VOCAL CORD PALSY

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Case Presentation

- M /70 years
- Pensioner
- Christain
- Bini
- Resides in Benin

- Had total thyroidectomy.

  Follicular Ca of thyroid

- Post-op developed inspiratory stridour and respiratory difficulty on extubation
- DL in theatre by anaesthetists- vocal cords apposed with slit-like opening
- Ass- ?neuropraxic injury to recurrent laryngeal nerve

- 3rd day post op
- Extubation attempted but failed
- Had tracheostomy under LA by ENT TOC
- **Fibre-optic laryngoscopy**
- Pooling of saliva around the supra-glottis and over the cords. Cords are centrally placed and immobile.
- Ass- bilateral abductor paralysis
- Plan- retain tracheostomy tube
- Being followed-up in ENT clinic

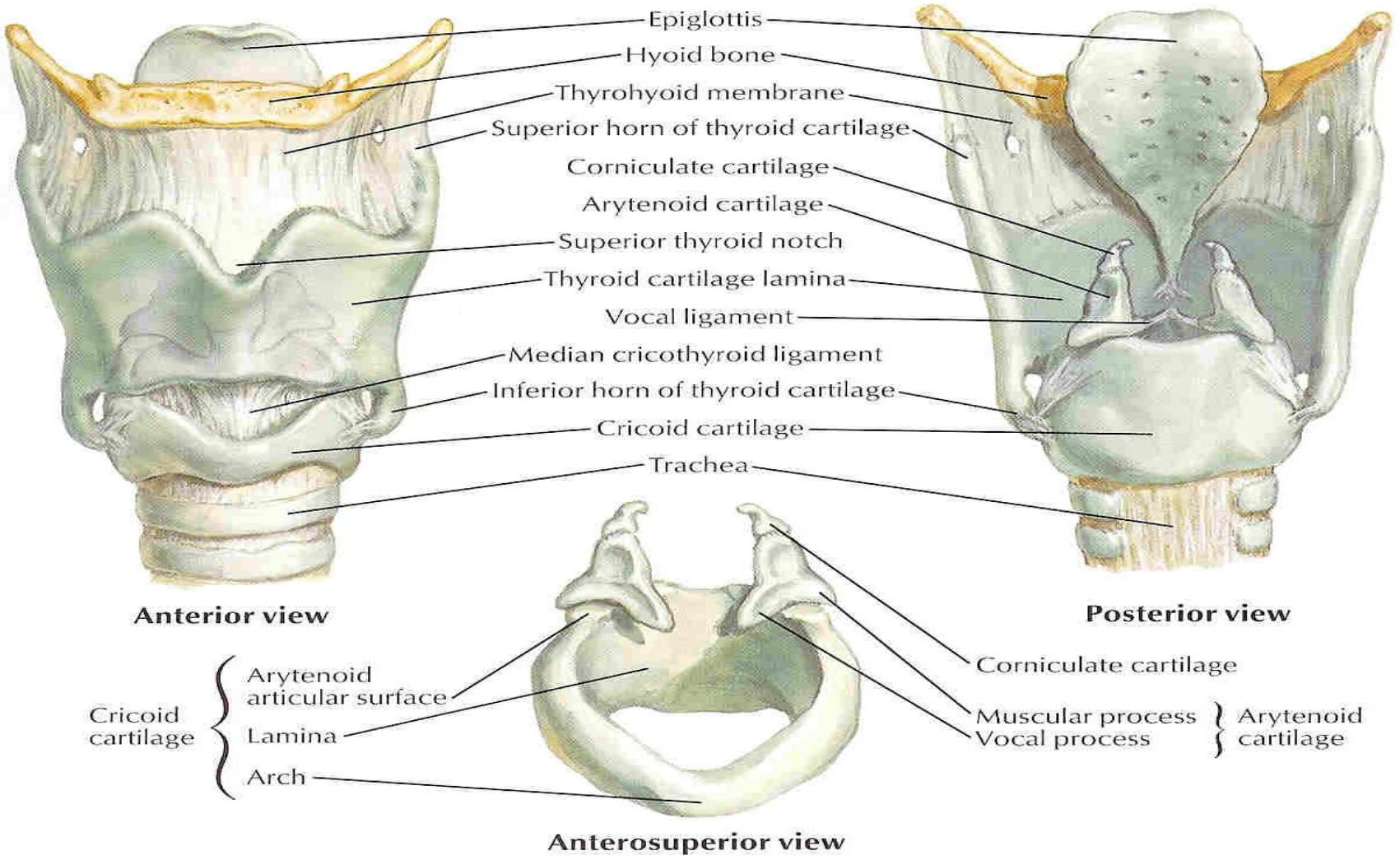
Introduction

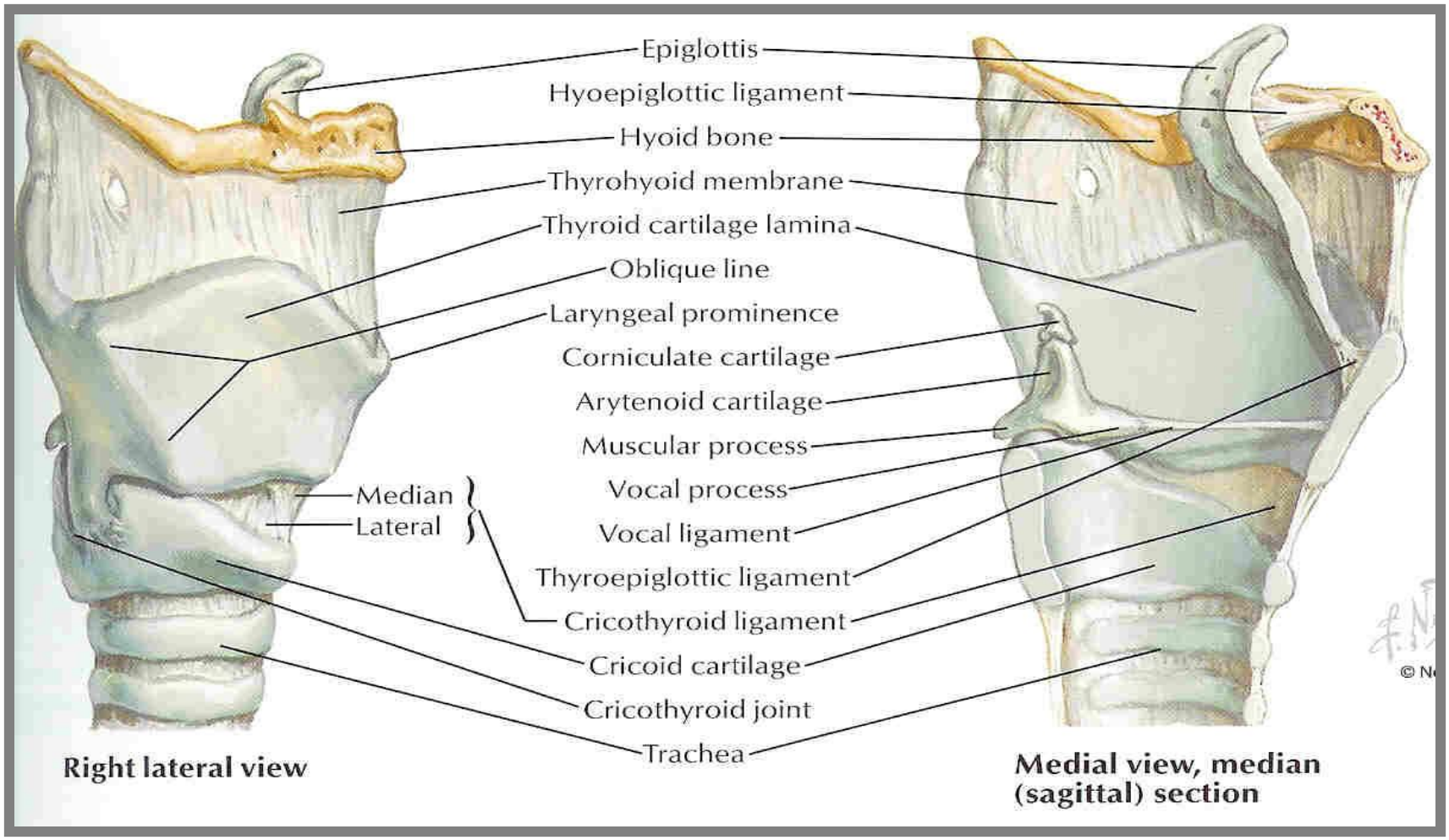
- Vocal fold paralysis can have a profound impact on a patient's quality of life.
- Bilateral vocal fold paralysis is life threatening because of airway compromise, and unilateral vocal fold paralysis is potentially life threatening.
- The surgical armamentarium available has significantly expanded over the last 15 years.

