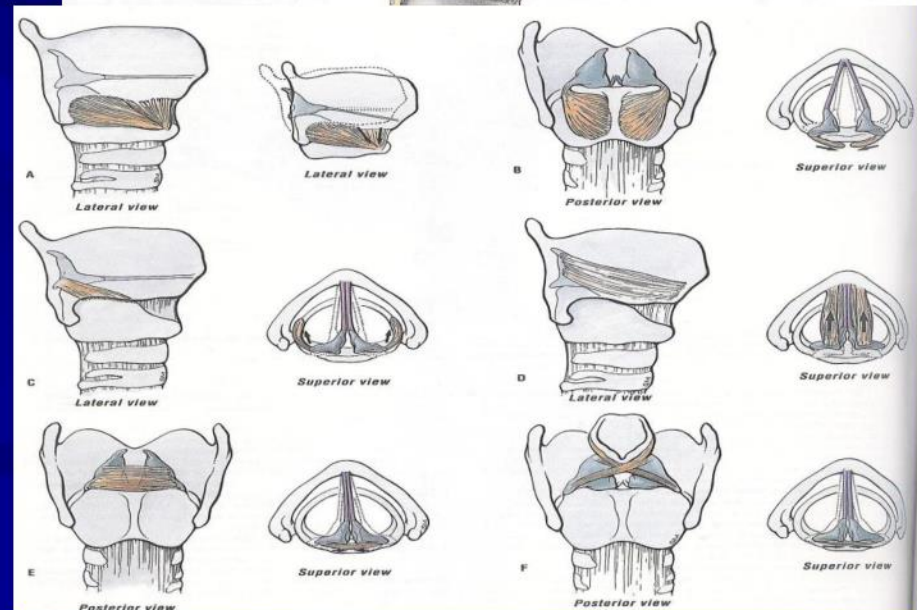
■ Abductors :

- posterior cricoarytenoid (PCA)



■ Adductors:

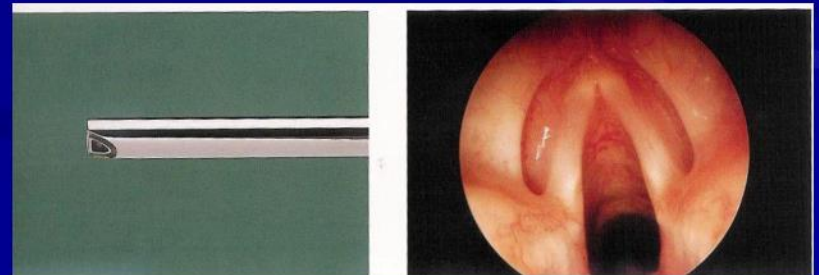
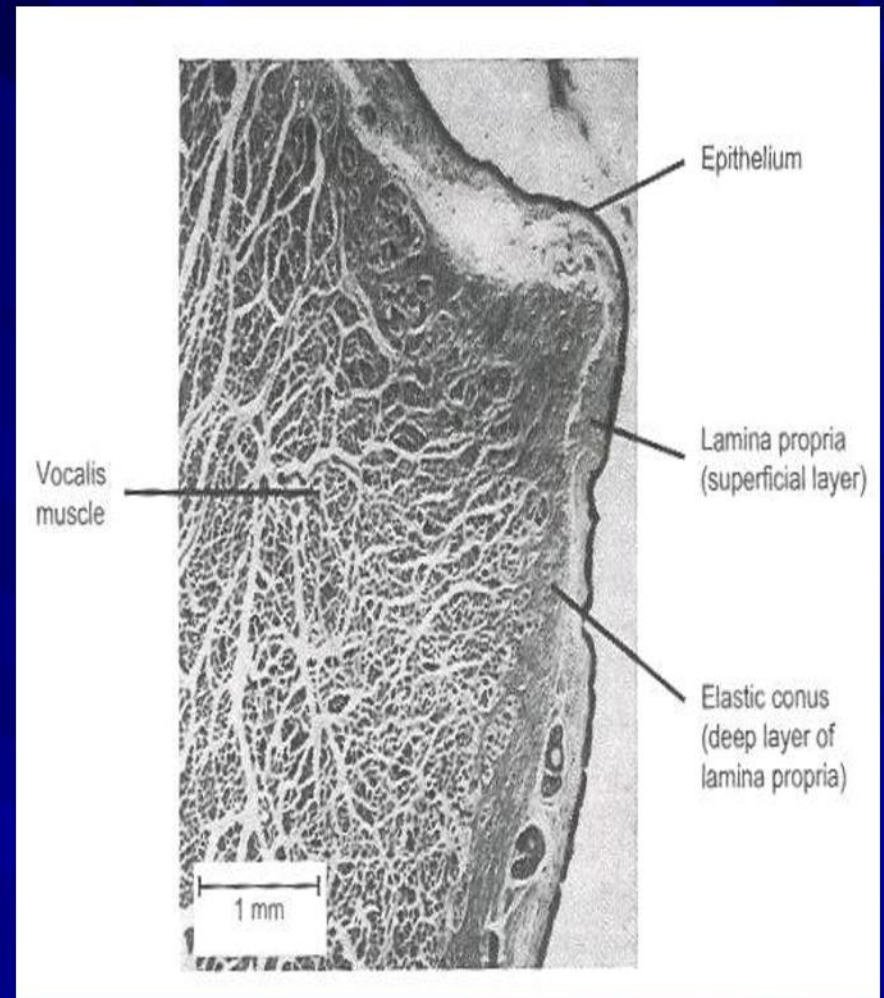
- thyroarytenoid (TA) ,lateral cricoarytenoid (LCA) ,cricothyroid, interarytenoid



– 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)



■ **Blood supply :**

- Superior and inferior laryngeal artery and veins.

■ **lymphatic drainage:**

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

■ Nerve supply:

– Superior laryngeal nerve

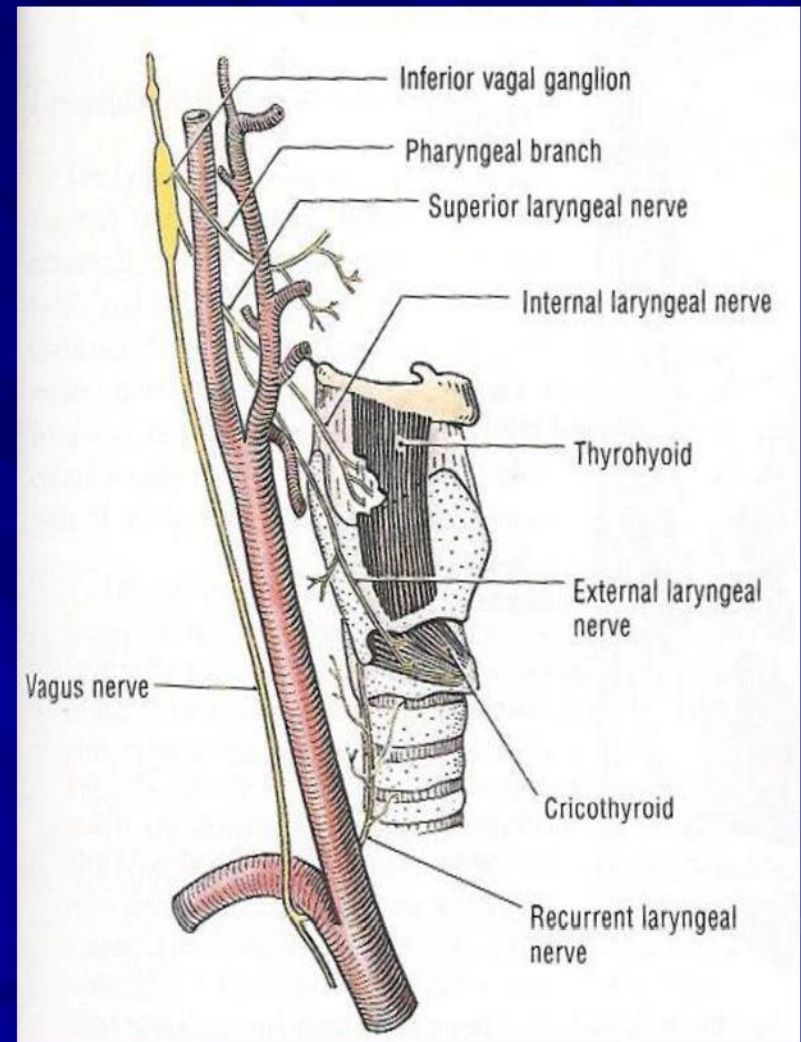
- Internal branch (sensory)
+superior laryngeal artery .
- External branch
▶ **cricothyroid muscle**

– 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**



Pediatric airway anatomy

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



Applied physiology of the larynx

■ Protection of the lower air passages

- Closure of the laryngeal inlet
- Closure of the glottis
- Cessation of respiration
- Cough reflex (forced expiration is made against a closed larynx)

■ 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**)

■ Respiration

■ Laryngeal sphincters

- True vocal cord
- false vocal cord
- Aryepiglottic sphincter

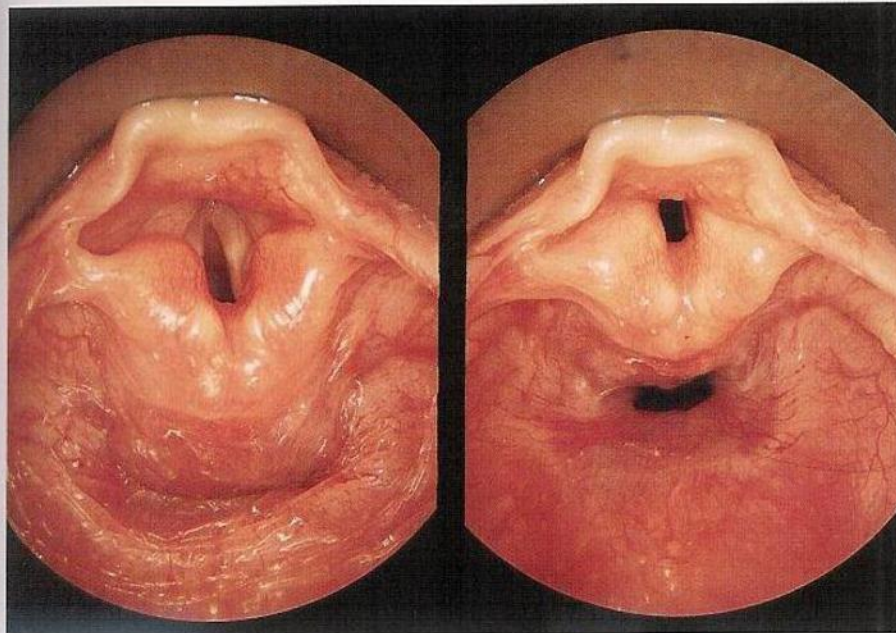


Figure 8.24

'The Benjamin lift' often assists exposure of the postcricoid region – a telescope can often be passed to examine the upper part of the oesophagus.

Evaluation of the dysphonic patient

■ HISTORY

– Dysphonia (hoarseness)

- URTI, fever, cough, (voice, tobacco or alcohol abuse), dysphagia, aspiration, breathing difficulty, wt lost, GERD, trauma, previous surgery.

