LARYNX

OUTLINE

I. CARTILAGES
II. LIGAMENTS
III. MUSCLES
IV. TERMS/AREAS
V. INNERVATION
VI. BLOOD SUPPLY
VII. LYMPHATICS
VIII. OBSTRUCTION OF LARYNX

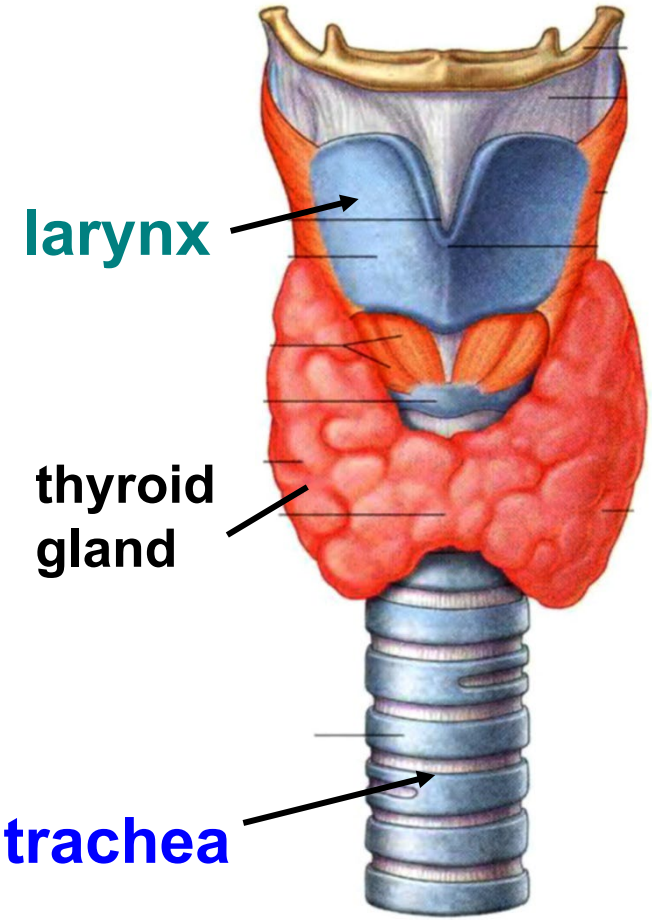
LARYNX IS SOUND GENERATOR; HOWEVER, SOUNDS ARE EXTENSIVELY MODIFIED IN SPEECH AND SINGING BY RESONANCE OF PHARYNX, NASAL CAVITY, ORAL CAVITY

LARYNX

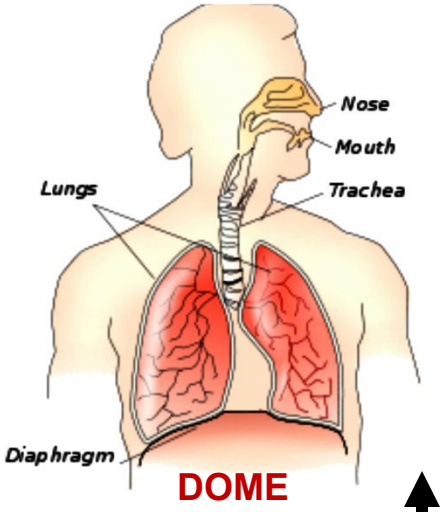
Cartilages connected by membranes and ligaments, moved by muscles

2 Functions: 1) Sound production

2) Closes of Respiratory System - allows increase in Abdominal Pressure



Note: In Respiration - Inspire - Diaphragm; Expire - Some muscles but largely passive; Forced Expire - Abdominal Muscles



DOME

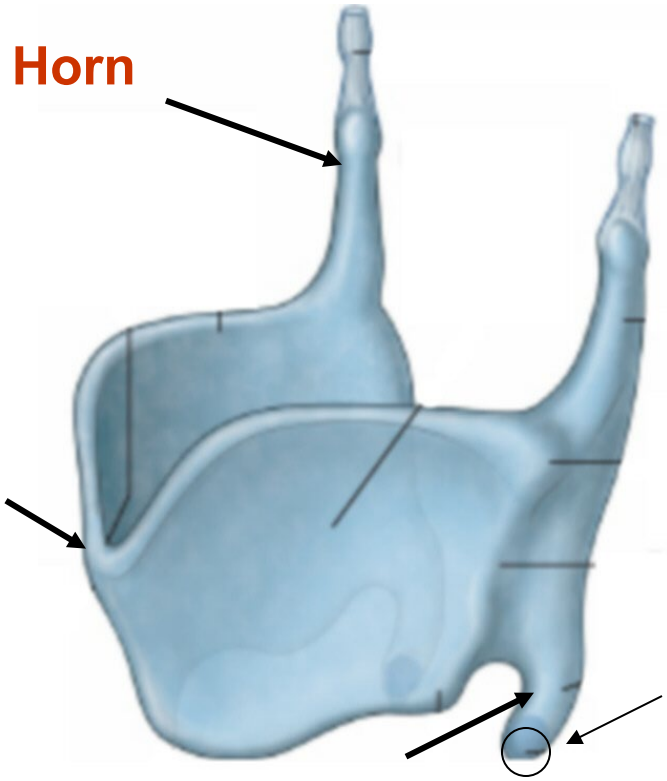
INSPIRE - diaphragm

EXPIRE - abdominal muscles

When larynx closes off trachea, forced expiration produces increased abdominal pressure: push-childbirth; defecation etc.

I. LARYNX: CARTILAGES

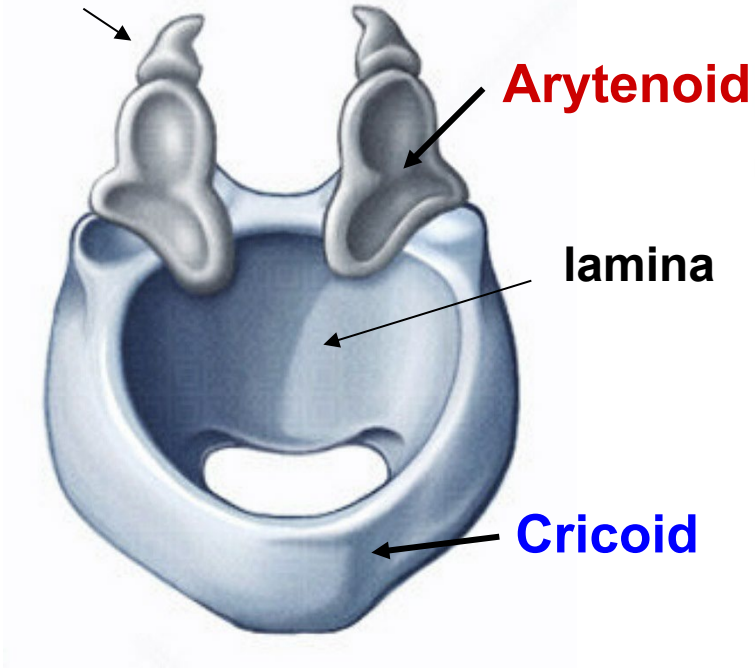
A. <u>THYROID CARTILAGE</u> – Shield shaped
- has Sup. and Inf. Horns from upper and lower edges



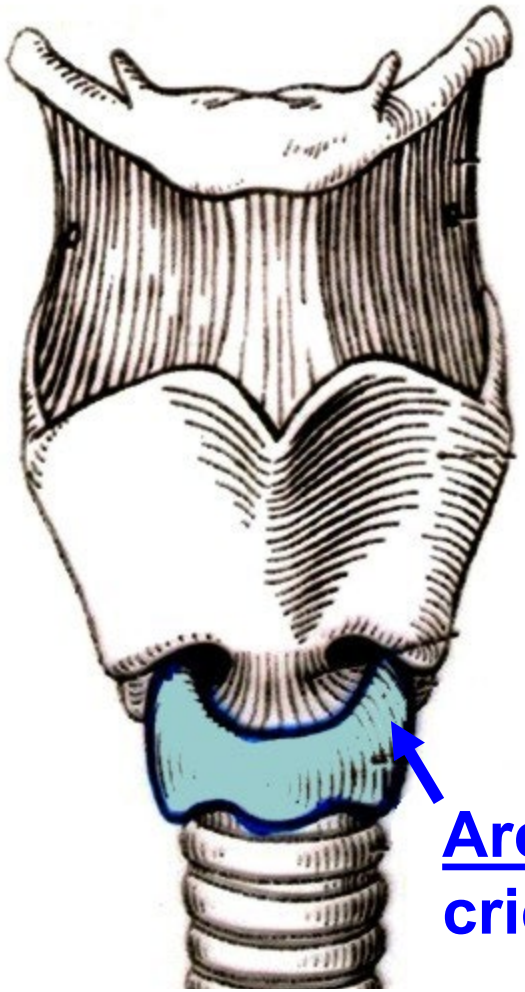
- <u>Inferior horns</u> make synovial hinge joints with Cricoid Cartilage; - <u>Laryngeal Prominence = Adam's Apple</u>, more prominent in males