ANATOMY OF LARYNX

- The larynx lies in front of the hypopharynx opposite the third to sixth cervical vertebrae

- Larynx has 3 unpaired and 3 paired cartilages.
- Unpaired: Thyroid, cricoid, epiglottis.
- Paired: Arytenoid, corniculate, cuneiform


Epiglottis
Hyoid bone
Thyrohyoid membrane
Superior horn of thyroid cartilage
Corniculate cartilage
Arytenoid cartilage
Superior thyroid notch
Thyroid cartilage lamina
Vocal ligament
Median cricothyroid ligament
Inferior horn of thyroid cartilage
Cricoid cartilage
Trachea
Anterior view
Posterior view
Cricoid cartilage
Arytenoid articular surface
Lamina
Arch
Corniculate cartilage
Muscular process
Vocal process
Arytenoid cartilage
Anterosuperior view


Epiglottis
Hyoepiglottic ligament
Hyoid bone
Thyrohyoid membrane
Thyroid cartilage lamina
Oblique line
Laryngeal prominence
Corniculate cartilage
Arytenoid cartilage
Muscular process
Vocal process
Vocal ligament
Thyroepiglottic ligament
Cricothyroid ligament
Cricoid cartilage
Cricothyroid joint
Trachea
Median
Lateral
Right lateral view
Medial view, median (sagittal) section

Muscles of Larynx

- They are of two types,
- intrinsic, which attach laryngeal cartilages to each other, and
- extrinsic, which attach larynx to the surrounding structures

Intrinsic muscles.

(a) Acting on vocal cords

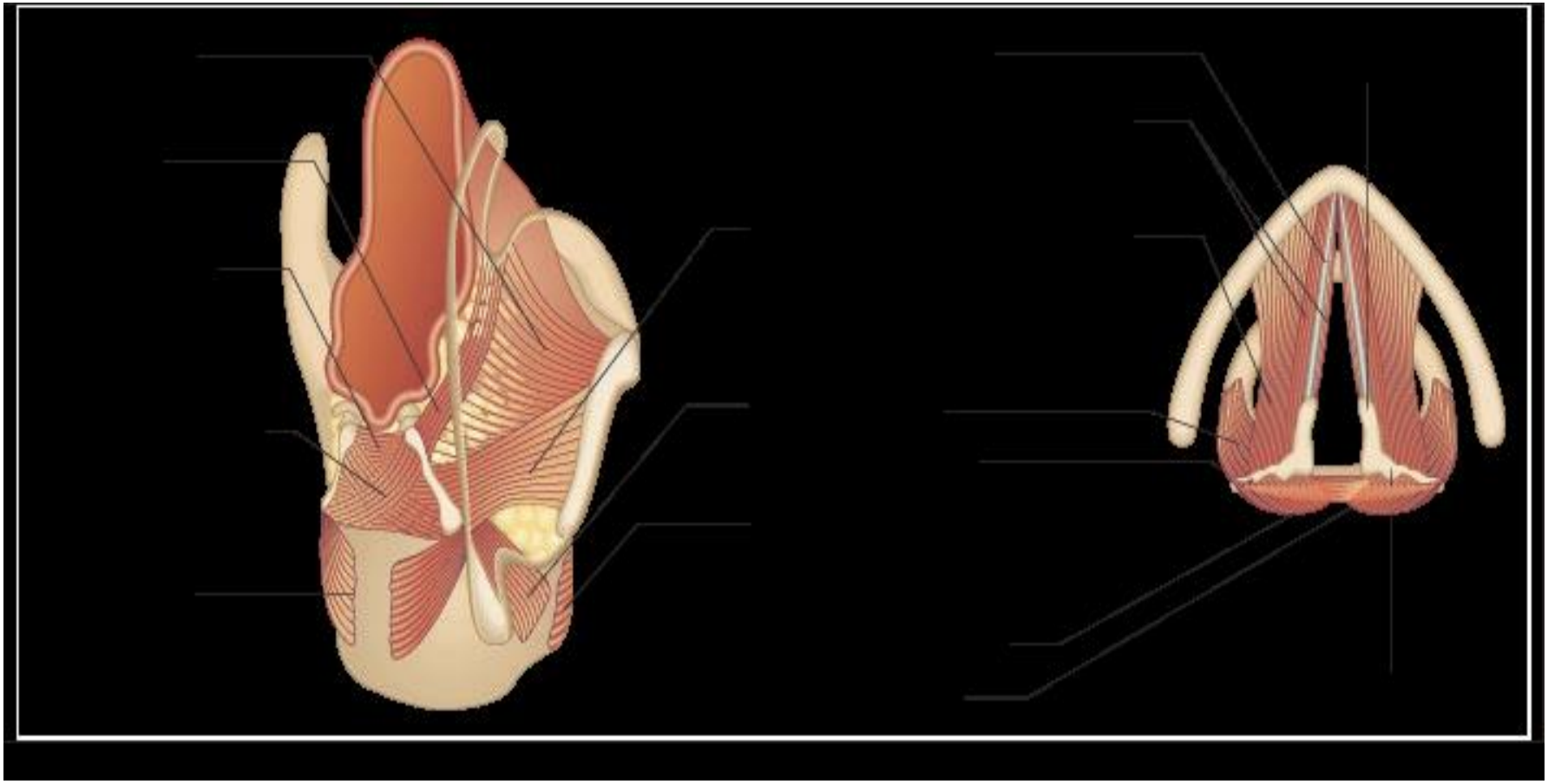
- Abductors: Posterior cricoarytenoid
- Adductors: Lateral cricoarytenoid lnterarytenoid, Thyroarytenoid (external part)
- Tensors: Cricothyroid, Vocalis

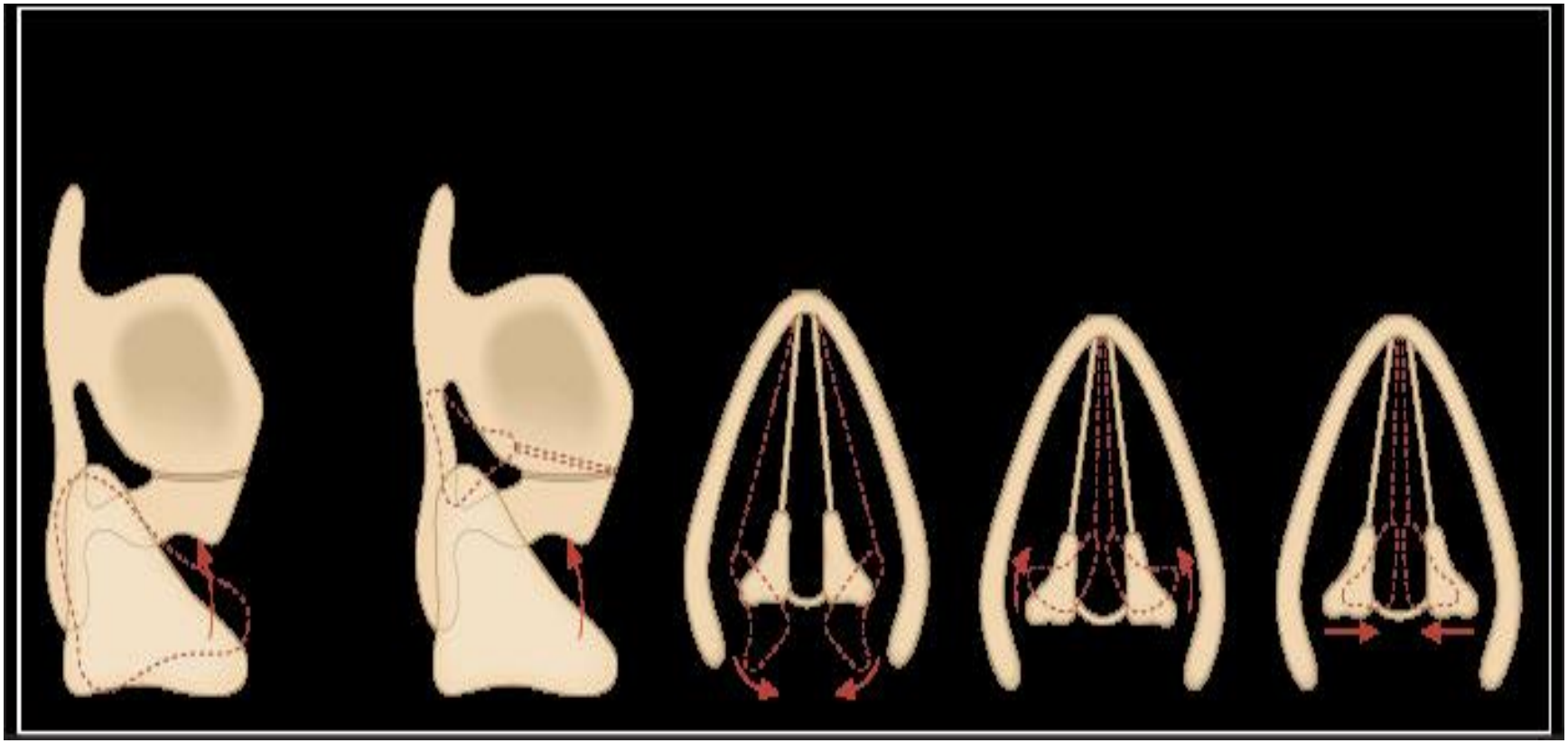
(b) Acting on laryngeal inlet

- Openers of laryngeal inlet: Thyroepiglottic
- Closers of laringeal inlet: Interarytenoid (oblique part), Aryepiglottic

Extrinsic muscles.