■ EXAMINATION

- Indirect laryngoscope (mirror)
- Direct laryngoscope
- Fibreoptic flexible scope
- Stroboscopy
- Acoustic analysis

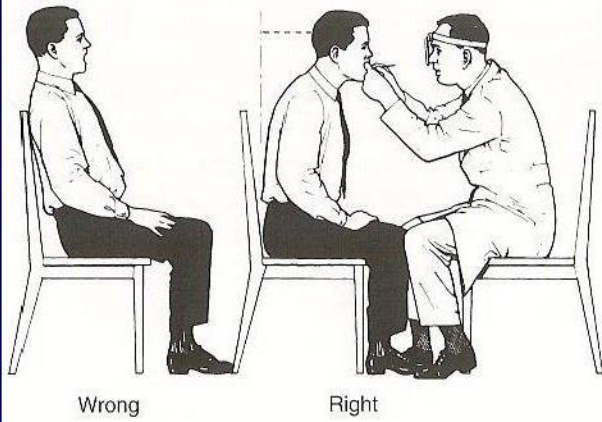
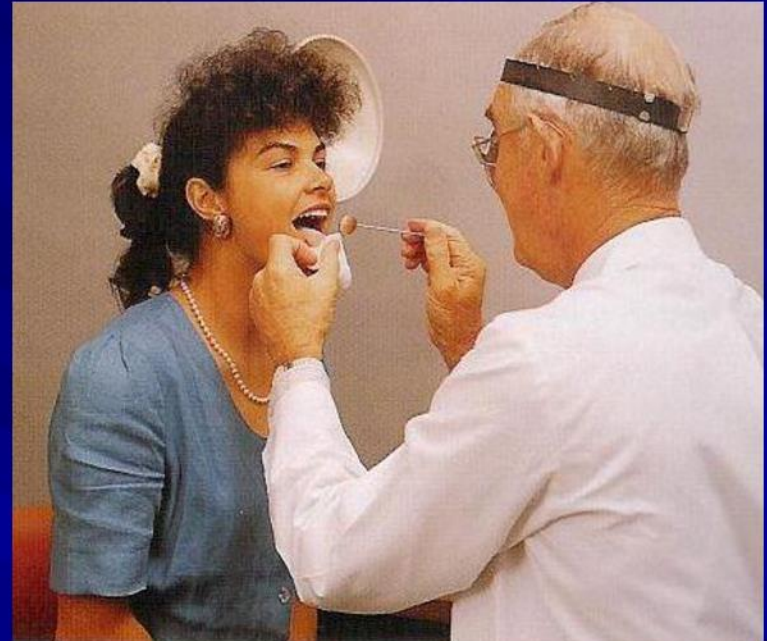
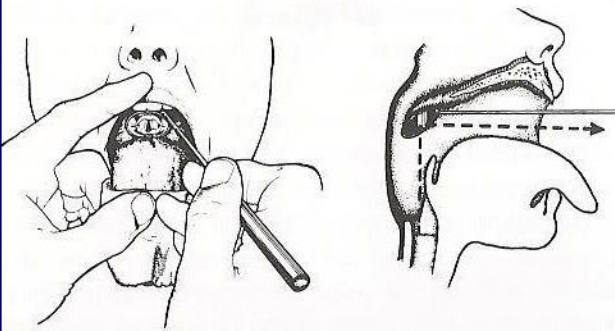


Figure 1.3
Position of the patient's head and neck for indirect laryngoscopy to create the best angle for a comprehensive view of the laryngeal structures.



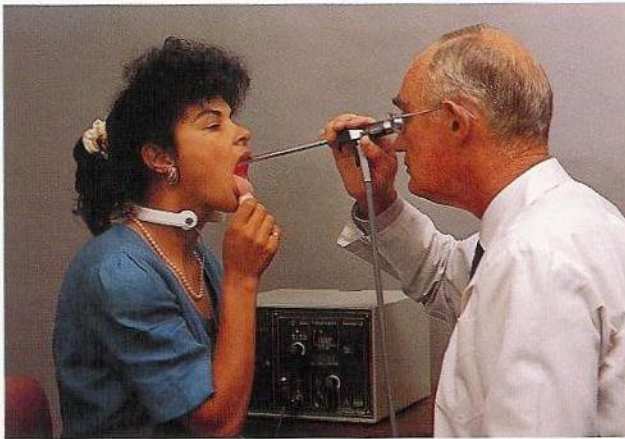


Figure 16

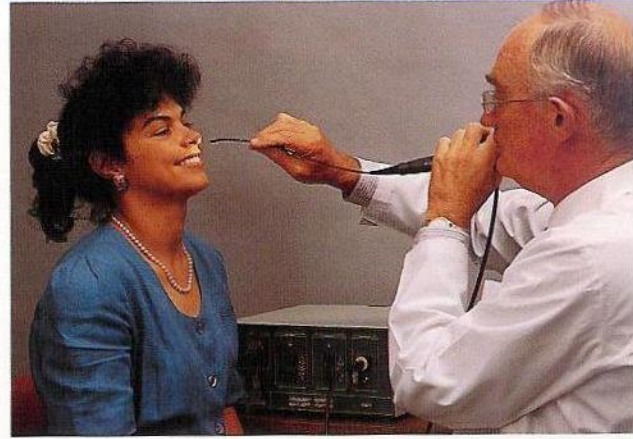
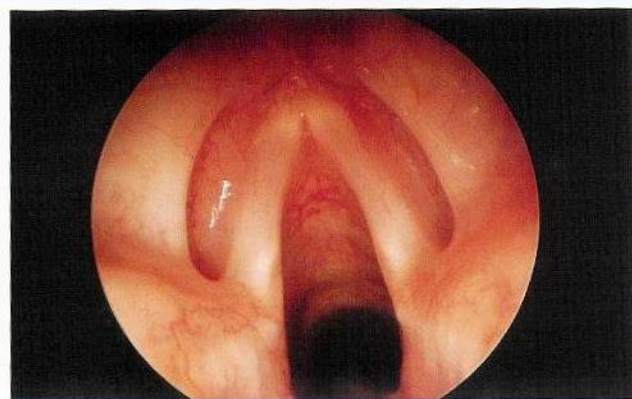
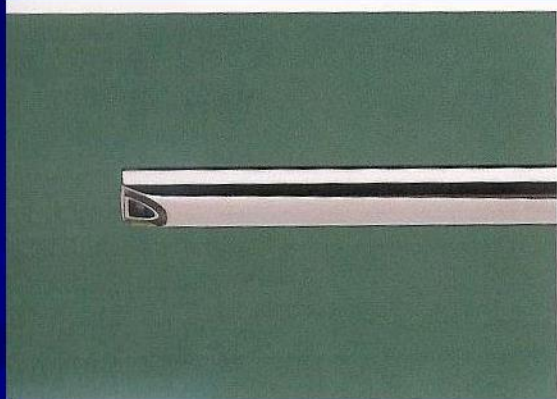
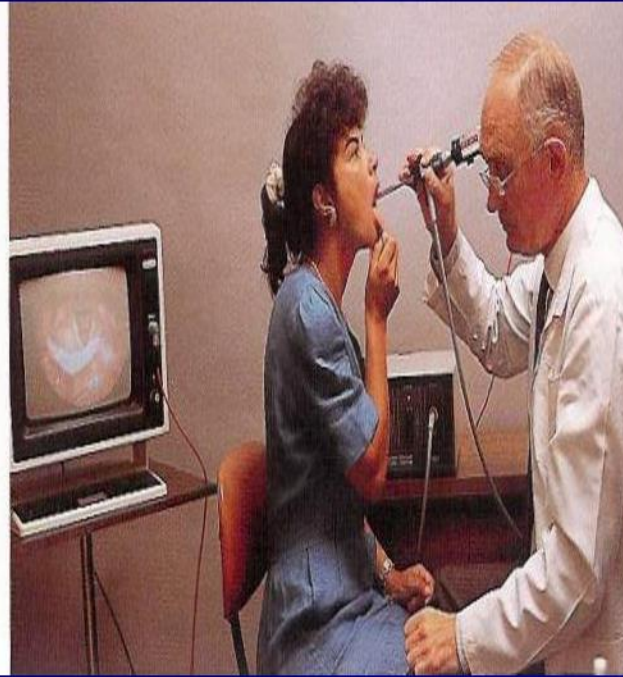
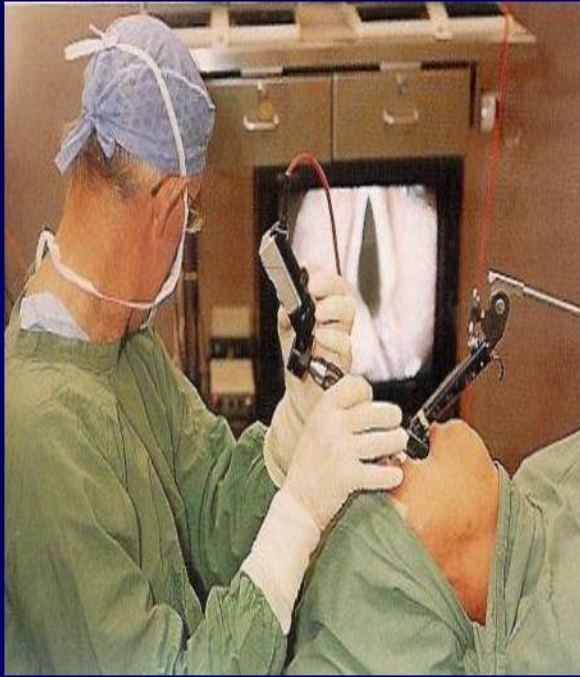
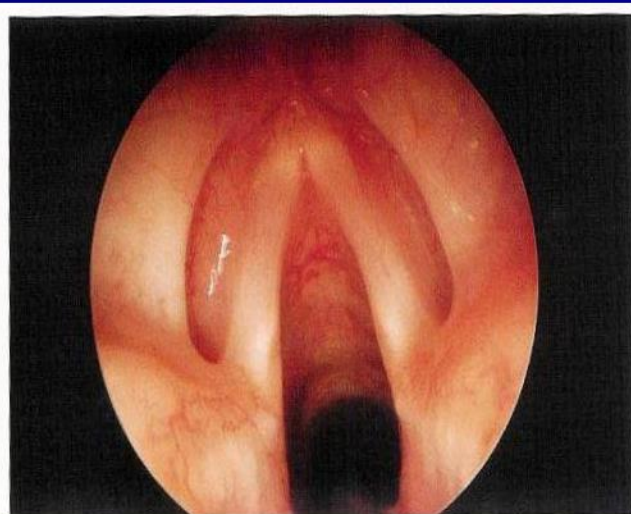
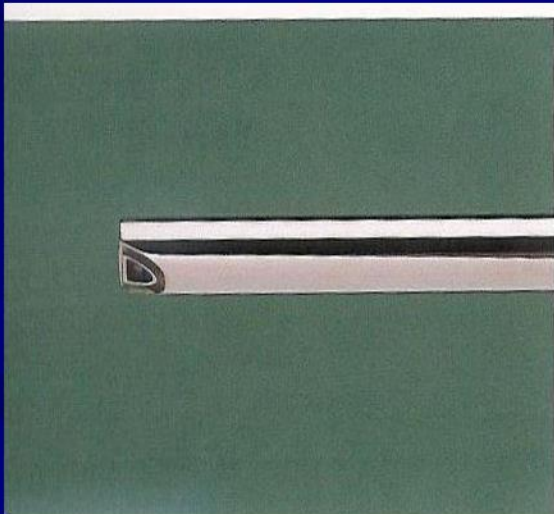
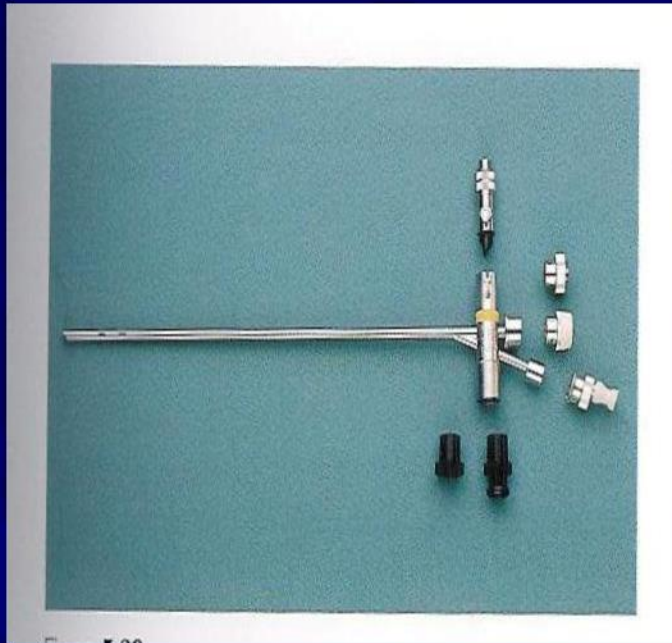
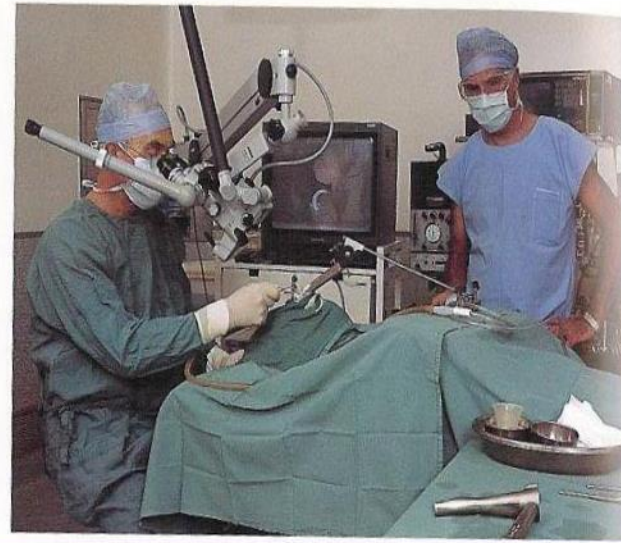
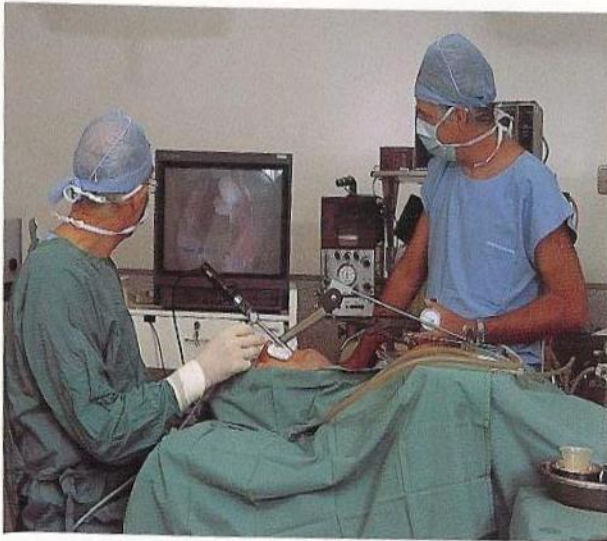