LARYNX: CARTILAGES

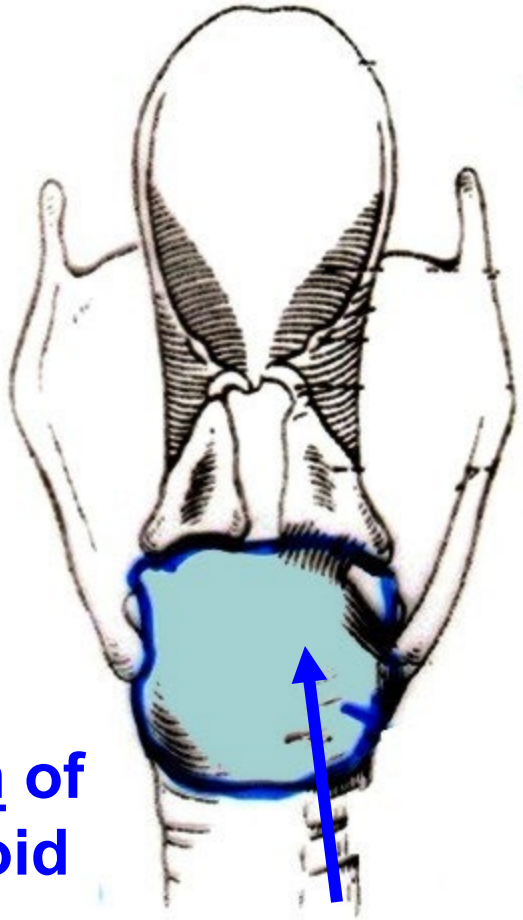
B. CRICOID- complete ring of cartilage has narrow Arch ant., broad Lamina post.



ANT VIEW



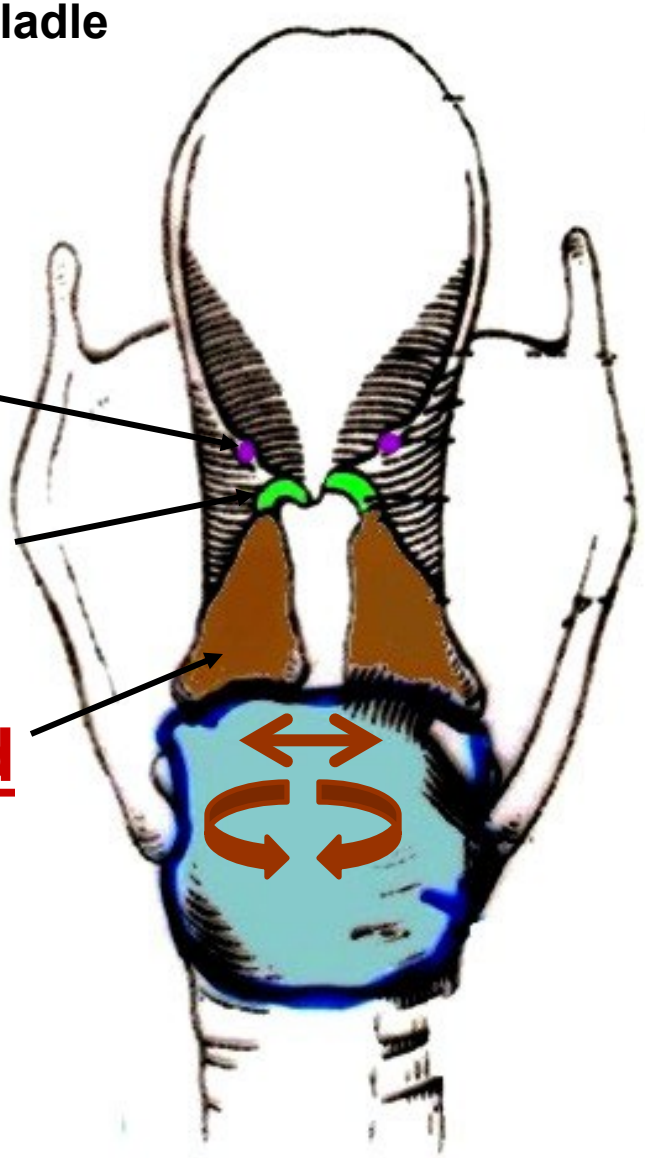
POST VIEW



Cricoid means Signet Ring

LARYNX: CARTILAGES

arytenoid - Gk. ladle
cornu - L. horn



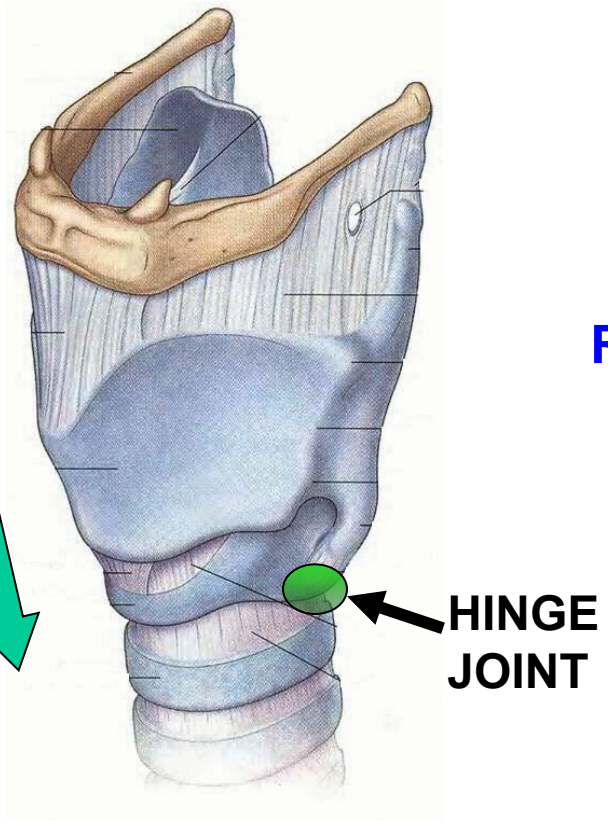
C. Arytenoid - 2 pyramidal shaped cartilages above lamina – have synovial joints with Cricoid permit
Swivel = Rotate
Sliding = Ab/Adduct

D. Corniculate - nodules above arytenoids in aryepiglottic folds

E. Cuneiform - rod shaped, above corniculate cartilages

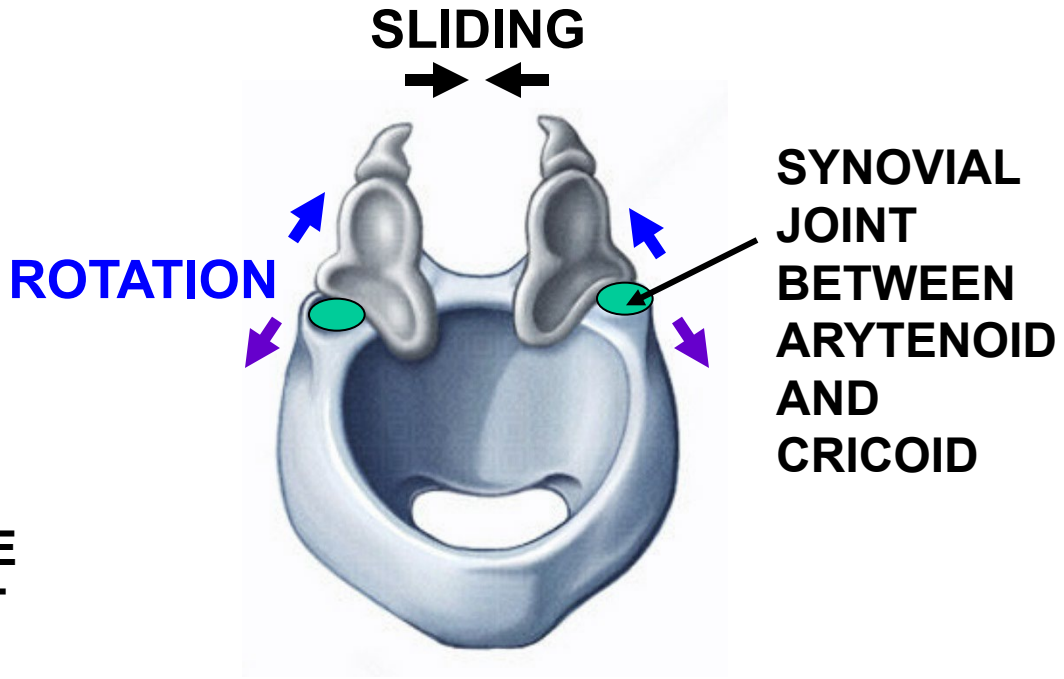
LARYNX: SYNOVIAL JOINTS

THYROID and CRICOID



JOINTS PERMIT TILTING OF THYROID-CRICOID:
- CHANGE PITCH OF SOUND (TENSE OR RELAX VOCAL LIGAMENTS)