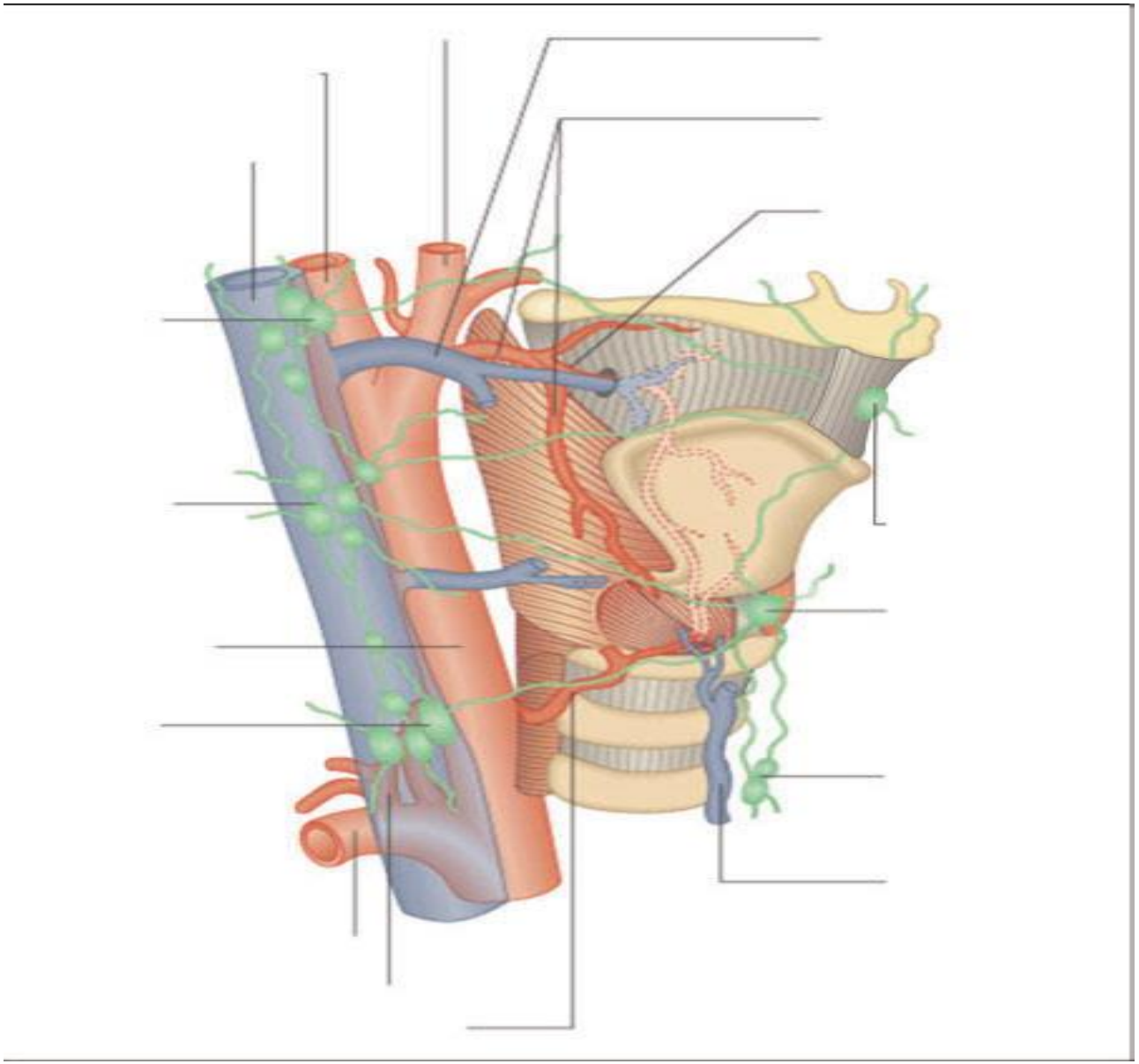
- (a) Elevators. Primary elevators- stylopharyngeus, salpingopharyngeus, palatopharyngeusand thyrohyoid.
- Secondary elevators- digastric, stylohyoid, geniohyoid.
- (b) Depressors. They include sternohyoid, sternothyroid and omohyoid.

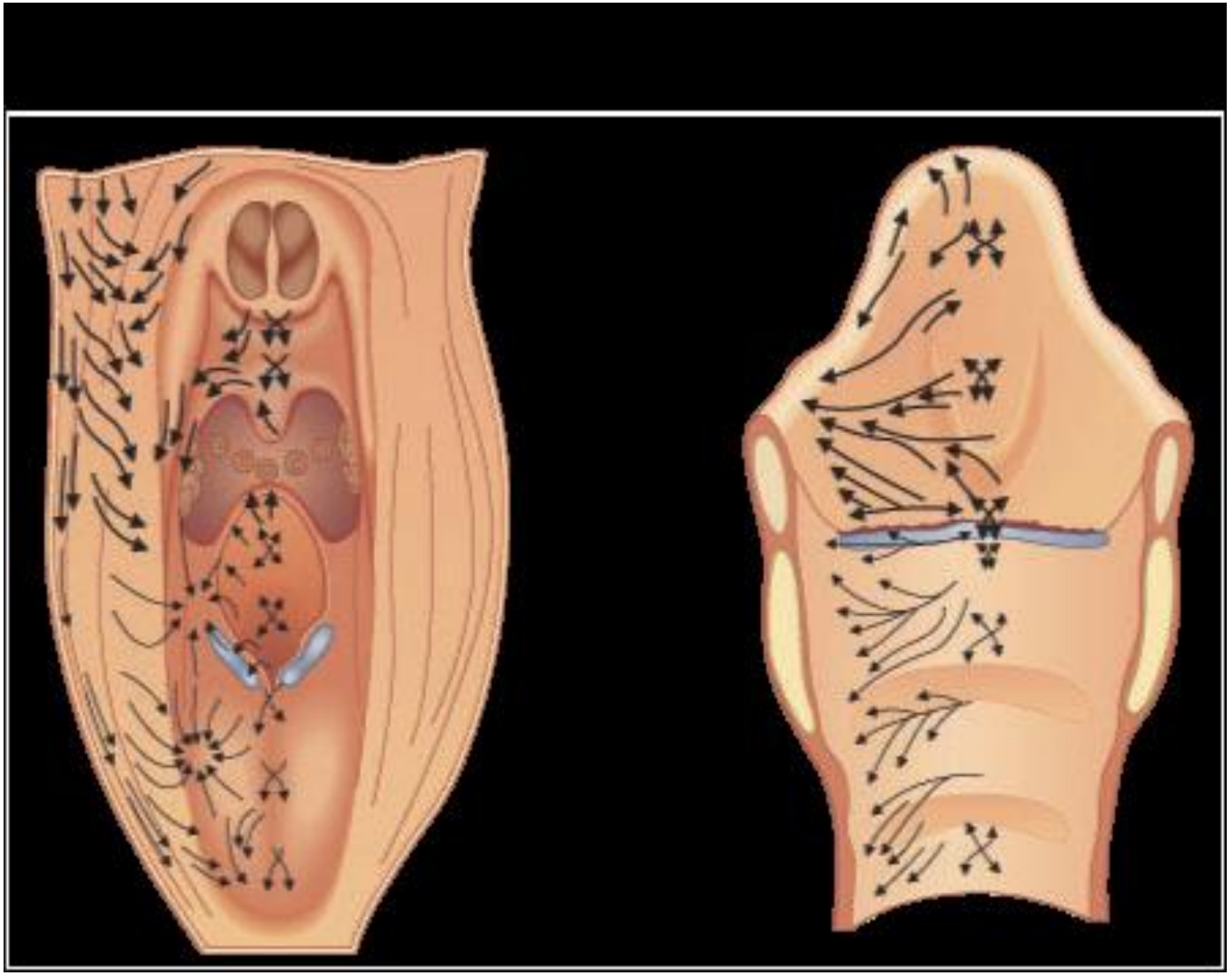




- Nerve supply- Vagus nerve (X CN)
  a. Superior laryngeal
  b. Recurrent laryngeal

- Arterial supply
  a. Laryngeal branches of supr & infr thyroid arteries
  b. Cricothyroid branch of supr thyroid artery





Neuro anatomy

- Centrally- Nucleus ambiguus and Nucleus tractus solitarus from upper medulla and lower pons.