Figure 17



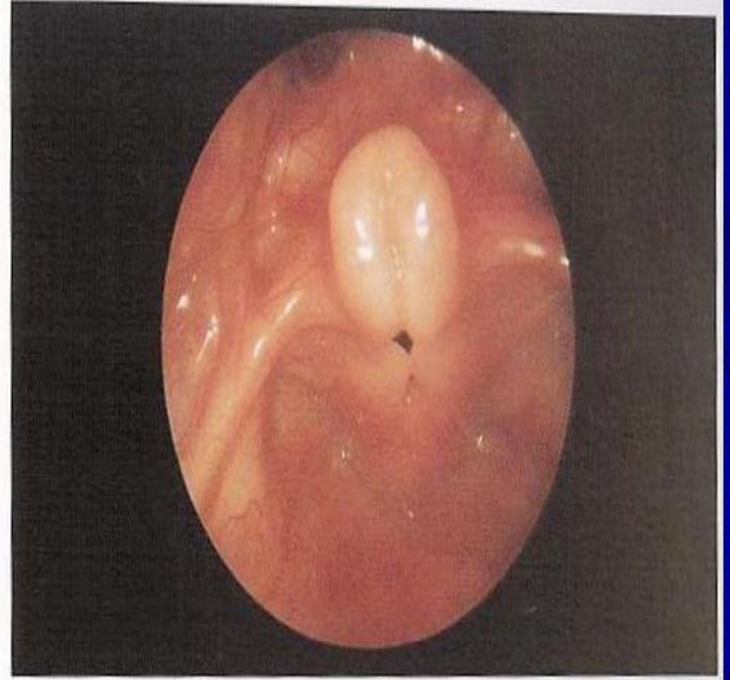
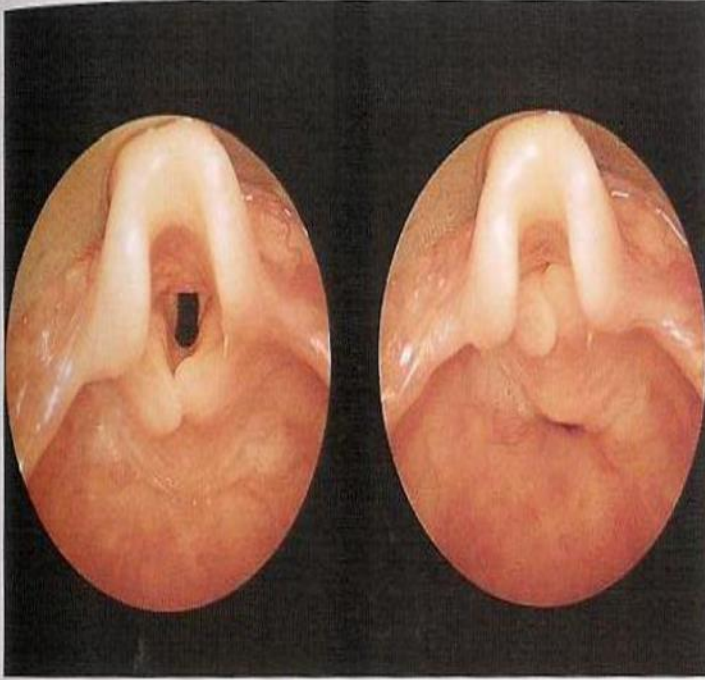






Disease of the larynx

- **Congenital abnormalities of the larynx :**
- **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
- **RX:**
 - observation
 - Epiglottoplasty
 - Tracheostomy



■ Subglottic stenosis :

- Incomplete recanalization, small cricoid ring

■ types:

- membranous
- Cartilaginous
- mixed

■ Grades:

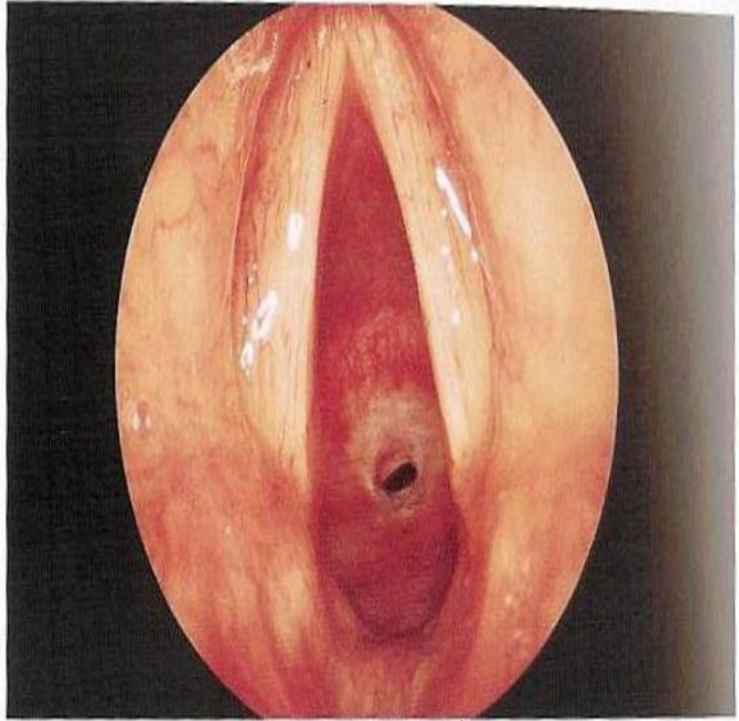
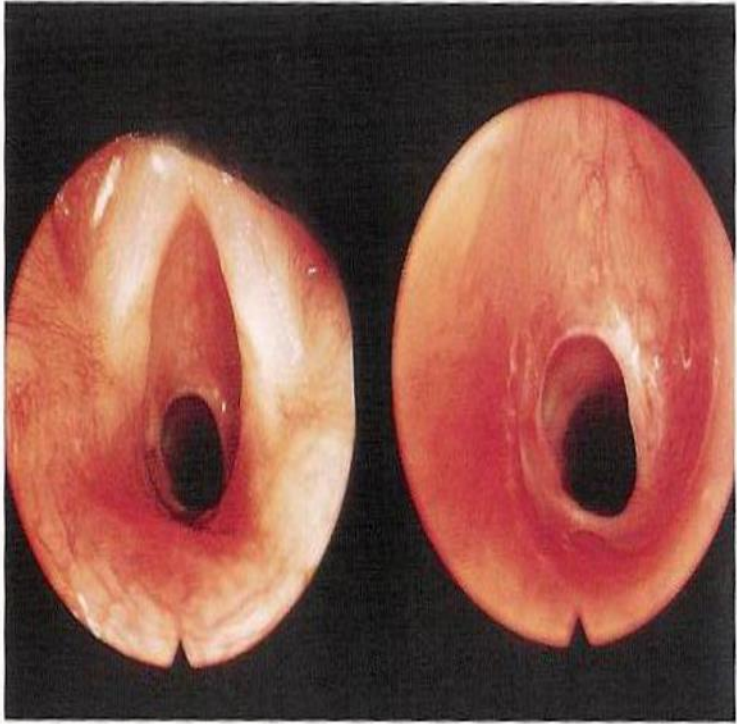
- I <70%
- II 70-90%
- III 91-99%
- IV complete obstruction

■ SSX :biphasic stridor ,failure to thrive .