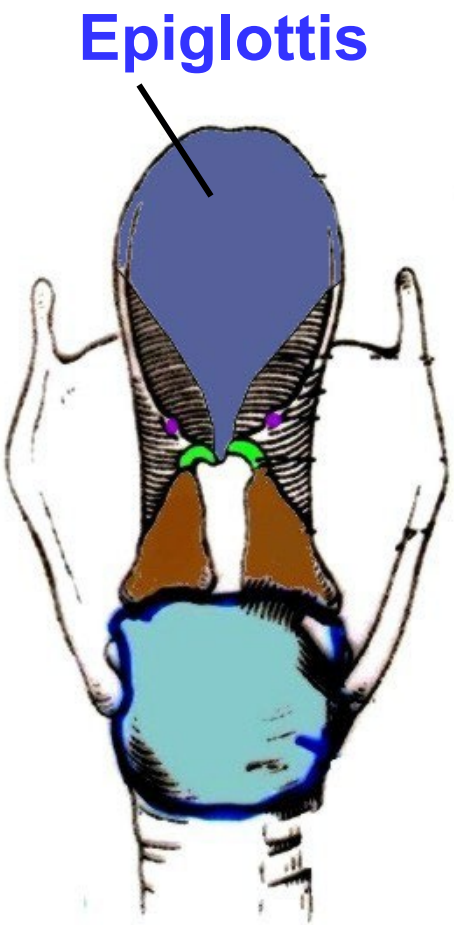
ARYTENOID and CRICOID

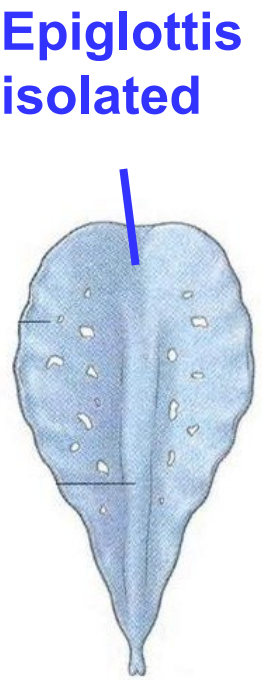


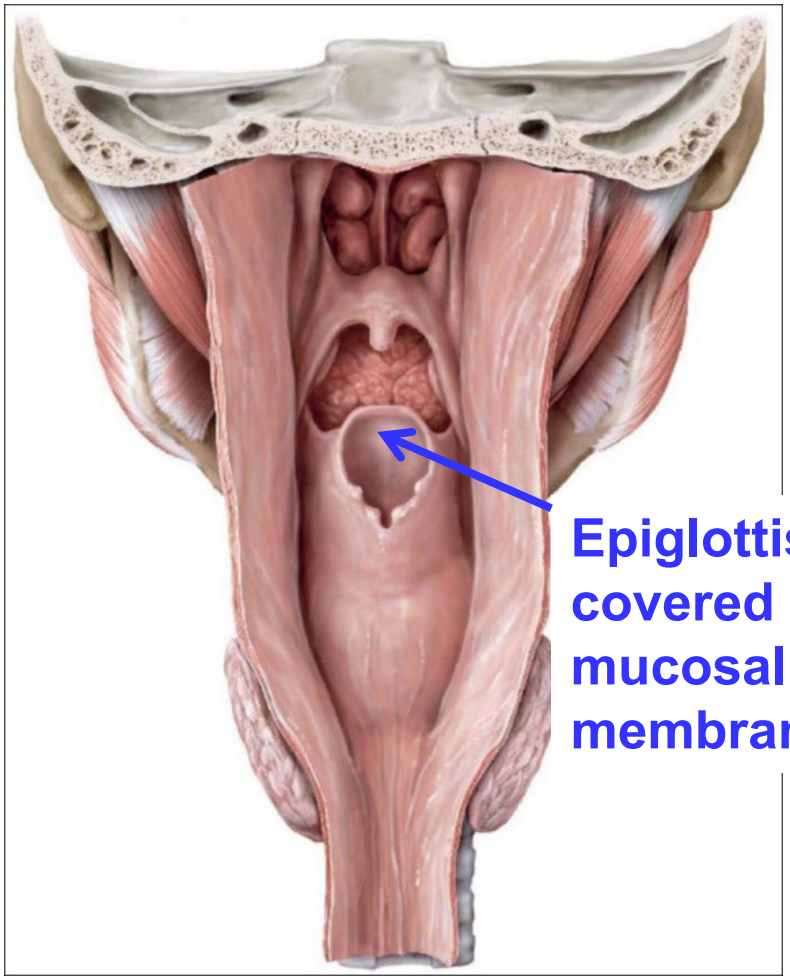
JOINTS PERMIT ROTATION AND SLIDING:
- OPEN OR CLOSE LARYNX (ABDUCT OR ADDUCT VOCAL LIGAMENTS)

LARYNX CARTILAGES: EPIGLOTTIS

POST. VIEW



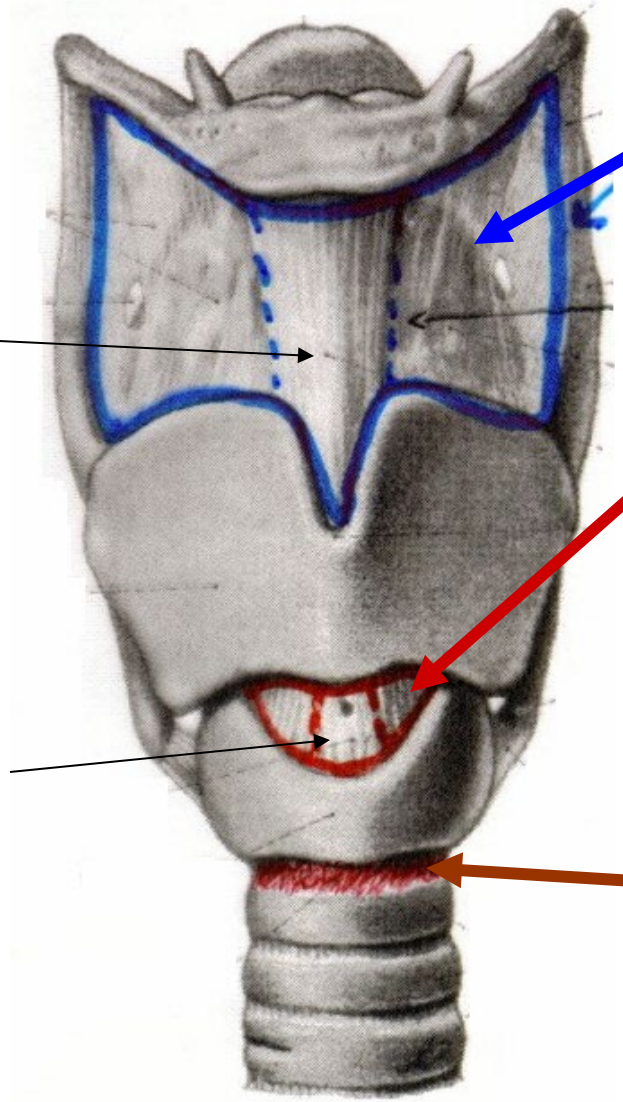




F. <u>EPIGLOTTIS</u> - <u>leaf shaped</u> cartilage posterior to root of tongue; connected to body of hyoid and post side of thyroid cartilage

II. LIGAMENTS OF LARYNX

A. Structural ligaments - hold larynx, hyoid, trachea together



Median Thyrohyoid Ligament

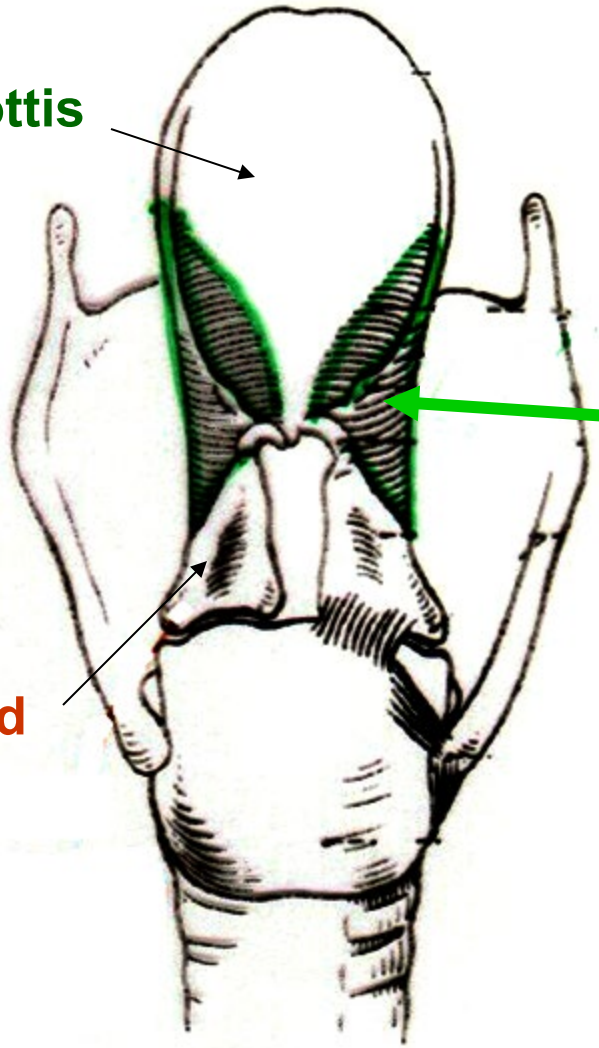
Median Cricothyroid Ligament

1. Thyrohyoid Membrane links larynx to hyoid; Median Thyrohyoid Ligament - thickened midline part

2. Cricothyroid Membrane links thyroid to cricoid; Median Cricothyroid Ligament - thickened midline part

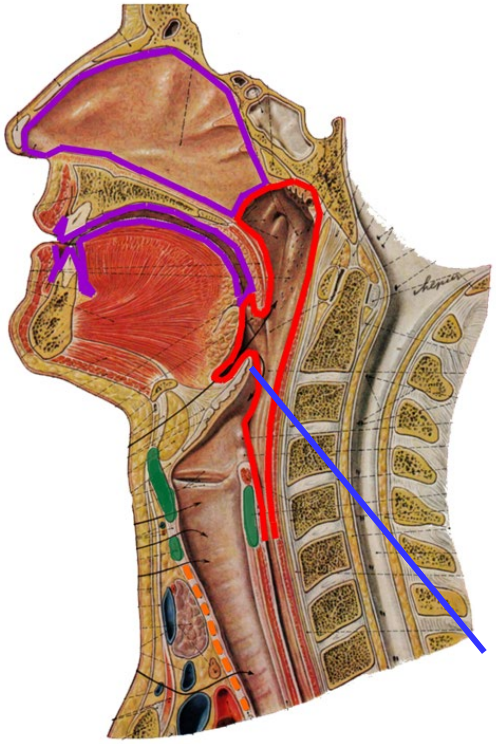
3. Cricotracheal ligament links Cricoid to first tracheal cartilage