- Vagus- Superior laryngeal nerve at nodose ganglion

Superior Laryngeal Nerve

- 2nd branch of the Vagus
- Deep to int carotid
- Divides into internal and external superior laryngeal nerve

- Internal branch- mainly sensory
  - » Enters larynx through thyrohyoid membrane
  - » Divides into superior, middle and inferior branches
  - » Anastomoses with recurrent laryngeal nv

External branch of SLN

- Seperates at greater cornu of hyoid
- Runs posterior to superior thyroid artery
- Ramifies into two to supply oblique and rectus bellies of cricothyroid
- May anastomose with recurrent laryngeal nerve

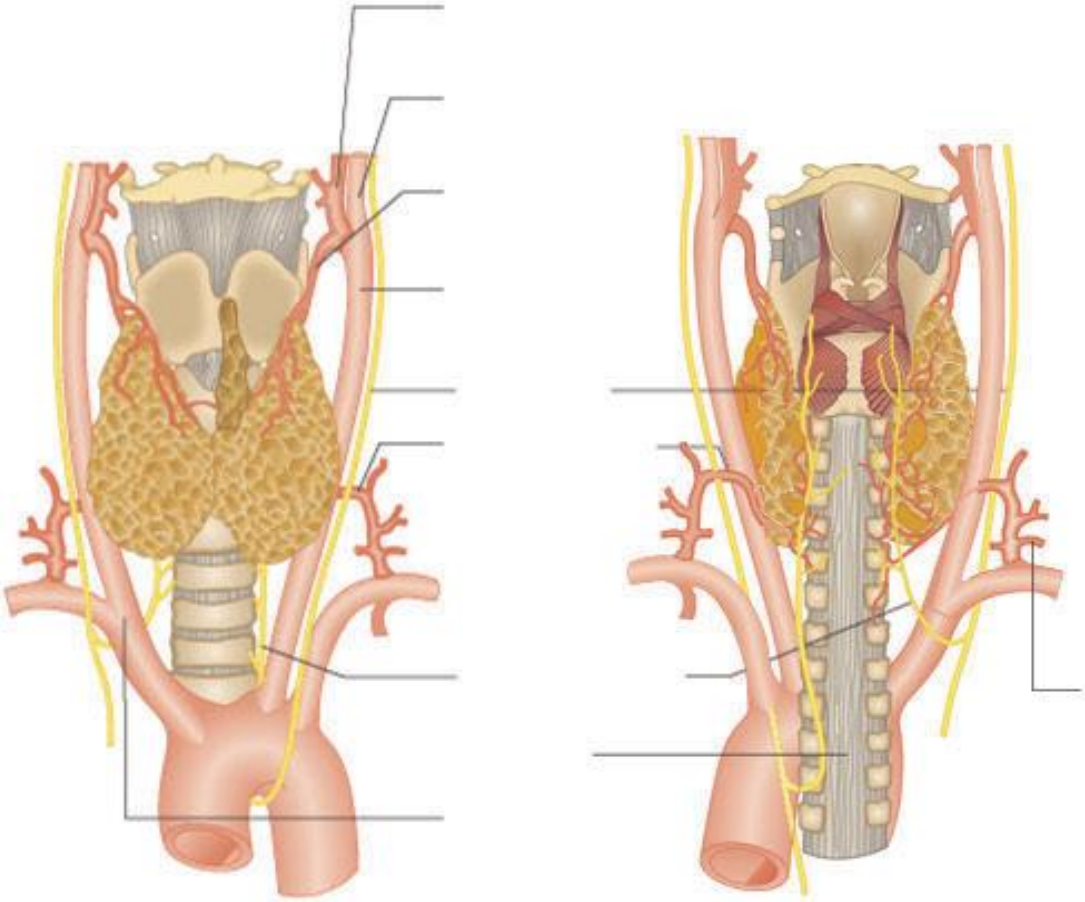
Recurrent Laryngeal nerve

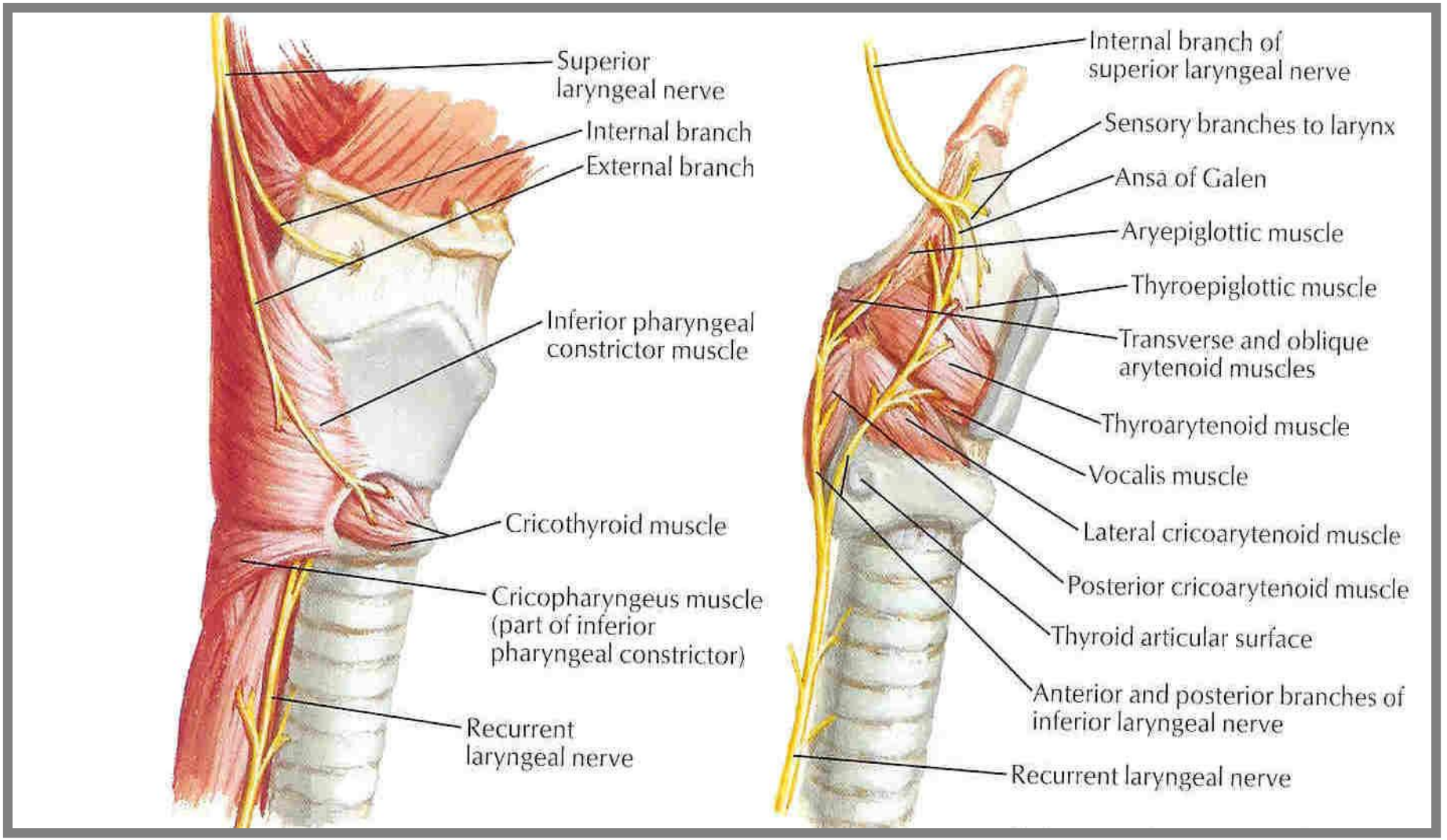
- Vagus travels in carotid sheath
- On the right the vagus runs anterior to subclavian
- Gives of right recurrent laryngeal nerve
- Runs ant to post and cephalad
- Lat to medial till the tracheo-oesophageal groove

- Left branches at the level of the aortic arch
- Cranially and medially till the tracheo-oesophageal groove
- Runs deep to the thyroid gland

- Branches to the deep cardiac plexus, trachea and oesophagus.