■ DX: chest and neck X-ray ,flexible endoscope

■ RX: tracheotomy

- grade I - II ;
 - endoscope (CO2 or excision with dilation)
- Grade III –IV:
 - open procedures:
 - Ant cricoid split
 - LTR OR 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
- open procedure+ tracheostomy

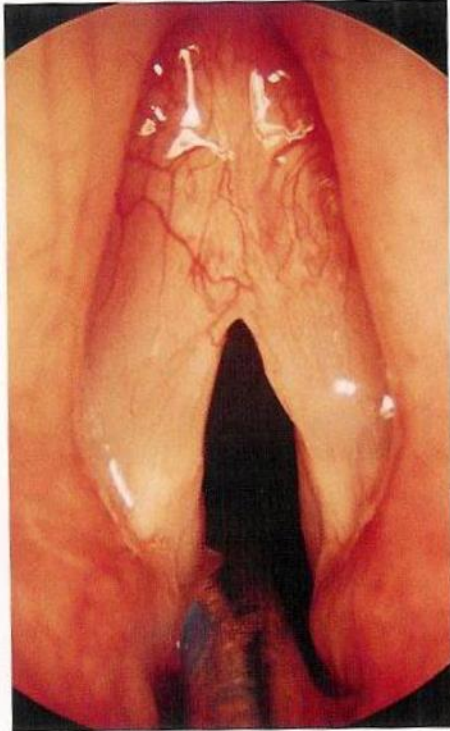
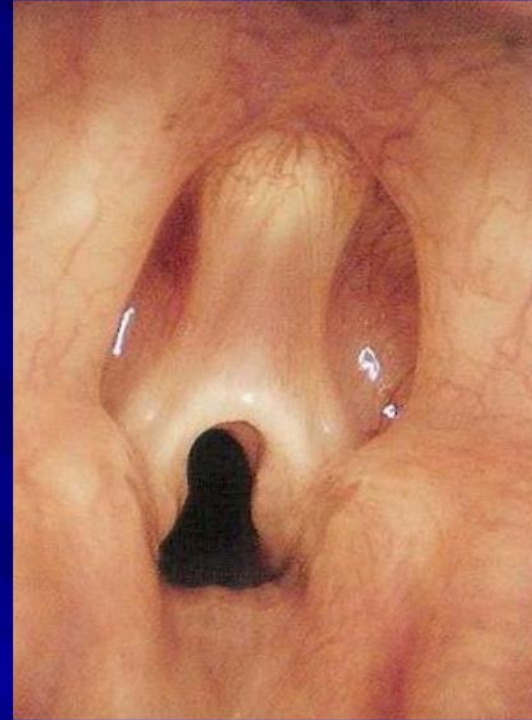
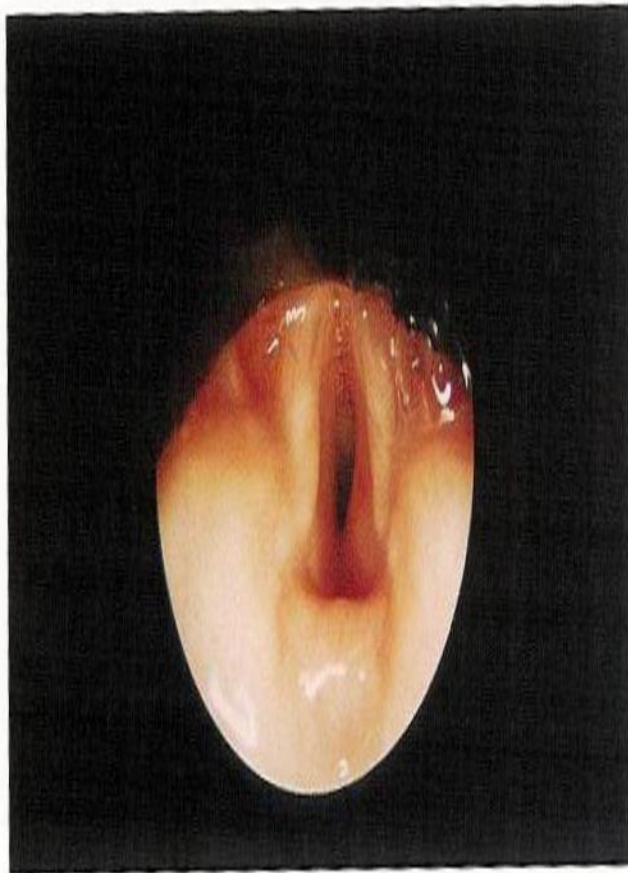
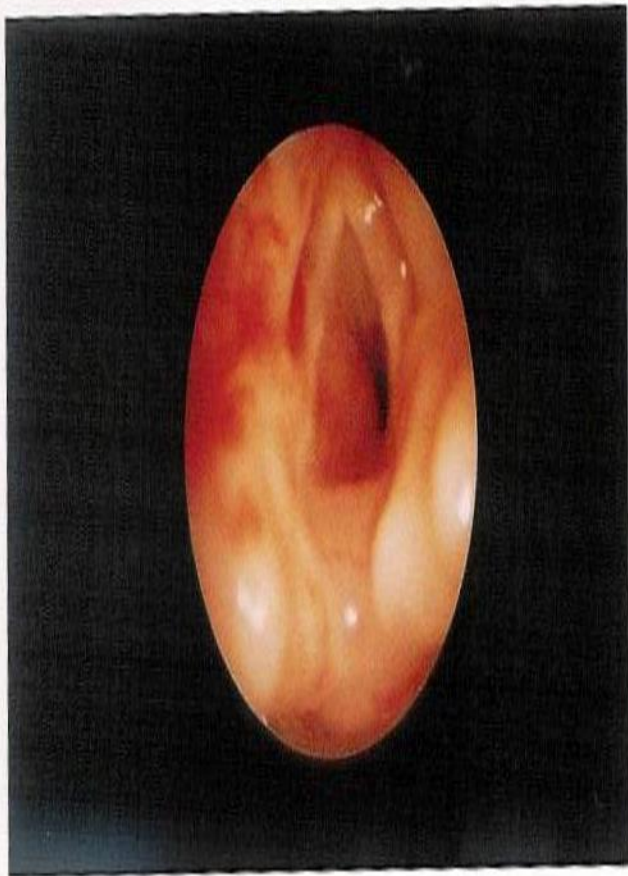


Figure 14.6
Vocal fold adhesion. Simultaneous removal of vocal nodules caused synechiae of moderate thickness. The voice was worse than before treatment.



Subglottic haemangioma

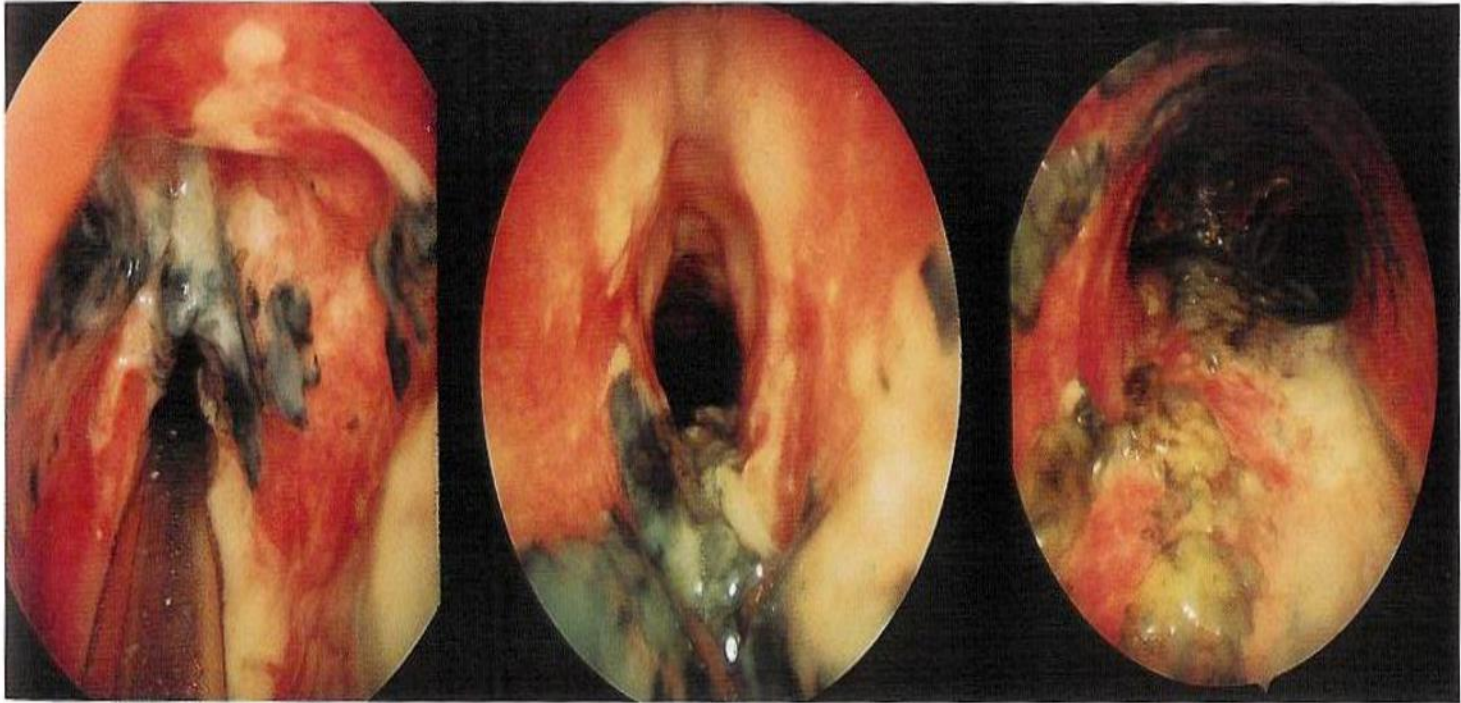
- Most common in subglottic space
 - 50% of subglottic hemangiomas associated with cutaneous involvement
- **Types:**
 - capillary (typically resolve)
 - Cavemous
- **SSX:** biphasic stridor
- **DX :**endoscope
- **RX:**
 - observation
 - Corticosteroid
 - CO2 LASER