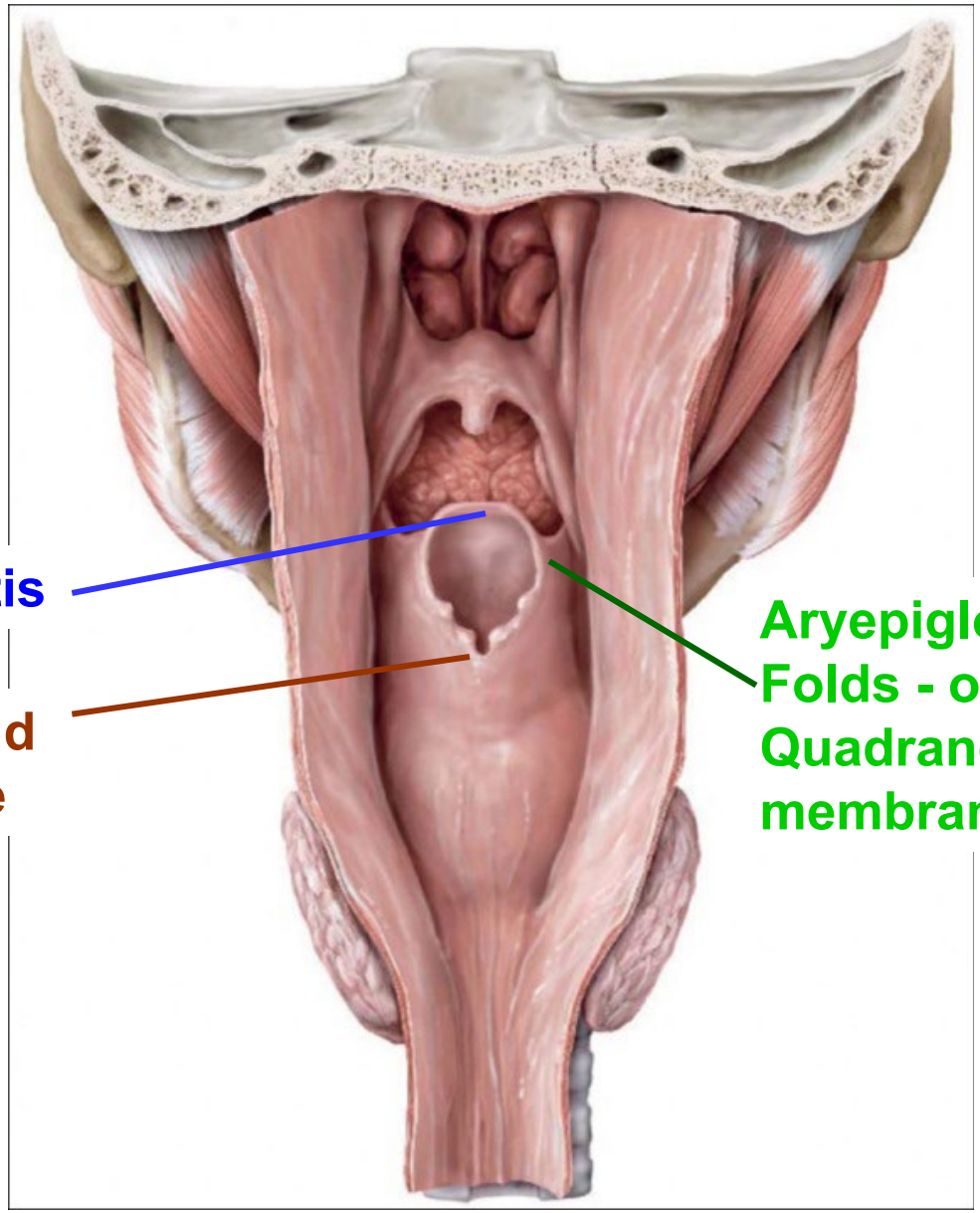
STRUCTURAL LIGAMENTS



4. Quadrangular Membrane links
Arytenoid
To epiglottis

STRUCTURAL LIGAMENTS





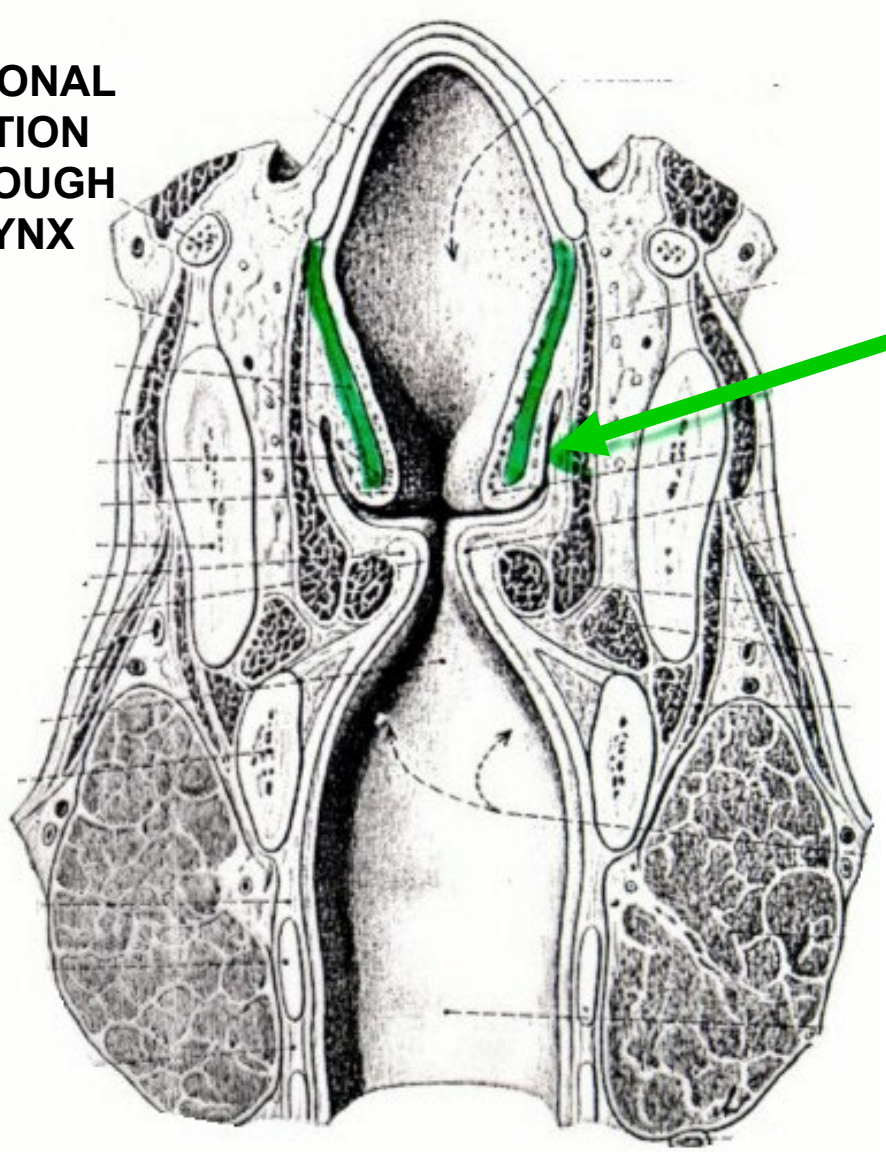
Epiglottis

Arytenoid cartilage

Aryepiglottic Folds - overlie Quadrangular membrane

STRUCTURAL LIGAMENTS

CORONAL SECTION THROUGH LARYNX



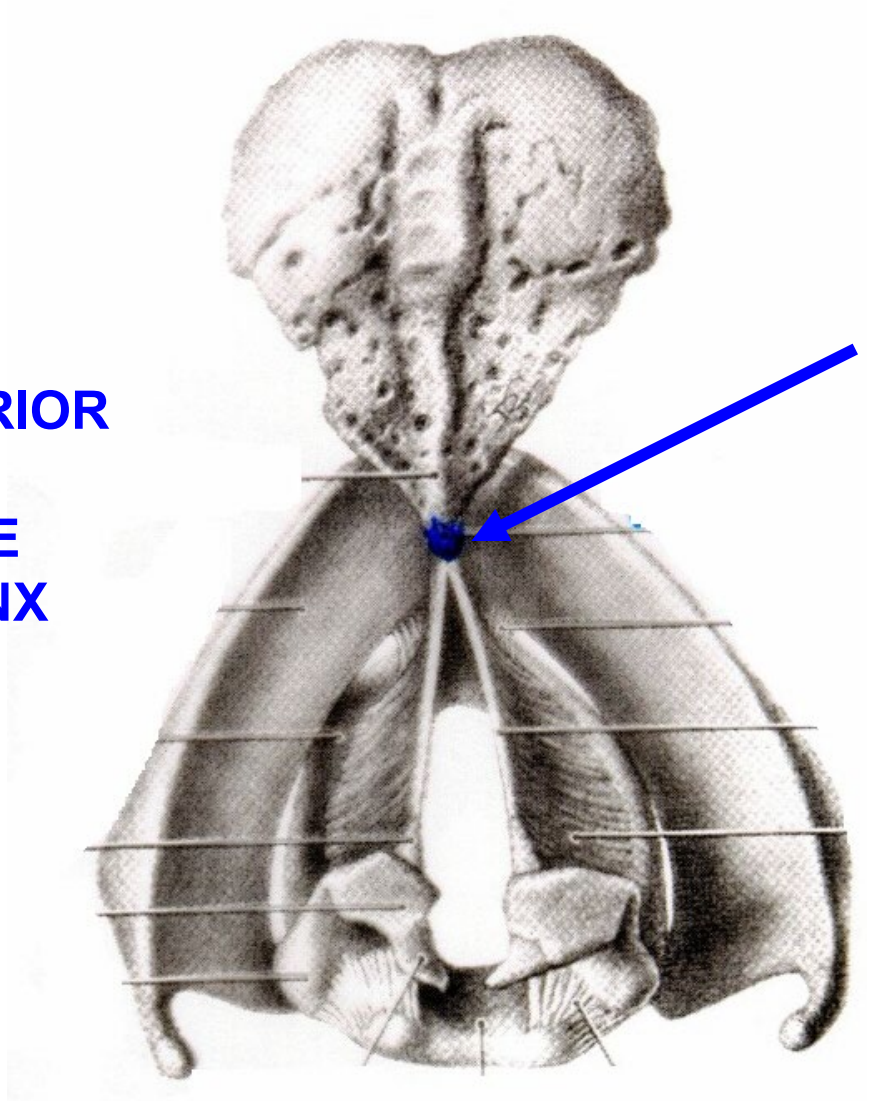
trachea

Lower free edge of Quadrangular membrane is Called <u>Vestibular Ligament</u>; deep to Vestibular (False Vocal) Folds

STRUCTURAL LIGAMENTS

NOSE

SUPERIOR VIEW ABOVE LARYNX