- Enters the larynx at inf. Cornu of thyroid cartilage
- Divides into anterior adductor and posterior abductor branches
- Sensory to the sub-glottis



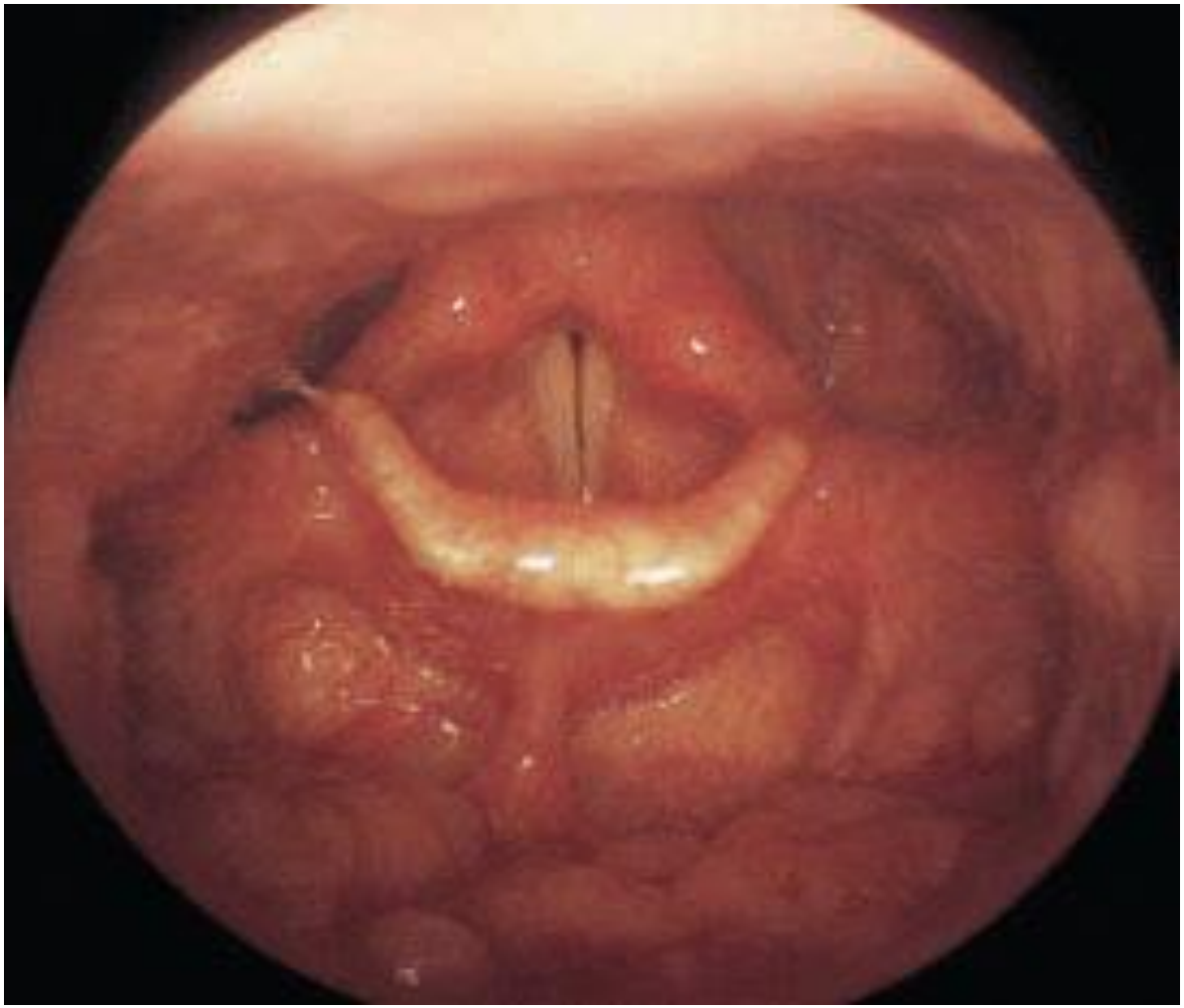

Superior laryngeal nerve
Internal branch
External branch
Inferior pharyngeal constrictor muscle
Cricothyroid muscle
Cricopharyngeus muscle (part of inferior pharyngeal constrictor)
Recurrent laryngeal nerve
Internal branch of superior laryngeal nerve
Sensory branches to larynx
Ansa of Galen
Aryepiglottic muscle
Thyroepiglottic muscle
Transverse and oblique arytenoid muscles
Thyroarytenoid muscle
Vocalis muscle
Lateral cricoarytenoid muscle
Posterior cricoarytenoid muscle
Thyroid articular surface
Anterior and posterior branches of inferior laryngeal nerve
Recurrent laryngeal nerve

- Epithelium of the mucous membrane is ciliated columnar
- type except over the vocal cords and upper part of
- the vestibule where it is stratified squamous type.

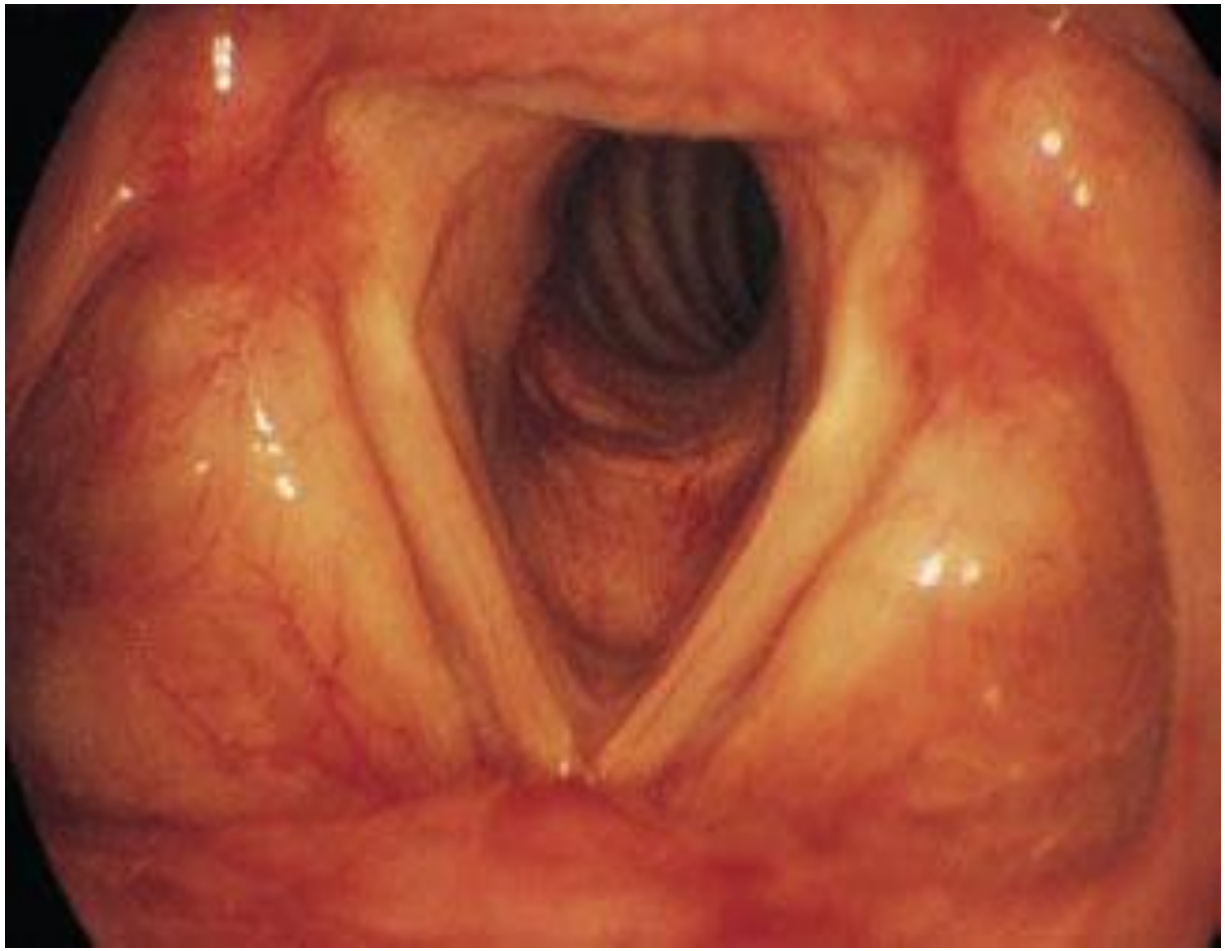
Physiology

- The larynx performs the following important functions:
- Protection of lower airways
- Phonation
- Respiration
- Fixation of the chest.