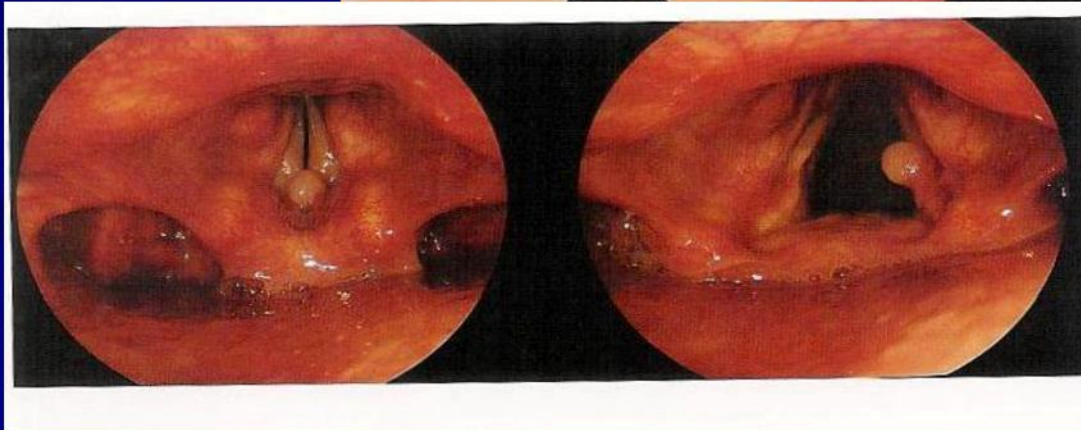
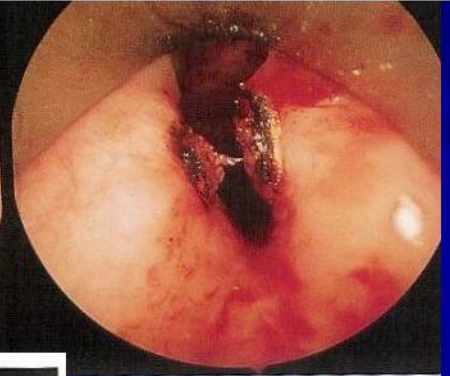
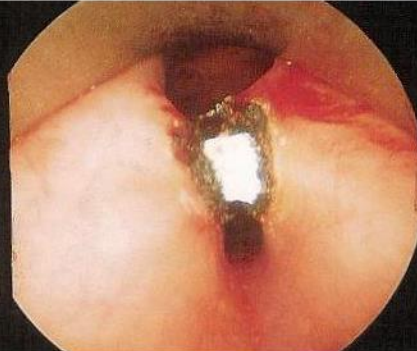
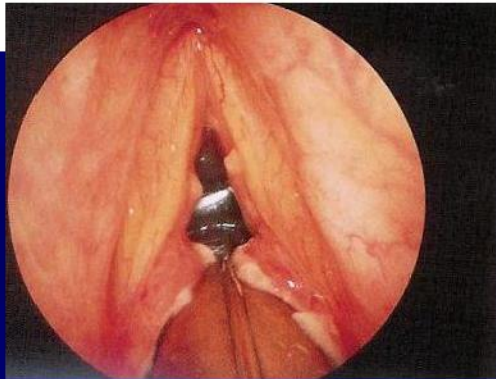
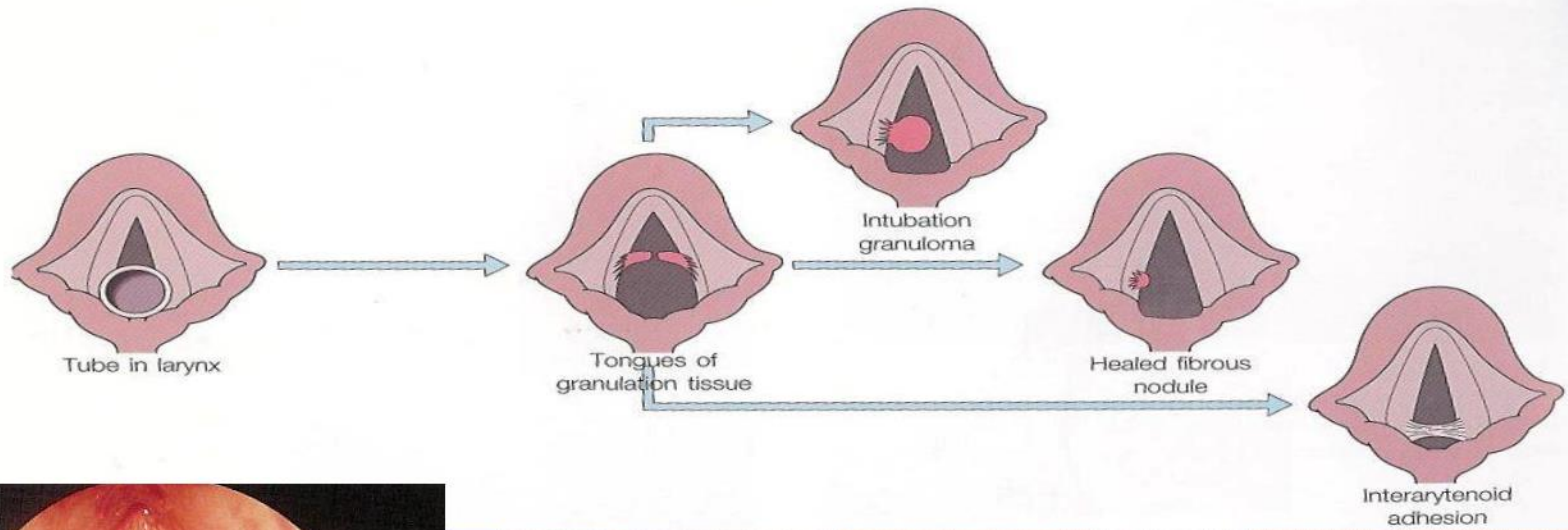


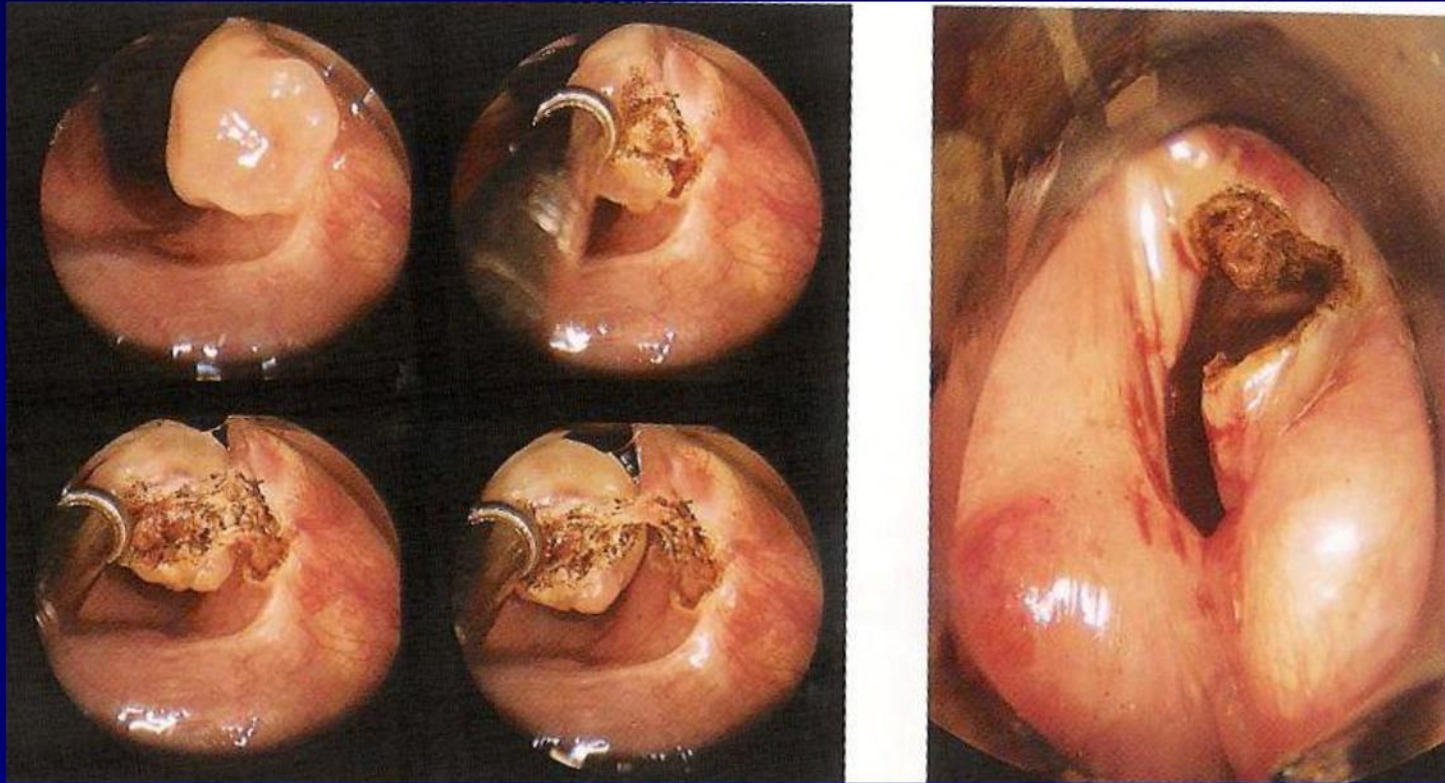
Traumatic conditions of the larynx

- Direct injuries (blows)
- Penetration (open)
- Burns (inhalation , corrosive fluids)
- Inhalation foreign bodies
- **Intubations injuries :**
 - Prolonged intubation
 - Blind intubation
 - too large tube
- **pathology :**
 - Abrasion ► granulomatous formationsubglottic stenosis
 - SSX; hoarsness , dyspnoea
 - RX:
 - voice rest
 - endoscopic removal
 - prevention





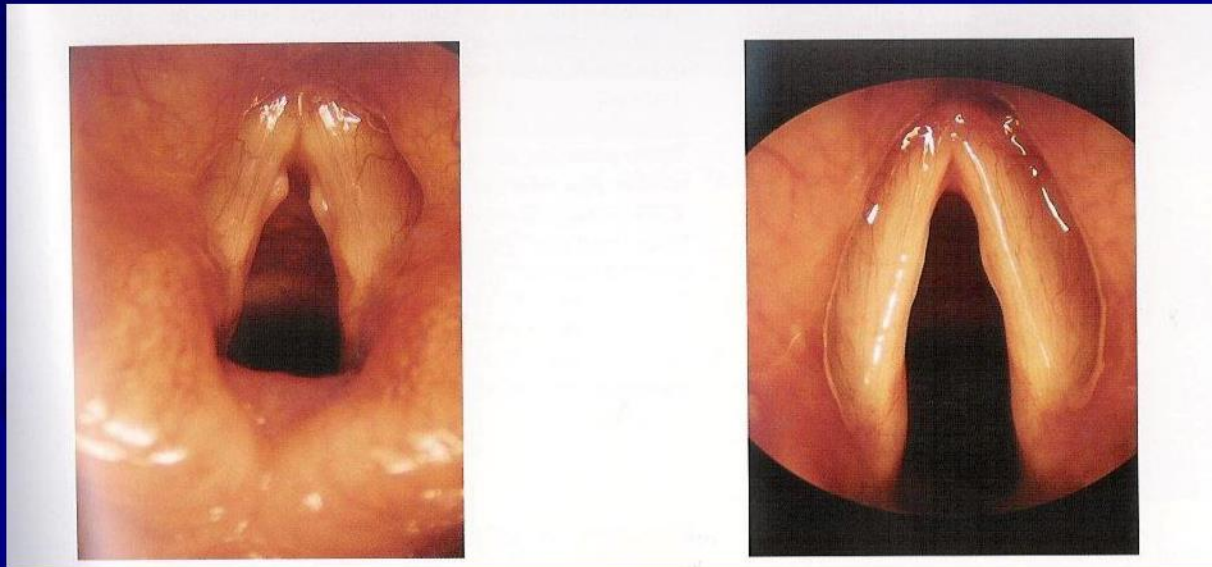
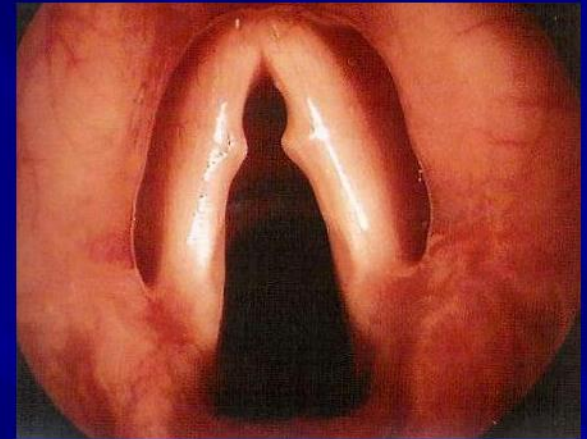




Vocal fold lesions secondary to vocal abuse and trauma

■ Vocal nodules (singer's nodules)

- At junction of ant 1/3 and mid 1/3
- RX :
 - voice therapy
 - surgical excision



■ Vocal fold polyp :

- Middle and ant 1/3 , free edge , unilateral
- Mucoid , hemorrhagic
- RX :
 - surgical excision



■ Vocal fold cyst ;