5. Thyroepiglottic Ligament
links epiglottis to thyroid cartilage

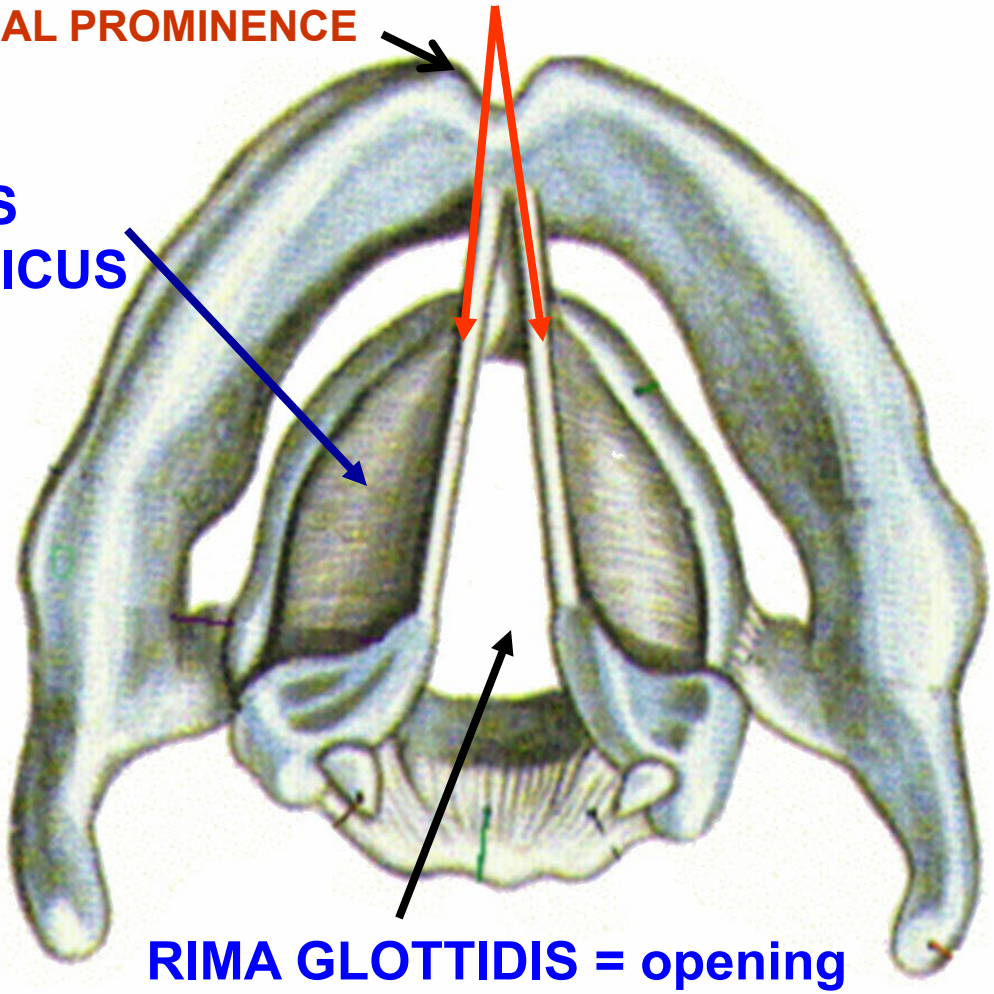
B. FUNCTIONAL LIGAMENTS

NOSE
top view

VOCAL LIGAMENTS = UPPER FREE EDGE OF CONUS

LARYNGEAL PROMINENCE

CONUS ELASTICUS



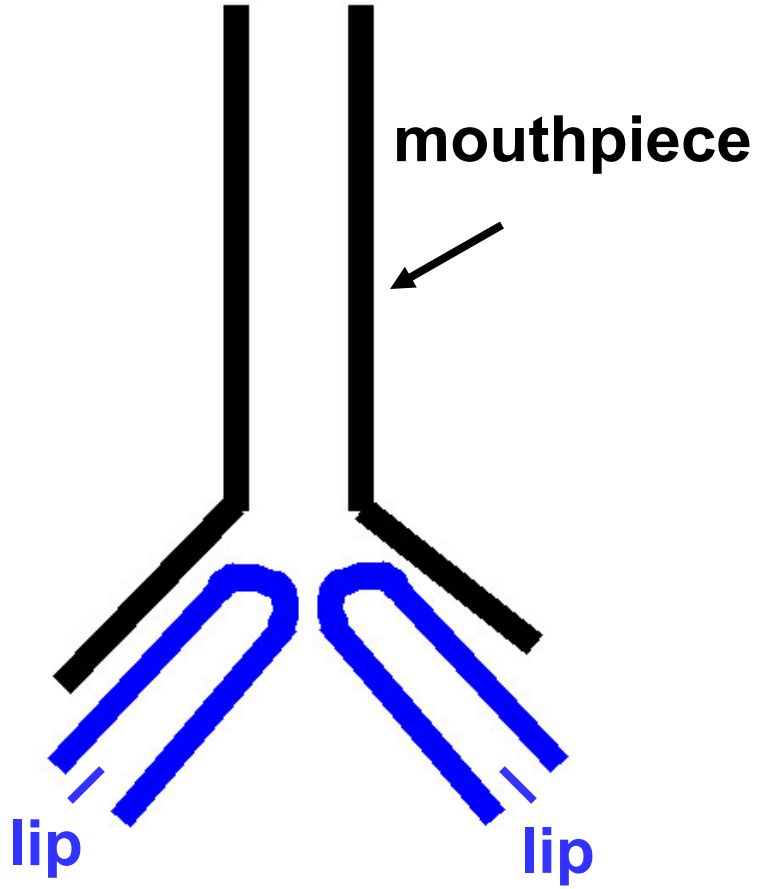
RIMA GLOTTIDIS = opening between Vocal ligaments

Functional ligaments: Conus Elasticus -
Vibrating lips that arise from entire upper edge of arch of cricoid
Attach: ant. to Thyroid, post. to Arytenoid

VOCAL LIGAMENTS - longer in males than females
- Laryngeal Prominence is Adam's apple not Eve's apple