View in phonation position



View in respiratory position



Causes of Vocal Cord Palsy

- Surgery
- Other medical interventions
- Medical diseases

Etiology

Cause	Unilateral %	Bilateral %
Surgery	24	26
Idiopathic/Viral	20	13
Malignancy	25	17
Trauma	11	11
Neurologic	8	13
Intubation	8	18
Other	5	5

Benninger *et al.*, Evaluation and Treatment of the Unilateral Paralyzed Vocal Fold. *Otolaryngol Head Neck Surg* 1994;111-497-508

Surgery

- Cevical- thyroidectomy, carotid endarterectomy, cricopharyngeal myotomy
- Thoracic- pneumonectomy, coronary artery bypass graft, aortic valve replacement, tracheal surgeries, oesophageal surgeries
- Skull base surgery, brainstem surgery, neurosurgery requiring brainstem retraction.

Other Medical Interventions

- Endotracheal intubation
- Central venous catheterisation
- Radiation
- Drugs and other toxicities

Medical Diseases

- Malignancy
- Mediastinal lymphadenopathy
- Aortic aneurysm
- Stroke
- Neurological diseases-Arnold-chiari malformation, Charcot-Marie-Tooth disease
- Viral- EBV, herpes simplex e.t.c

TREATMENT OF UNILATERAL VOCAL CORD PALSY

- Spontaneous recovery of unsevered nerve within 12months.
- Aim of treatment –to resolve glottic insufficiecy and improve swallowing and voice production.
- Interventions are generally safe and reversible.

MANAGEMENT OPTIONS FOR UVCP.

- Observation.
- Voice therapy
- Injection laryngoplasty
- Medialization laryngoplasty
- Laryngeal reinnervation.

VOICE THERAPY

- For voice strenghtening or swallow therapy as indicated..
- Can augment effectiveness of surgical treatment.
- Allows patients time to consider surgical options.

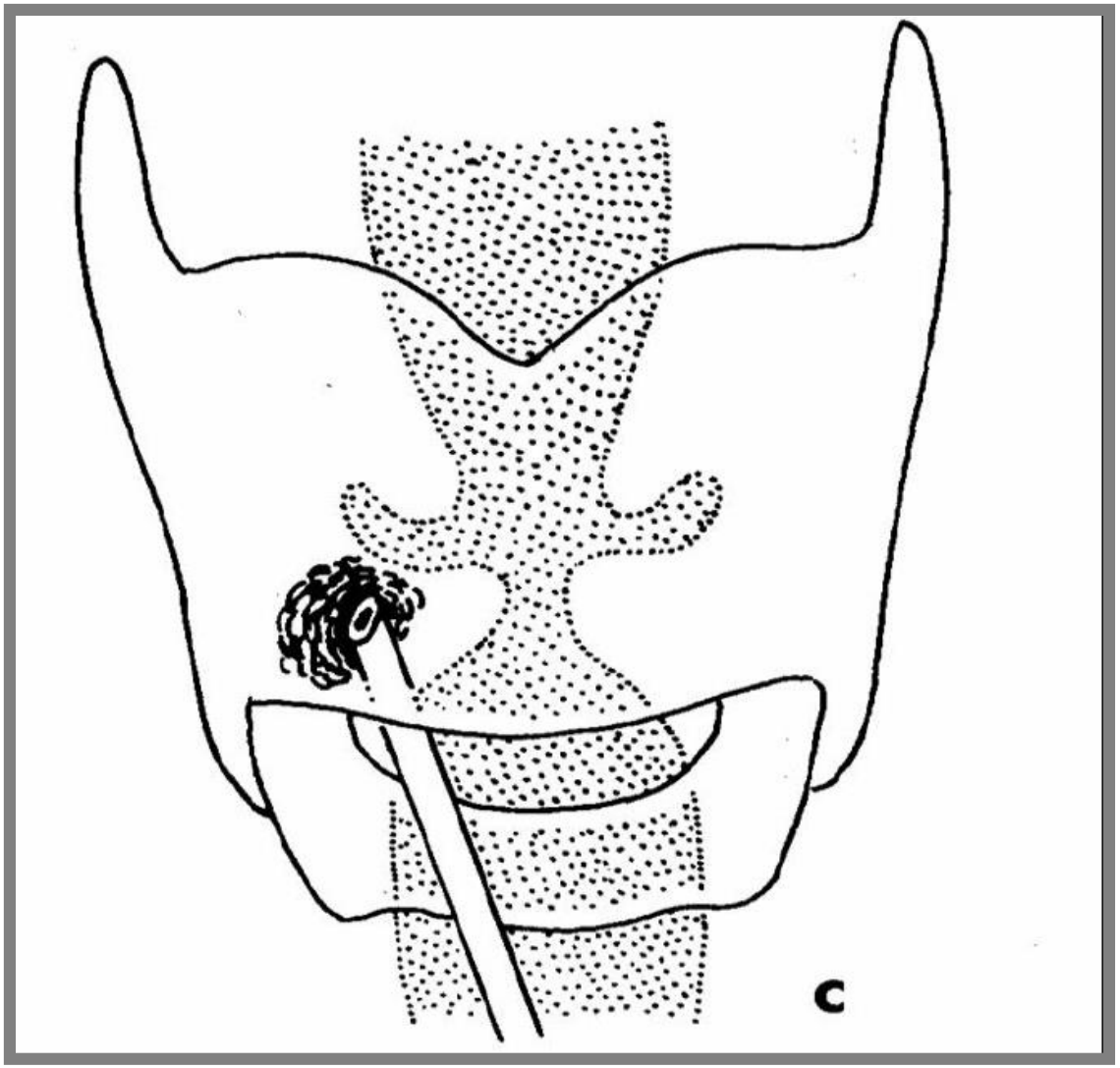
Determining the need for early intervention.

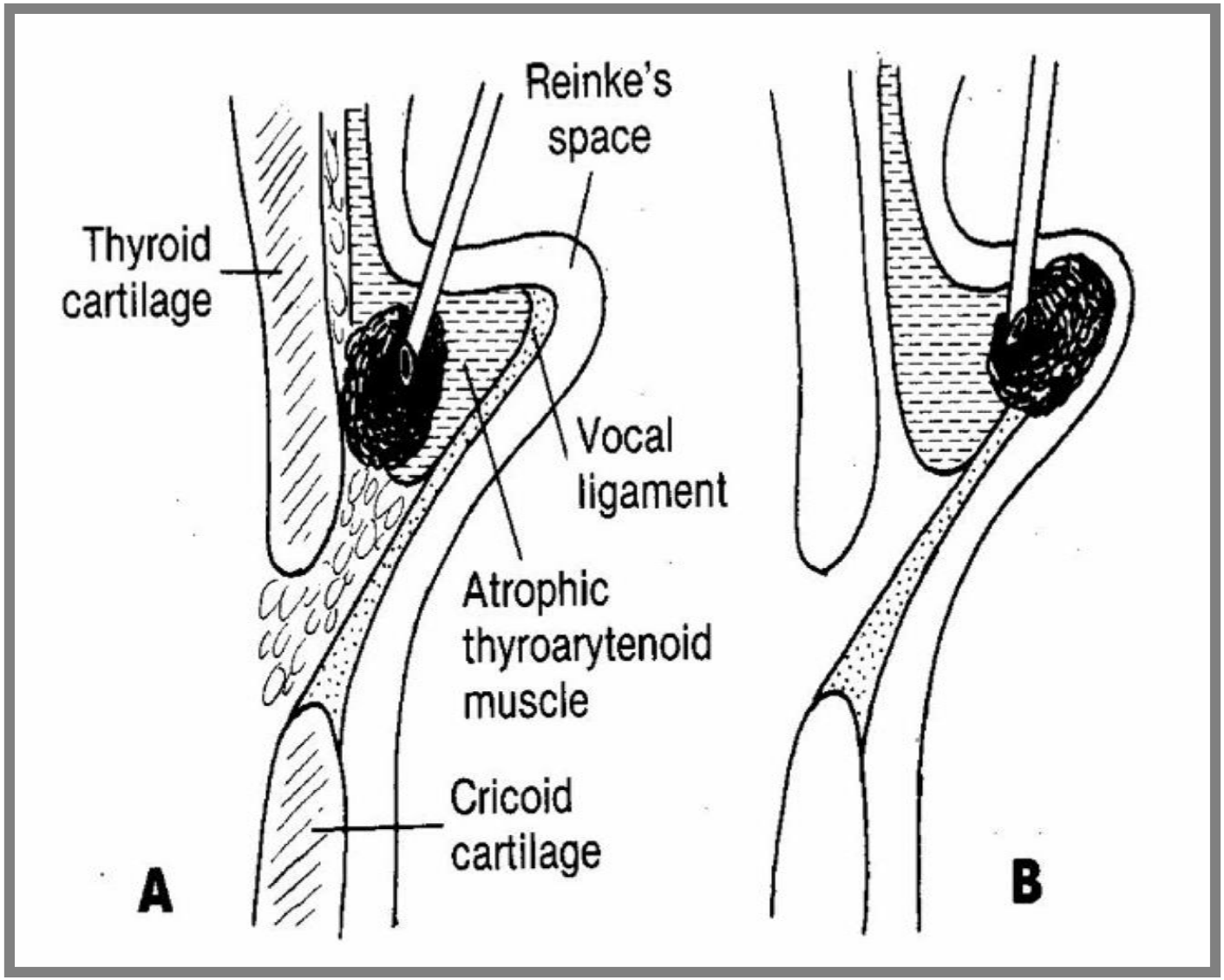
- Aspiration
- Severe denervation injury
- High level vocal demand.