- congenital dermoid cyst
- mucus retention cyst
- **RX:**
 - surgical excision

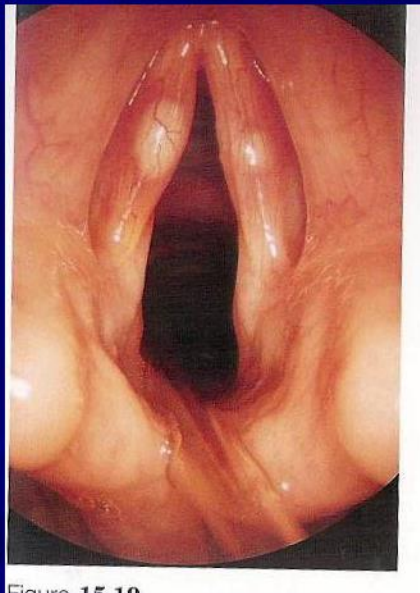


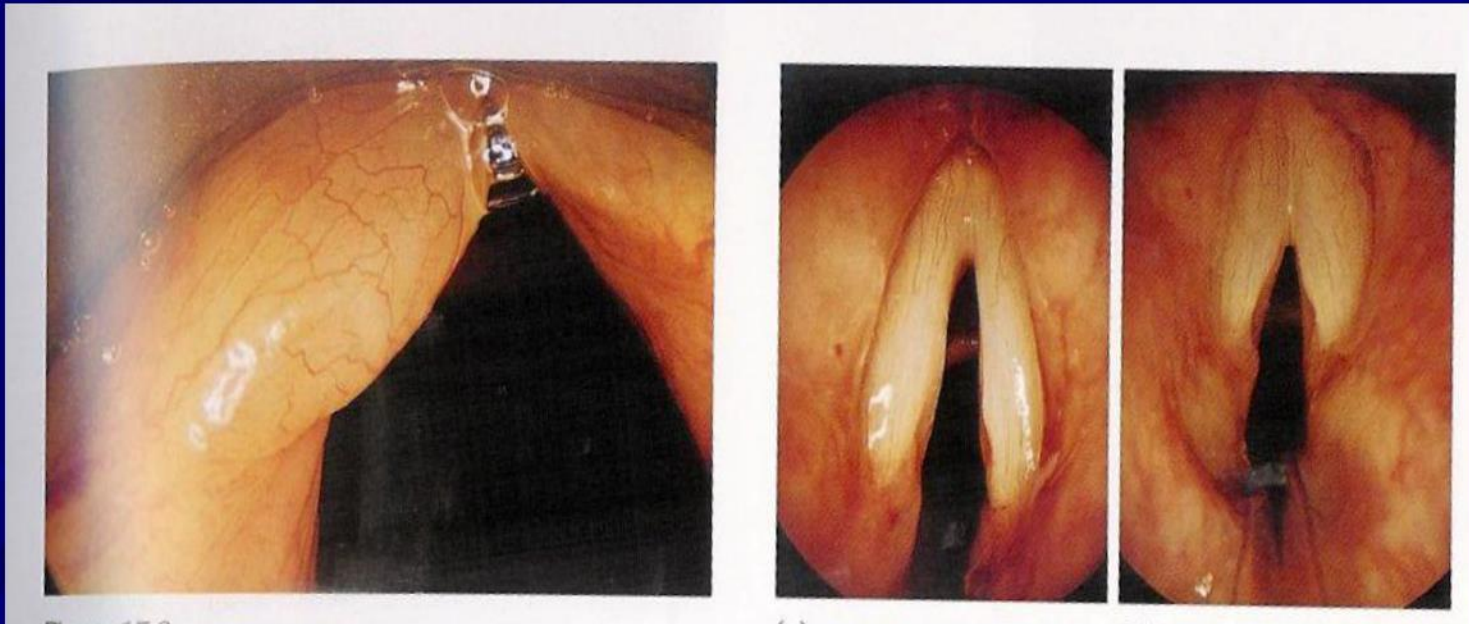
Figure 15-10



■ Reinke's edema

– RX:

- voice rest ,stop smoking
- surgical excision



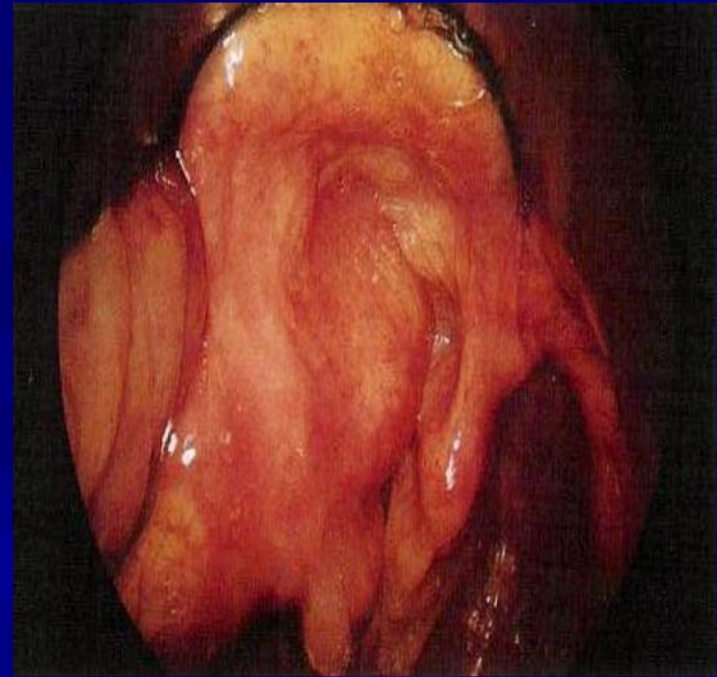
Laryngocele

- Air filled dilation of the appendix of the ventricle ,communicates with laryngeal lumen
- congenital or acquired

■ **types :**

- External : through thyrohyoid membrane
- Internal :
- Combined

■ **Rx :marsupialization**



Vocal cord paralysis

■ Causes:

– Adult

- Neoplastic
- Iatrogenic :
- Idiopathic
- Trauma
- Neurological
- infectious
- systemic diseases
- Toxins

– children

- Arnold chiari malformation
- Birth trauma

SSX:

Dysphonia

Chocking

Stridor

■ Vocal cord position :

- Median ,paramedian
,cadaveric

– Rx :

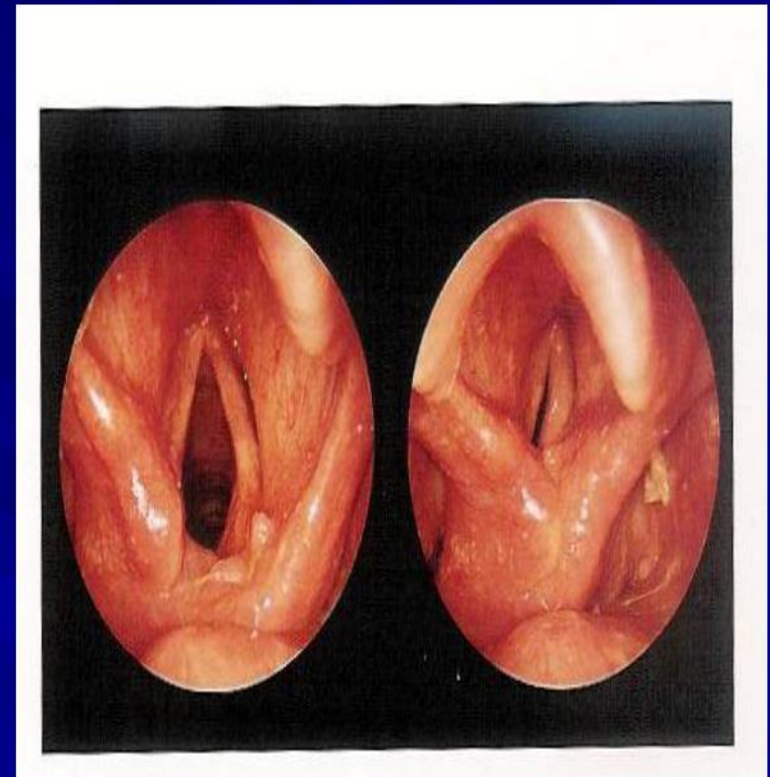
- Self limiting or permanent paralysis

– For medialization :

- Vocal cord injections
 - Gelfoam, fat, collagen, Teflon.
- Thyroplasty

– For lateralization:

- cordotomy
- Thyroplasty
- tracheotomy



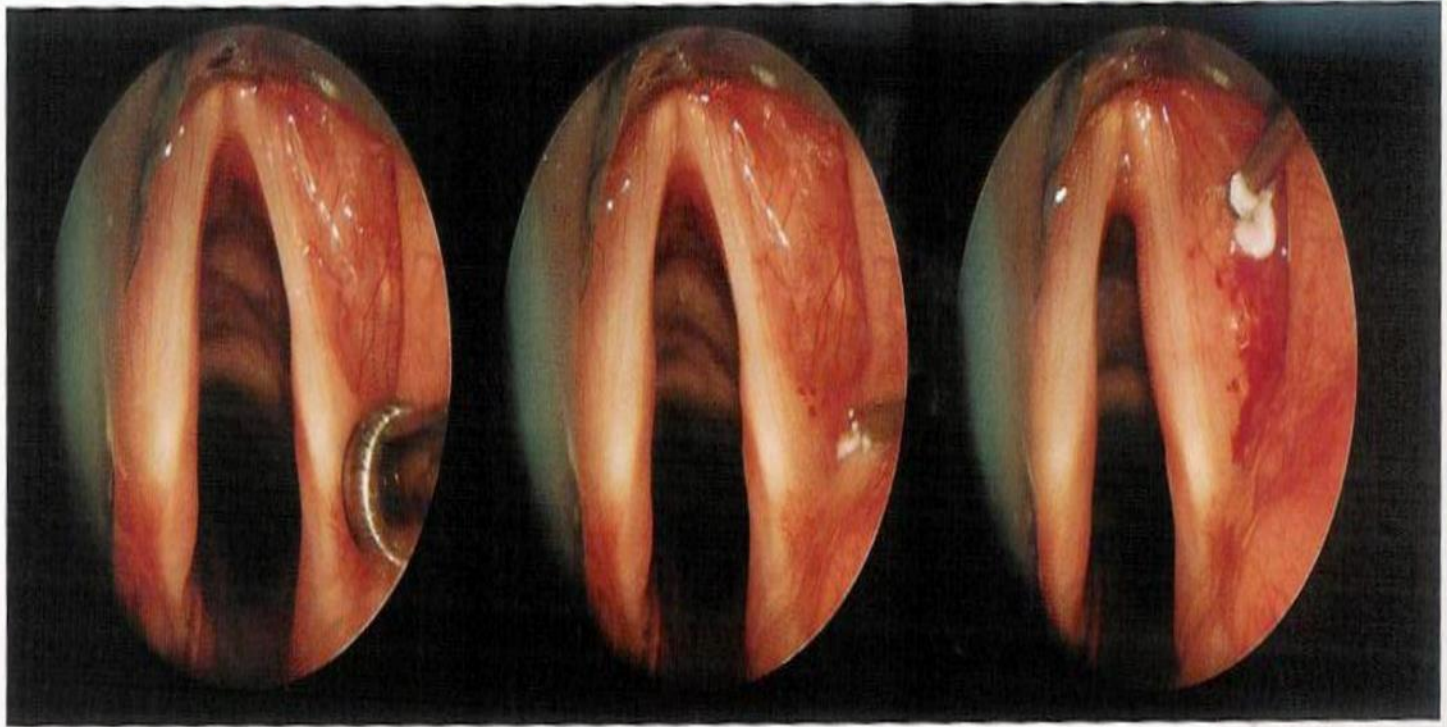
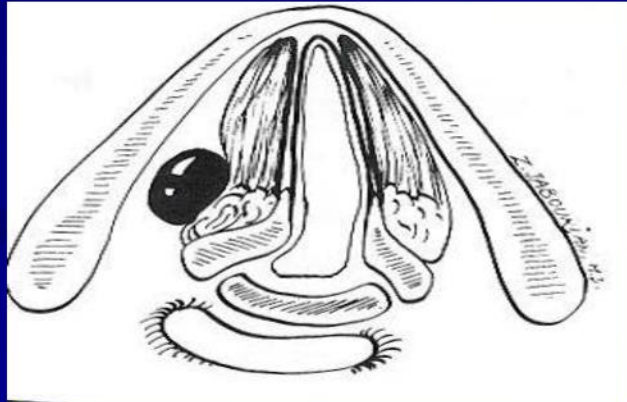
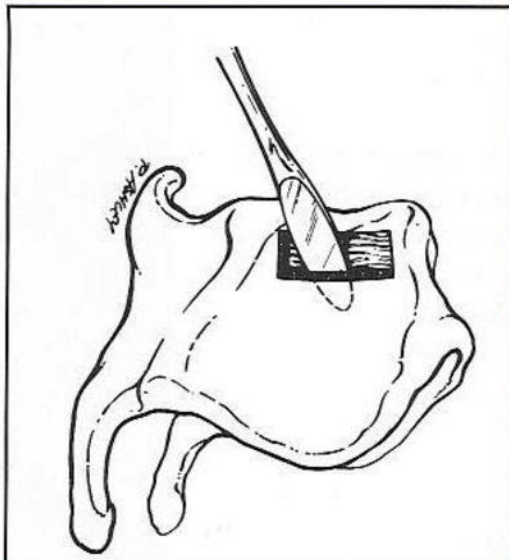
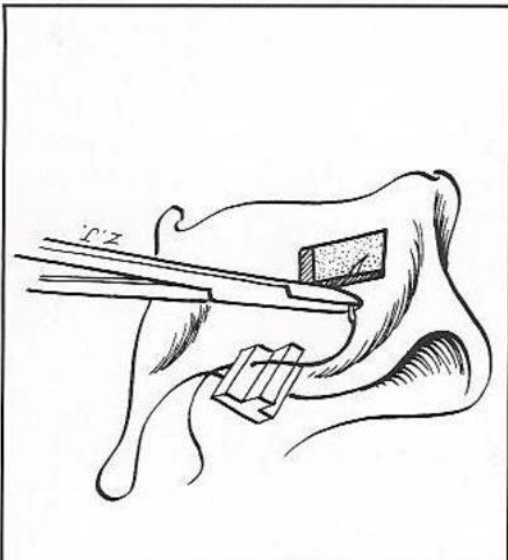
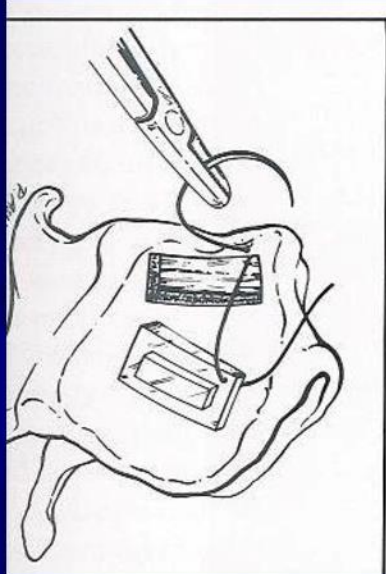
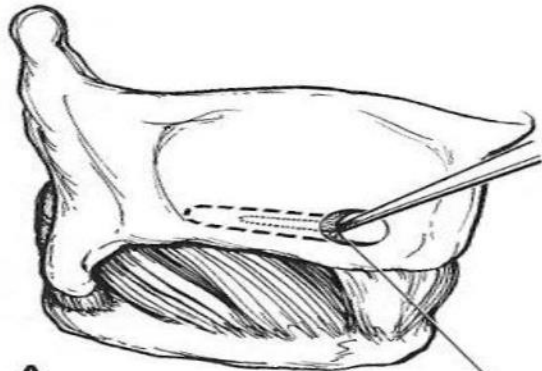


Figure 11.0

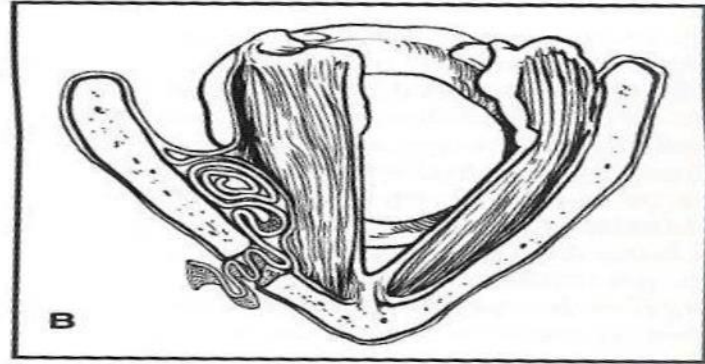




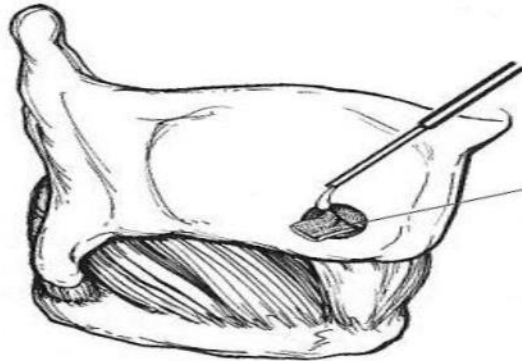


A

Inner Layer of Perichondrium is Elevated

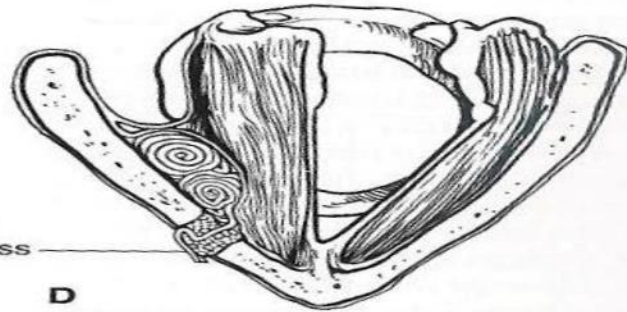


B



C

Application of Cyanoacrylate



D

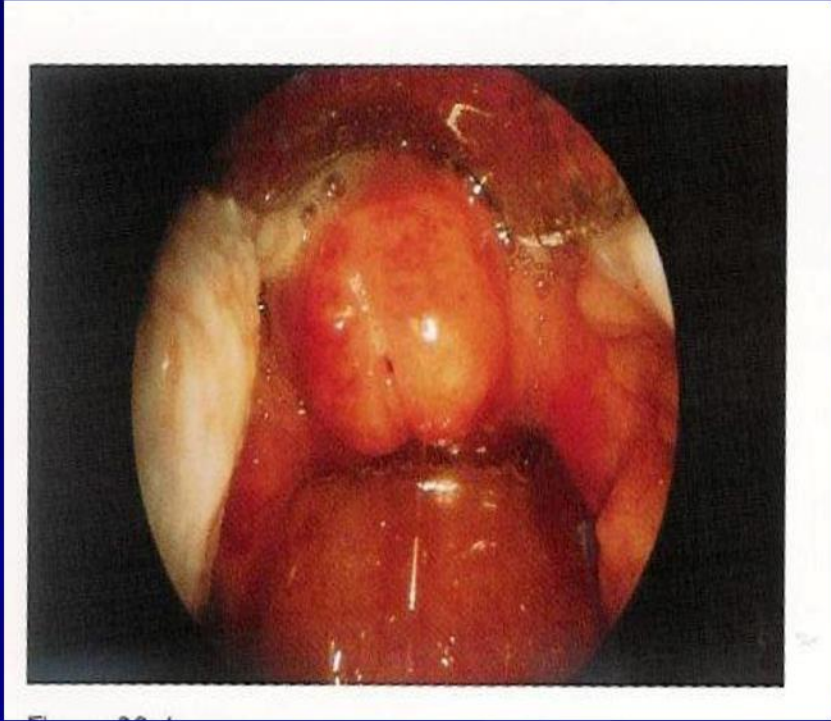
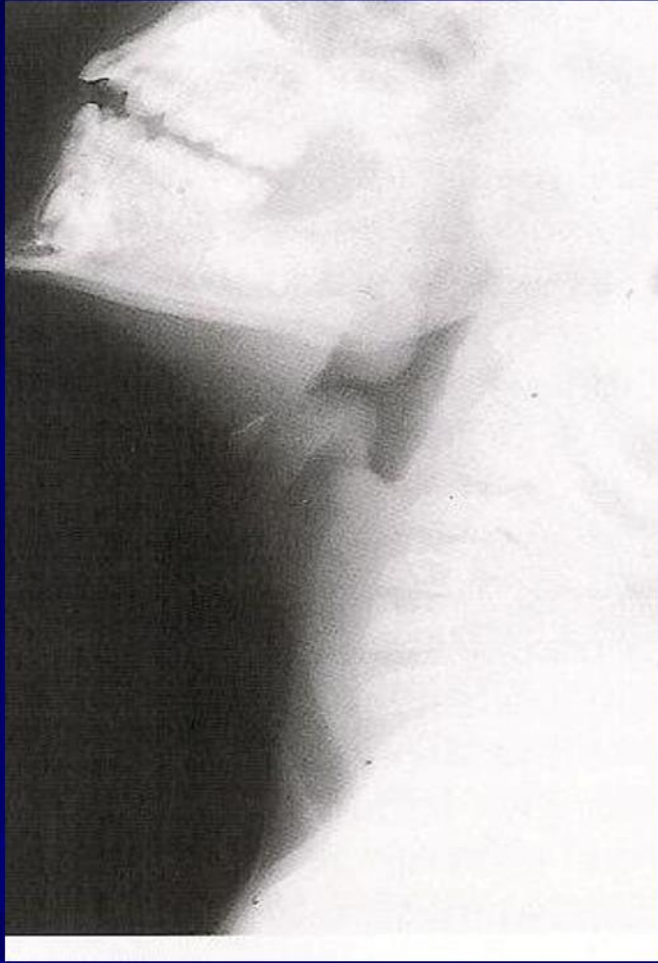
Tab is Left Free to Assist Future Access



Inflammation of the larynx

- **Acute viral laryngitis:**
 - Rhinovirus, parainfluenza
- **SSX:**
 - dysphonia , fever cough
- **Rx:**
 - conservative

- **Acute epiglottitis :**
 - Haemophilis influnzae B
 - 2-6 years
- **Ssx:**
 - fever , dysphagia ,drooling ,dyspnea, sniffing position , no cough, normal voice.
- **DX :**
 - x-ray (thumbprint sign)
- **Rx:**
 - do not examine the child in ER
 - Intubation in OR
 - IV abx
 - corticosteroid



■ Croup (laryngotracheobronchitis)

- Primary involves the subglottic
- Parainfluenza 1-3
- 1-5 years

■ SSX:

- biphasic stridor, fever , brassy cough , hoarseness , no dysphagia

■ DX:

- x-ray ,steeple sign

■ RX:

- humidified oxygen,racmic epinephrine ,steroid



Diphtheritic laryngitis

- Causes:
 - *Corynebacterium diphtheriae*
- Ssx:
 - Cough ,stridor ,dysphonia , fever
 - Greyish –white membrane
- Treatment:
 - Antitoxin injection
 - Systemic pencillin
 - Oxygen
 - tracheostomy

■ Fungal laryngitis :

- Immunocompromised
- candidiasis ,aspergillosis

– Ssx:

- dysphonia ,cough odynophagia

– RX:

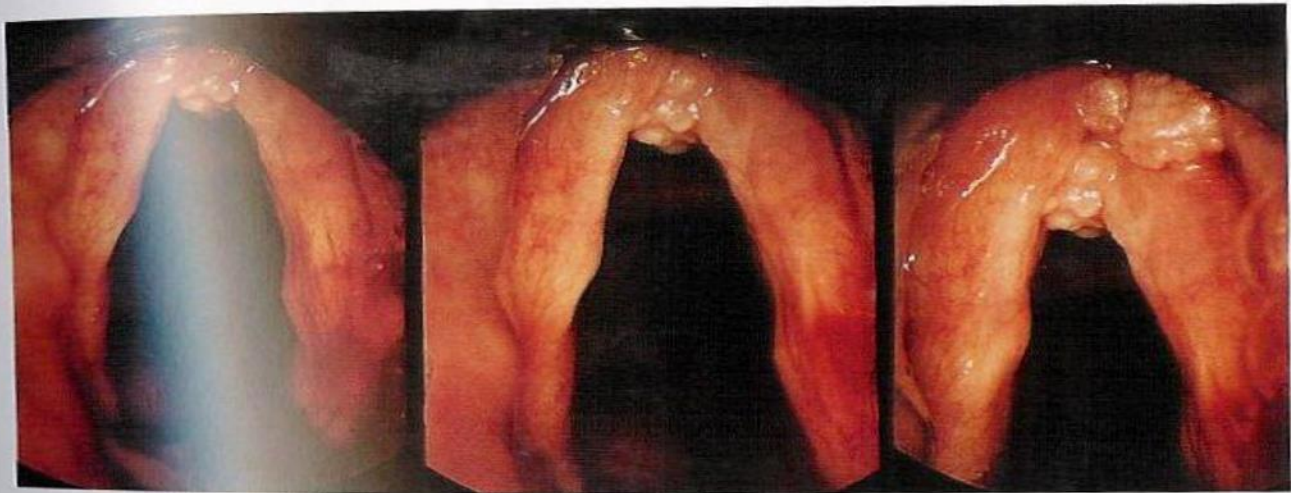
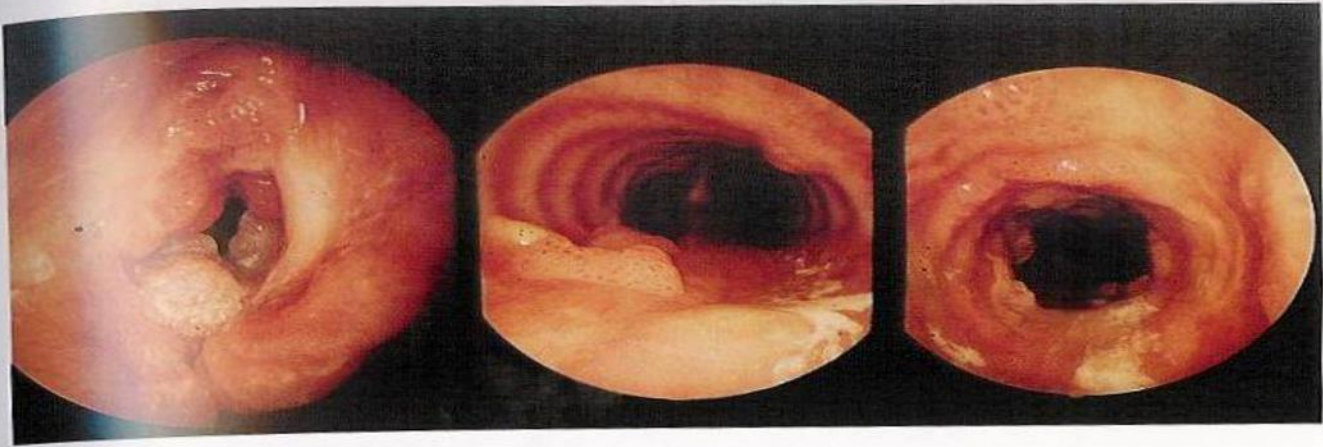
- antifungal regimen

■ Recurrent respiratory papillomatosis:

- 2/3 before age 15
- rarely malignant change
- HPV 6-11

■ Risks:

- younger first time mother (condyloma acuminata)
- Lesions: wart like (cluster of grapes)
- **Types :**
 - juvenile
 - Senile
- **SSX:**
 - Hoarseness stridor
- **RX;**
 - laser excision ,microdebrider
 - Adjunctive therapy: acyclovir , interferon ...



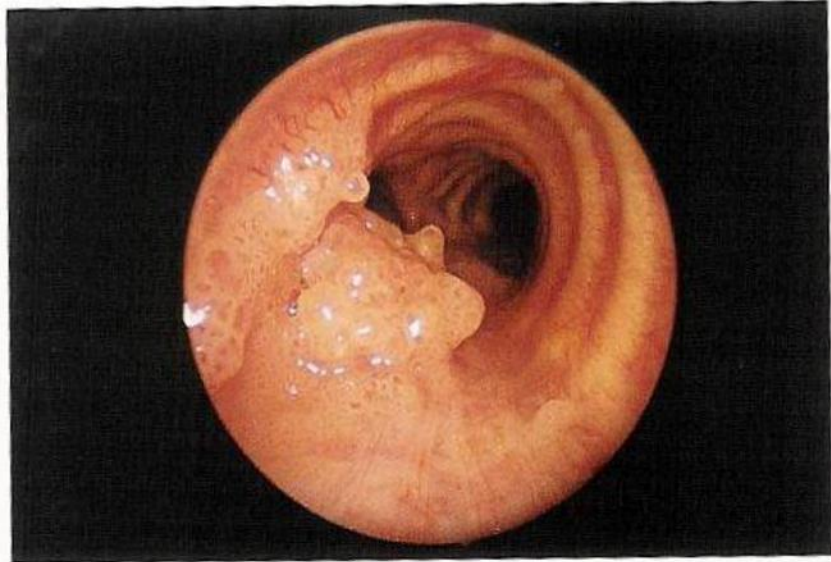
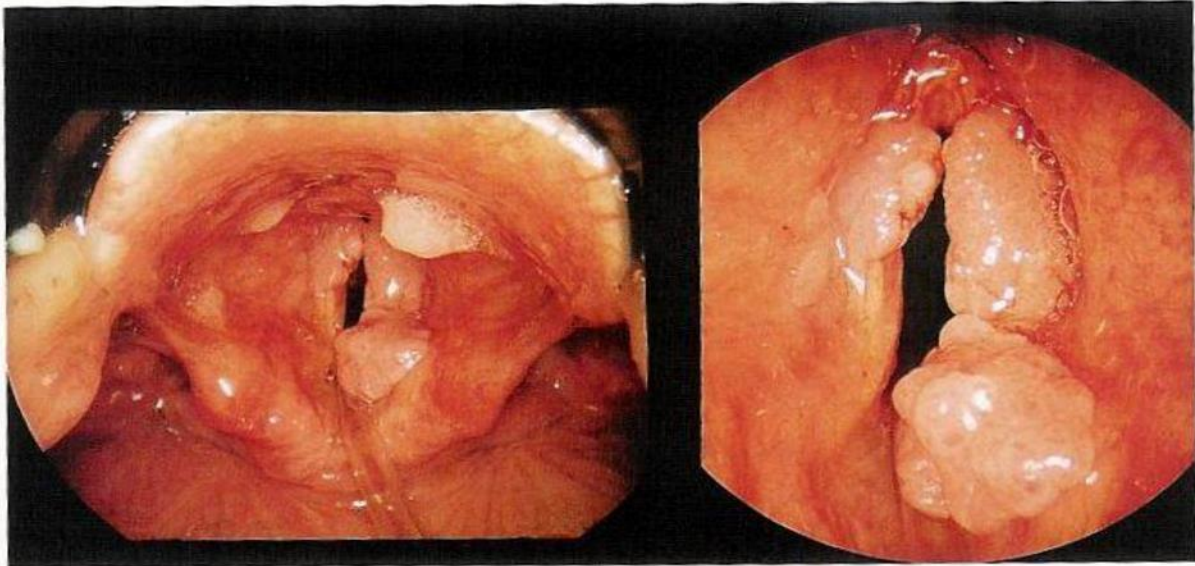


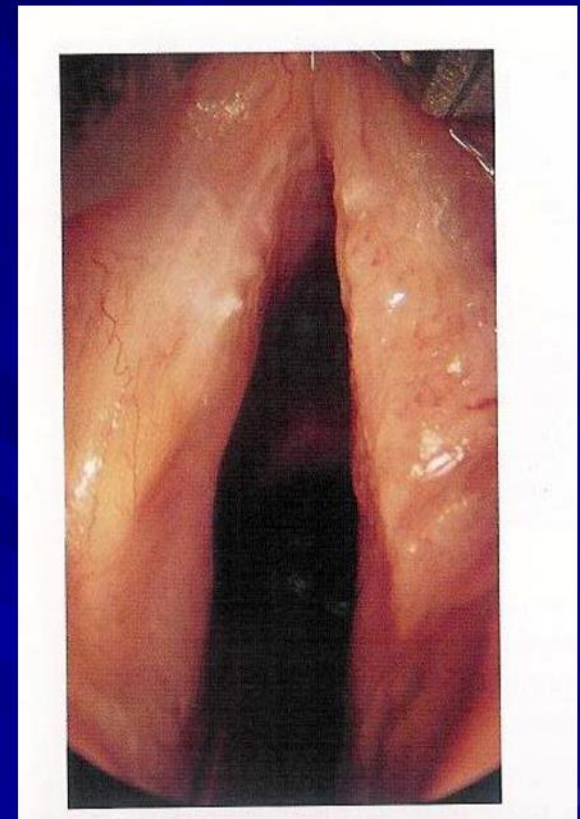
Figure 33.3

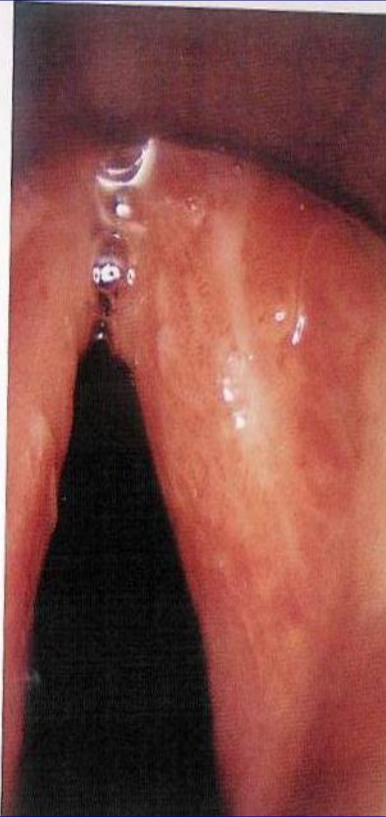


Malignant neoplasms of the larynx

- 1-5 % of all malignancies
- All are squamous cell carcinomas ;
- **Ssx:**
 - Hoarseness ,aspiration, dysphagia , stridor , wight 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 :**
 - Radiotherapy
 - hemilaryngectomy . Total laryngectomy + neck dissection





A sunset over the ocean with the words "Thank you" written in a red, hand-drawn font across the sky. The sky is filled with soft, colorful clouds in shades of purple, pink, and orange. The ocean is dark with gentle waves, and a sandy beach is visible in the foreground. The text "Thank you" is written in a simple, hand-drawn style, with the letters appearing to be made of a thick red line. The word "Thank" is on the left, and "you" is on the right, both positioned in the upper half of the image.

Thank you