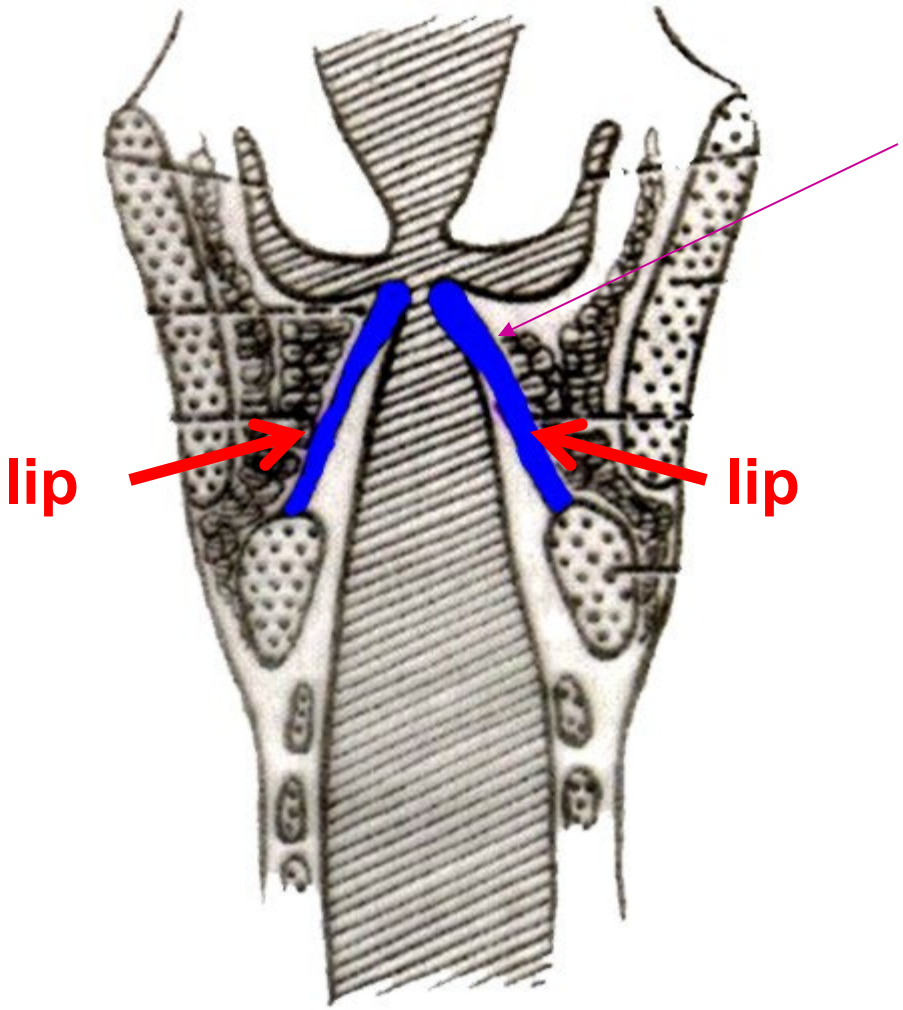
LARYNX PRODUCES SOUND LIKE LIPS OF TRUMPET PLAYER

Trumpet player –
Clifford Brown



Tense lips - raise pitch
Relax lips - lower pitch

FUNCTIONAL LIGAMENTS

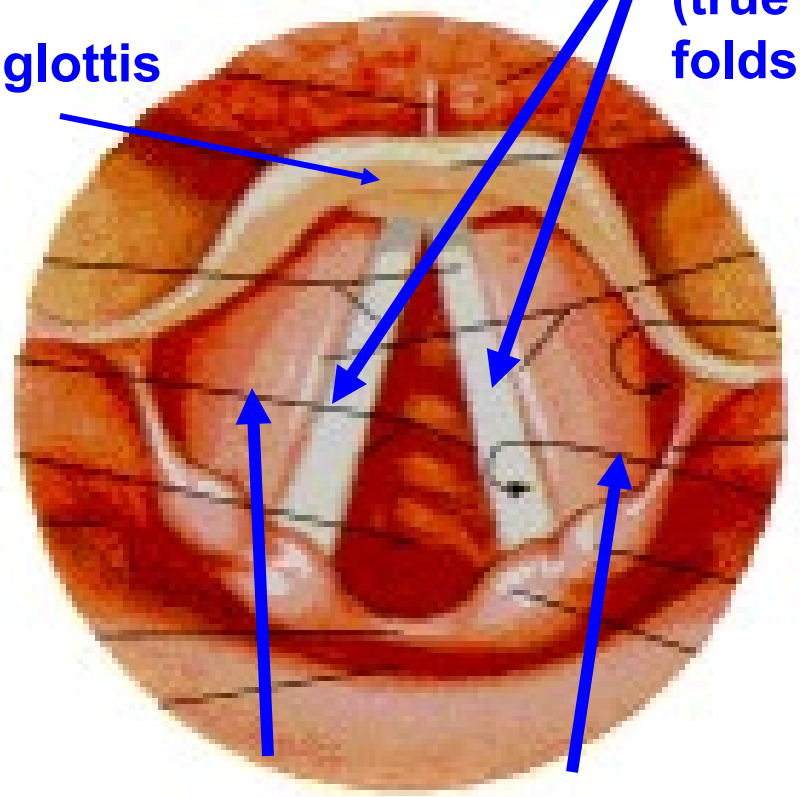


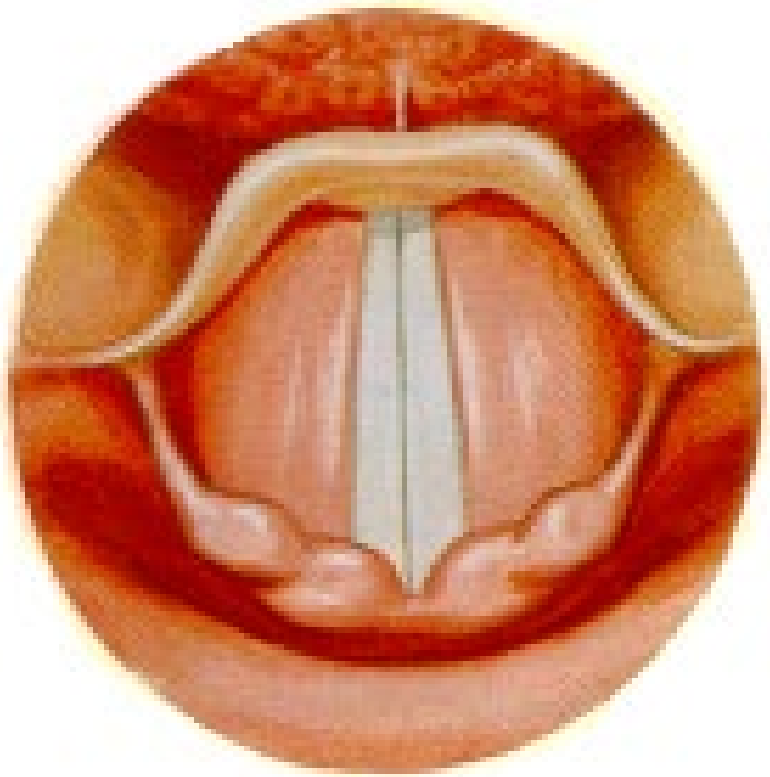
(In Coronal Section)

Conus Elasticus Functions

1) <u>Sound Production</u> – Vibrate like lips of trumpet player;
2) <u>Close Rima Glottidis</u> stops outflow air, upward movement of diaphragm - when contract abdominal muscle pressure increases in abdominal cavity; occurs in childbirth, defecation