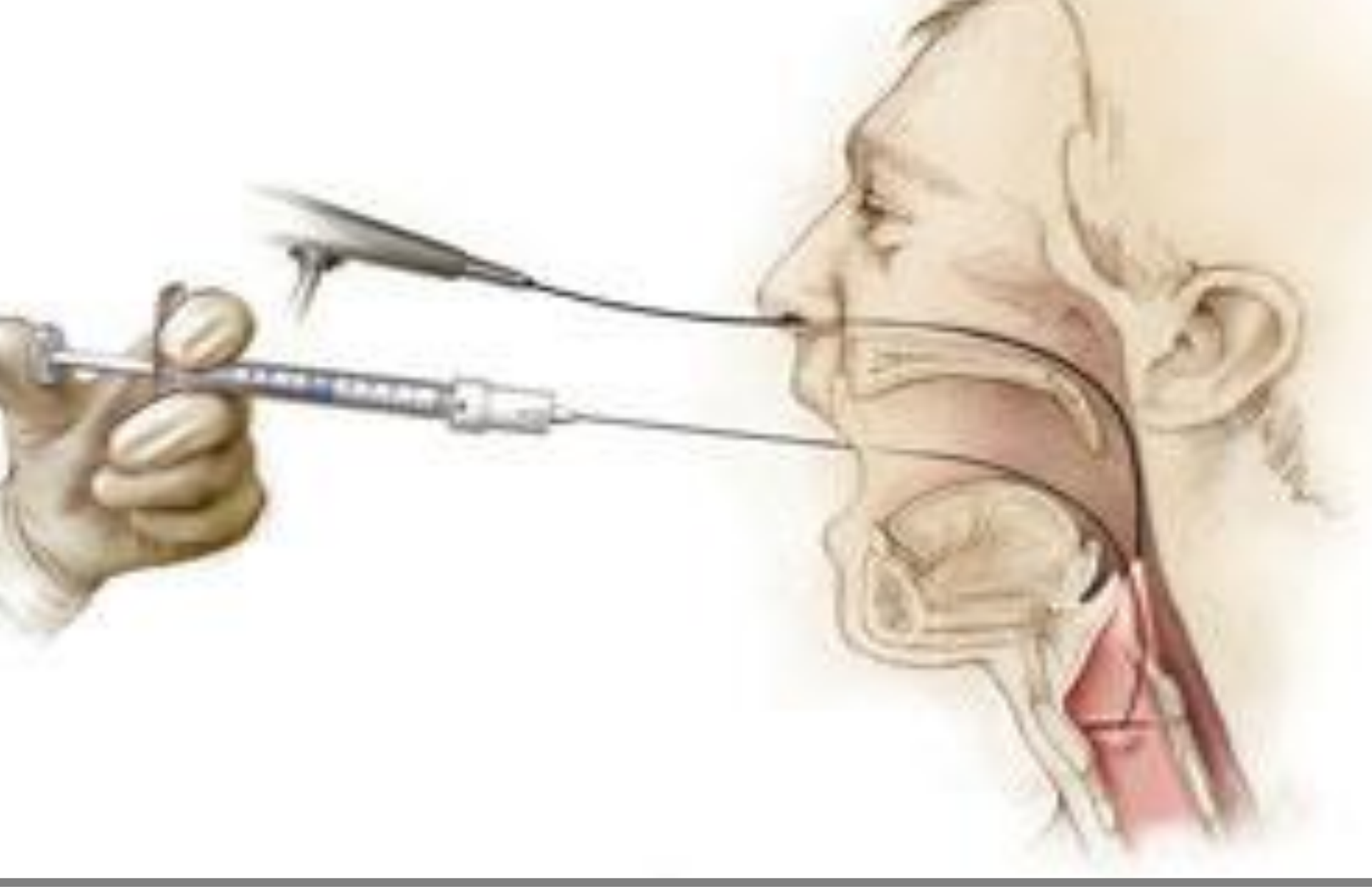
INJECTION LARYNGOPLASTY.

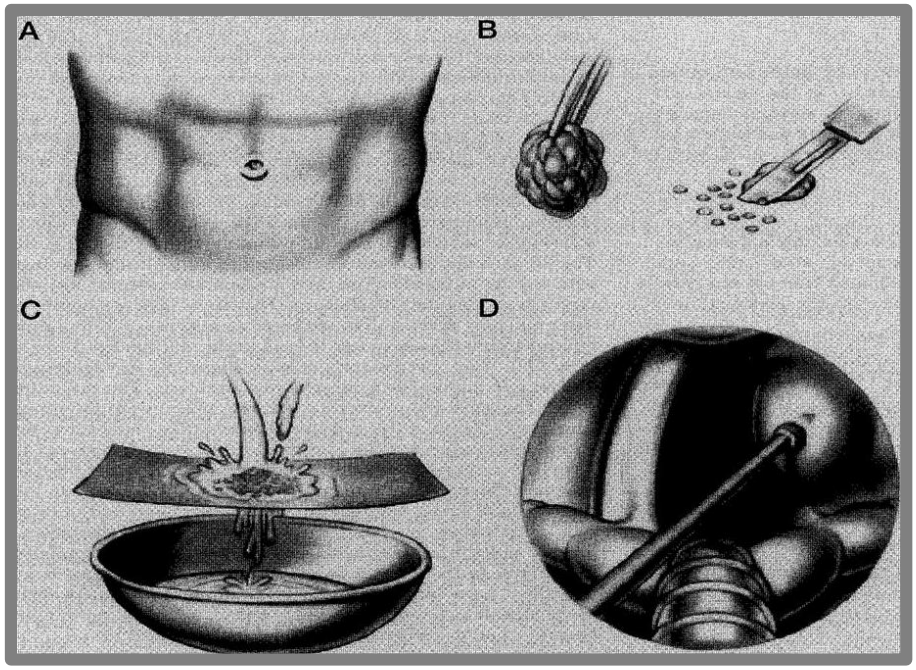
- Temporary procedure
- Indicated when prognosis for recovery is uncertain.
- Improves voice quality and swallowing while allowing a period of recovery of vocal cord function.

- Teflon
- Autologous fat.
- Autologous collagen
- Bioplastique
- Hyaluronic acid.
- gelfoam


c


Reinke's space
Thyroid cartilage
Vocal ligament
Atrophic thyroarytenoid muscle
Cricoid cartilage
A
B




A
B
C
D

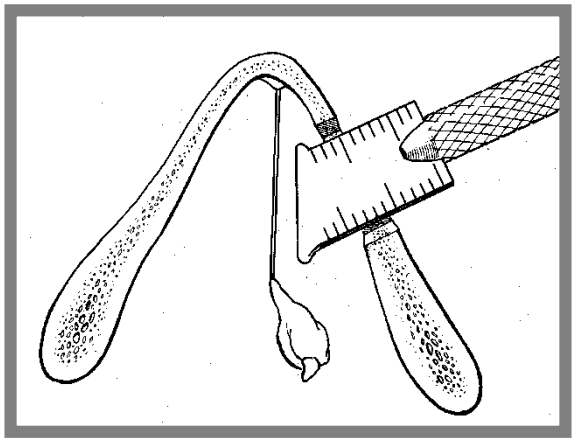
MEDIALIZATION LARYNGOPLASTY.