LARYNGOSCOPE VIEW OF LARYNX

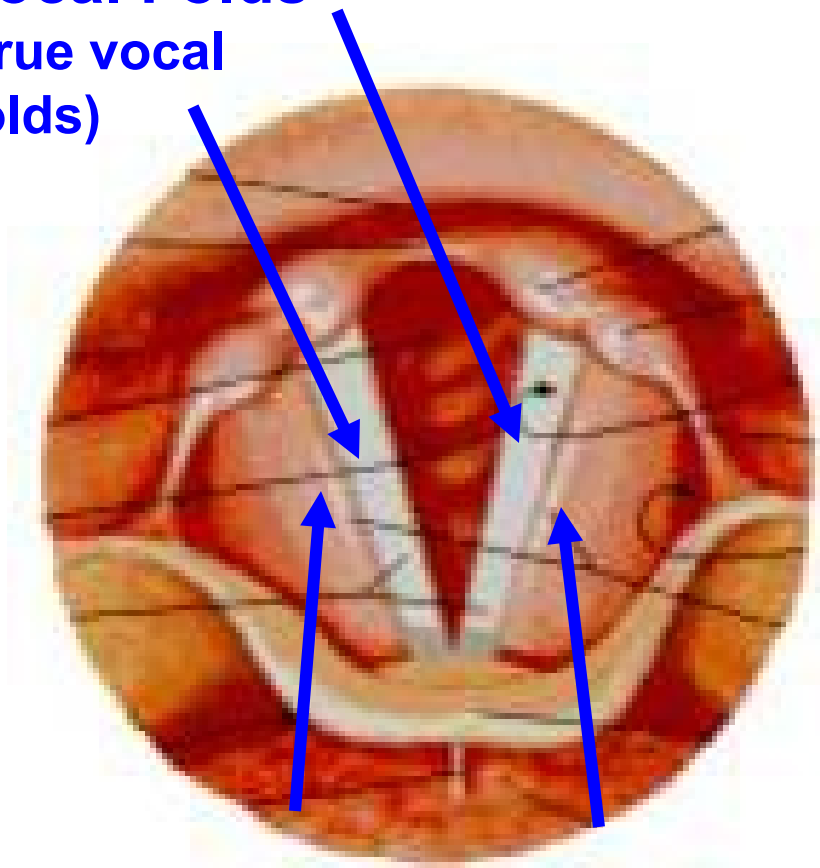


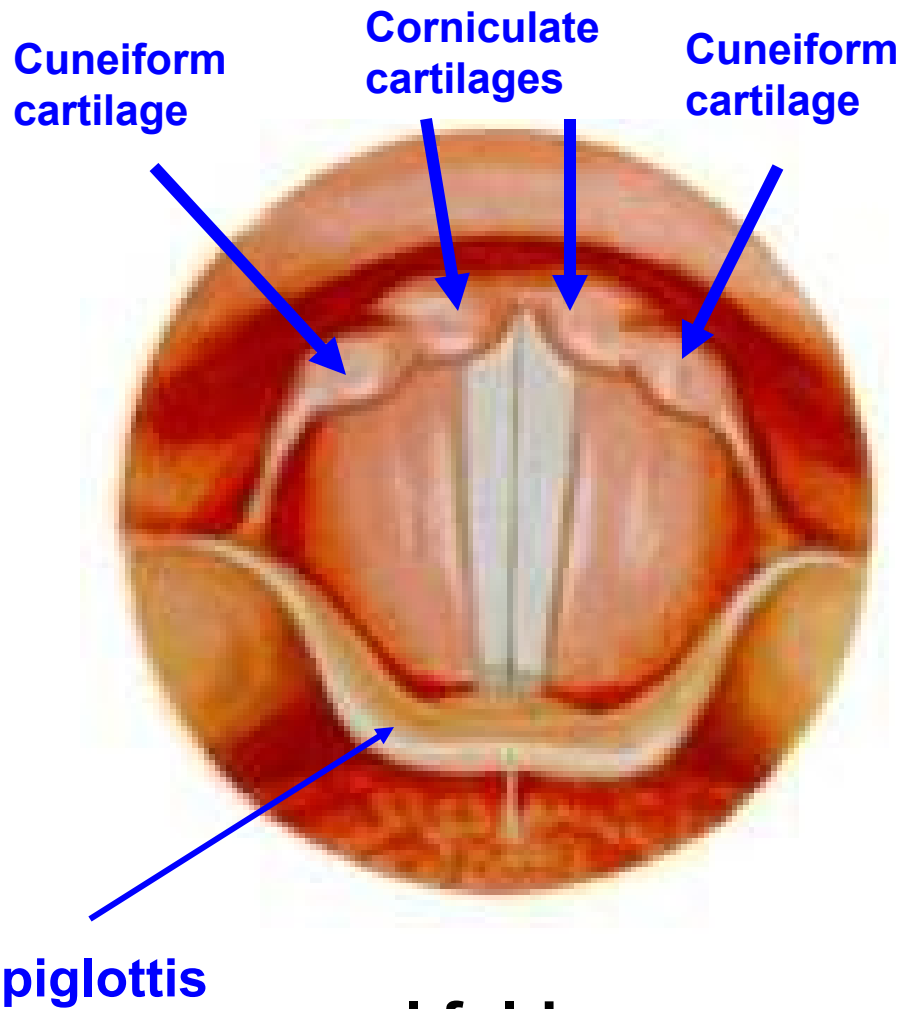


vocal folds adducted when talking or singing

LARYNGOSCOPE VIEW OF LARYNX

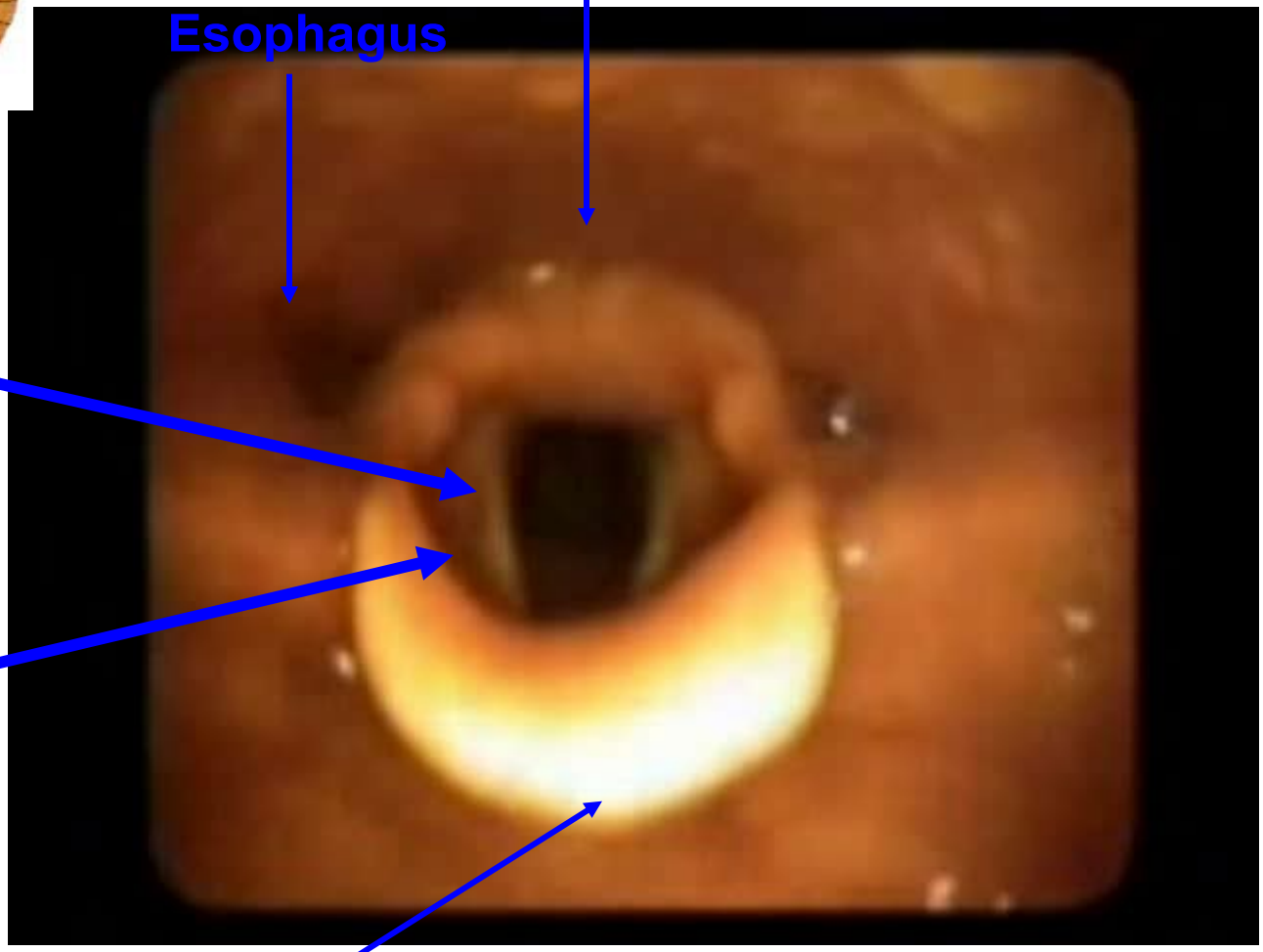
Post.