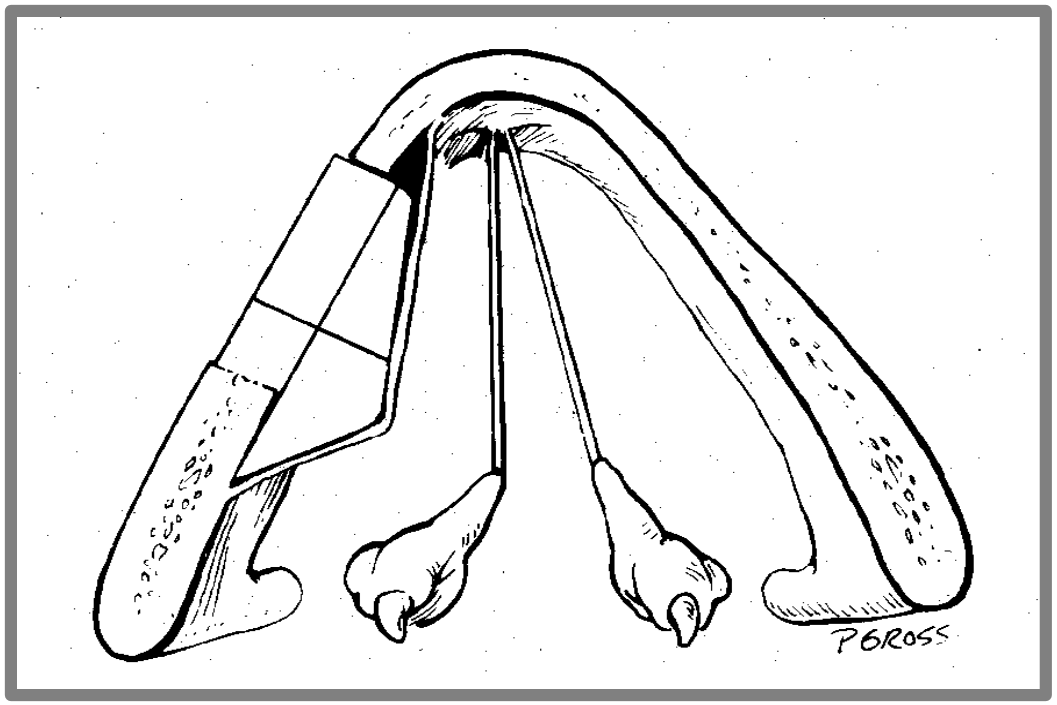
- Goal-to improve glottal closure by shifting the vocal cord to the midline by use of prosthesis

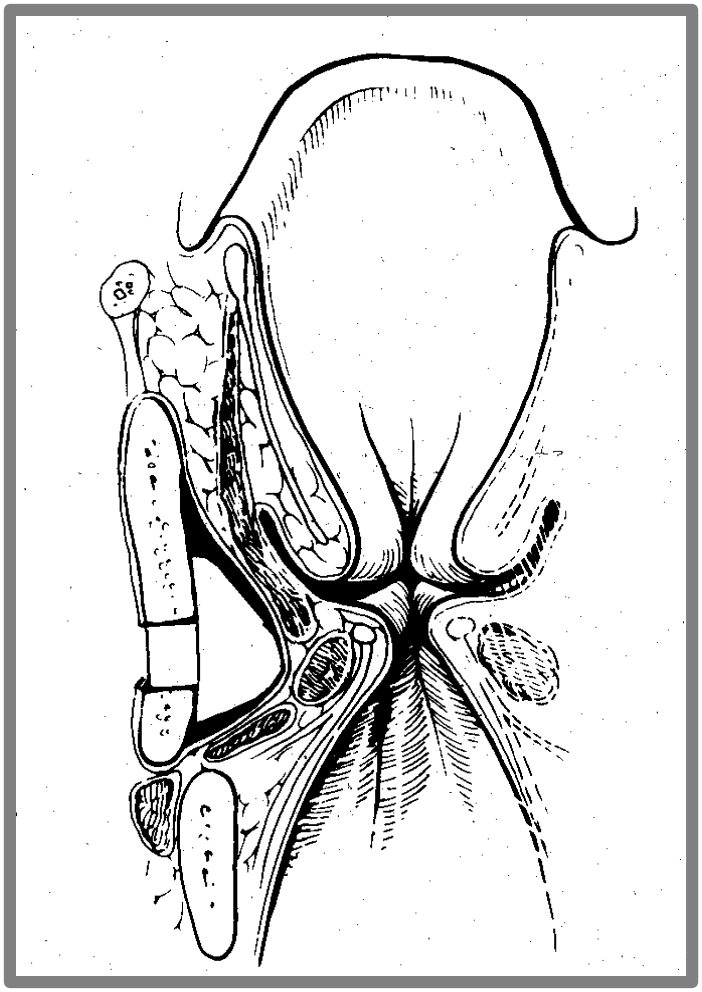
❖ Advantages-permanent but surgically reversible.
❖ No need to remove implant if vocal function returns.
❖ Materials-silastic,titanium,cartilage,gore tex,Hydroxyapatite.

Advantage-permanent but surgically reversible

Disavantage-more invasive.
Complications-airway obstruction,implant extrusion.

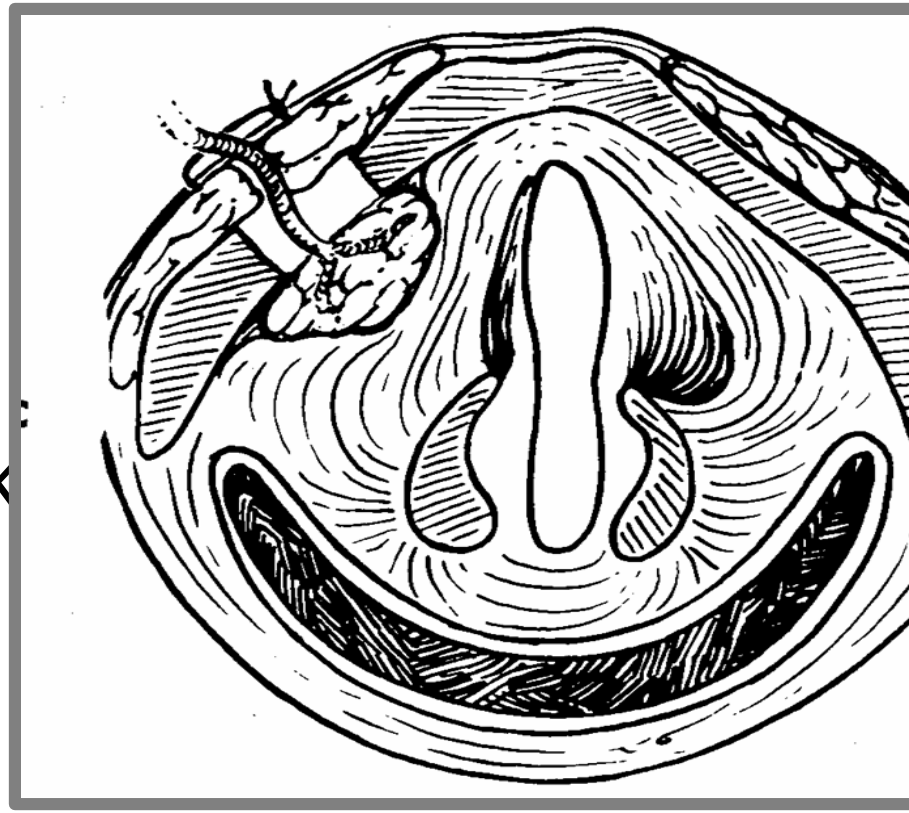



PGROSS



LARYNGEAL REINNERVATION

- Ansa to RLN
- Ansa to omohyoid to Thyroartenoid.
- Significant risk of synk nesis but also a good Chance of reasonable result.



- Hypoglossal to recurrent nerve.
- Use of crossed nerve grafts from one muscle to its paralysed counterpart are being researched.

BILATERAL VOCAL CORD PALSY

BILATERAL ABDUCTOR PARALYSIS.

- Procedures are devised to improve the airway while minimizing the detrimental effect on phonation and swallow.
- Reversible etiologies should be treated prior to destructive surgeries.ss

Options-

- Tracheostomy.
- Posterior cordotomy
- Arytenoidectomy
- Suture lateralization

TRACHEOSTOMY

- Most common treatment to provide an airway without detrimental effect to the voice.
- Not a good long term stategy as most patients are unhappy with permanent tracheostomy.

SUTURE LATERALIZATION

- May be performed alone or in combination with other procedures
- A viable option for temporising the patients airway..
- VC is lateralized by placing a suture from skin to larynx.
- Complications-altered voice quality
  -loss of airway protection.
  -granuloma formation.
  -chondritis of arytenoids.

POSTERIOR CORDOTOMY

- The most widely used surgical procedure in BVCP.
- An incision is made in the post vocal cord at the vocal process resulting in a wedge shaped defect.
- Effective
- Complications are rare.

Posterior cordectomy

ARYTENOIDECTOMY

-the laryngeal inlet is widened in its tranverse diameter producing a larger airway by partial or complete excision of the aytenoid.

-can be approached endoscopically or an external framework approach can be utilized.

BILATERAL ADDUCTOR PARALYSIS

- Goal-to prevent aspiration and improve phonation while preserving the airway.
- Aforementioned medialization techniques can be applied.

- Complications-altered voice quality
  - -loss of airway protection.
  - -granuloma formation.
  - -chondritis of arytenoids.

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LARYNGEAL PACING

- Most promising treatment for BVCP.
- A pulse generator implanted beneath the skin delivers electrical stimulation to the PCA during inspiration.

CONCLUSION