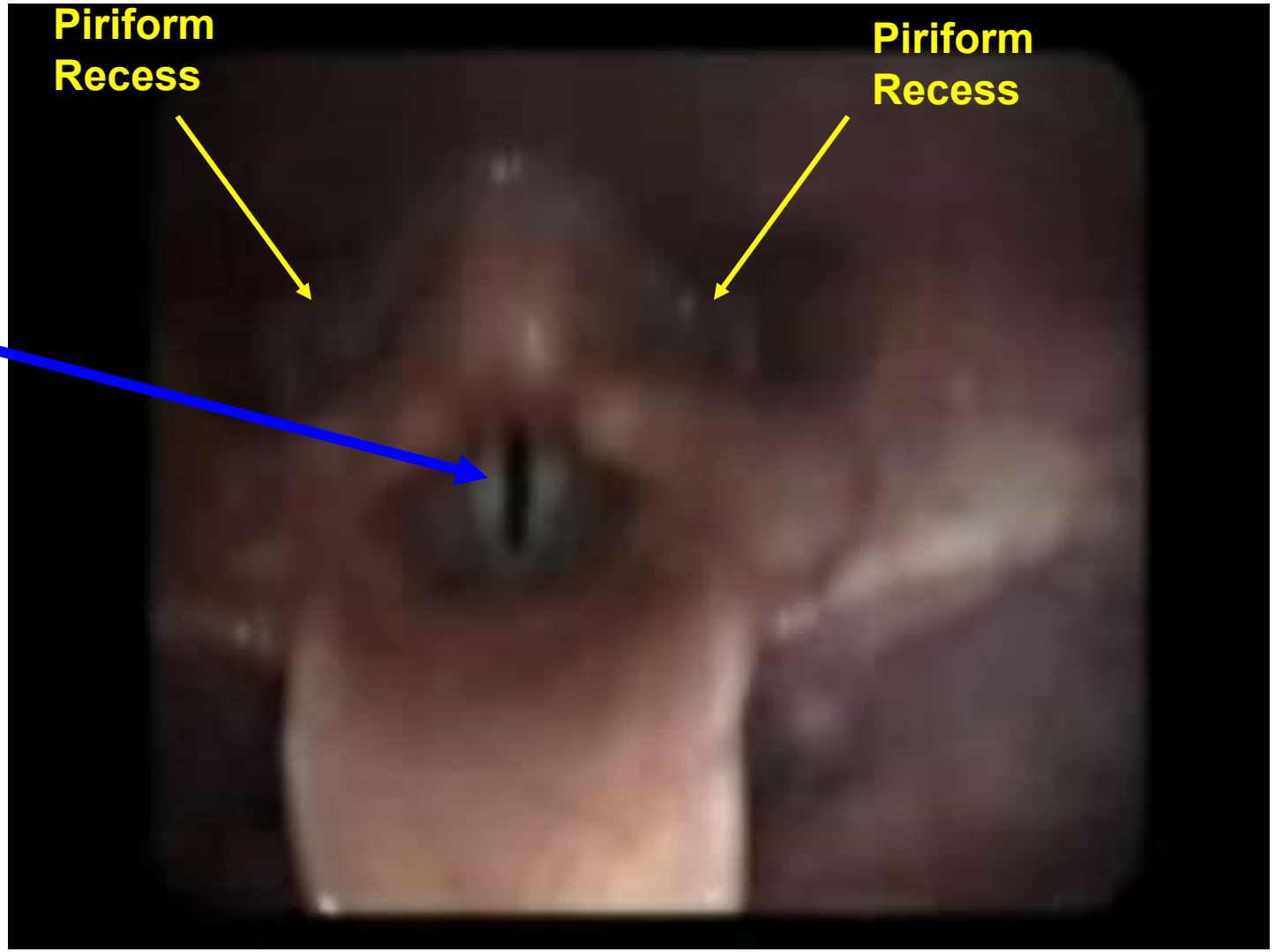


vocal folds adducted when talking or singing

BREATHING (INHALATION)



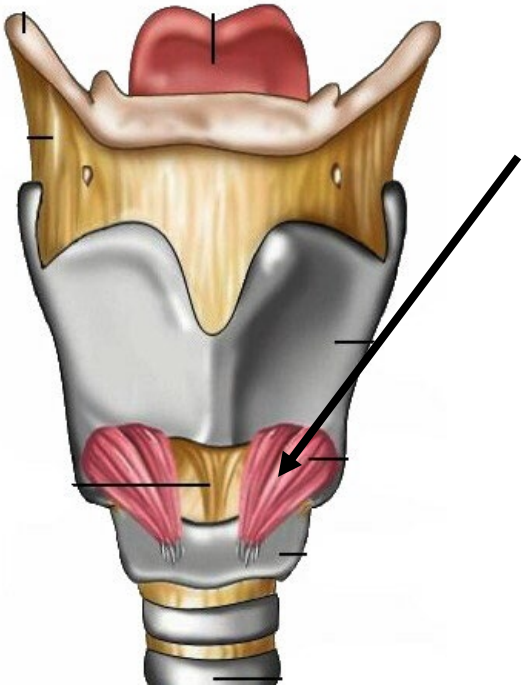
LARYNX PRODUCING SOUND



III. MUSCLES OF LARYNX - well named

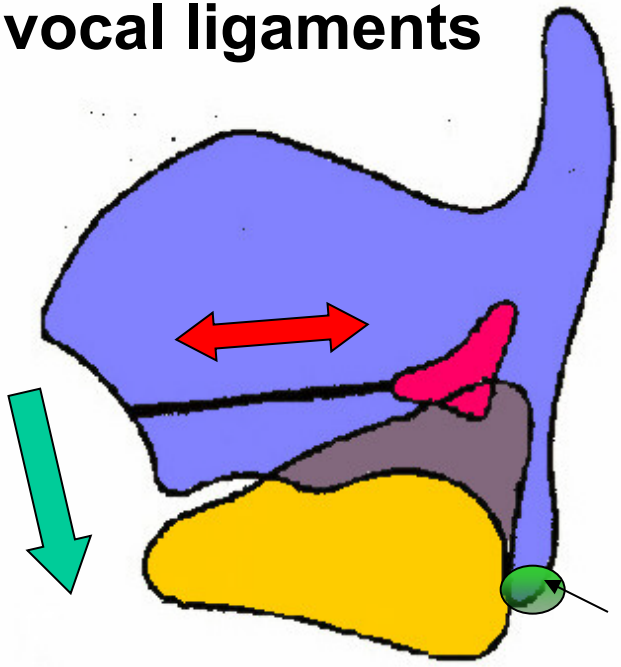
A. Extrinsic muscles (ex. hyoid muscles) - Move whole larynx as in swallowing

B. Intrinsic Muscles 1) change pitch by changing tension in vocal lig; increase tension raises pitch, decreased tension lowers pitch; 2) open and close Rima Glottidis



1) CRICOTHYROID- Tenses Vocal Ligament Increasing Pitch

Tilting - STRETCHES vocal ligaments

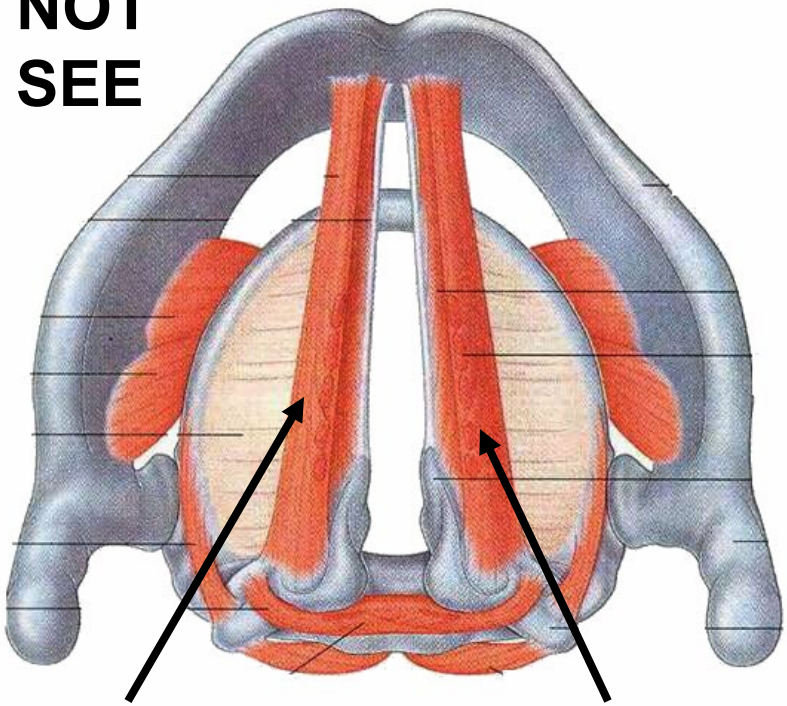


STRETCH vocal ligament

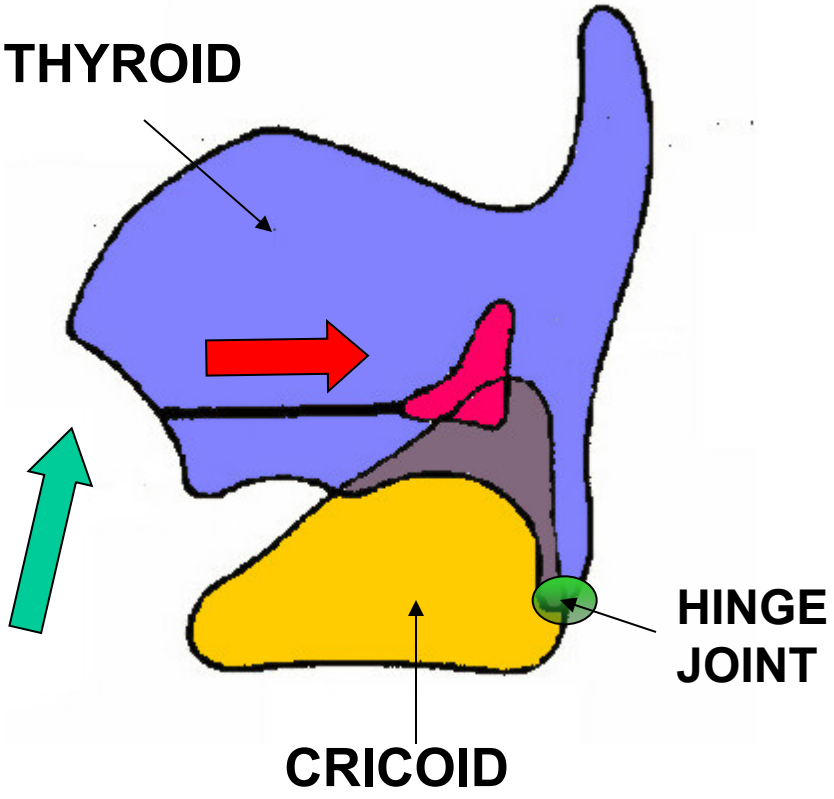
INCREASE PITCH - CRICOTHYROID

MUSCLES OF LARYNX

NOT SEE



THYROARYTENOID MUSCLES - adjacent to vocal ligament - Relaxes Vocal Ligaments Decreases pitch



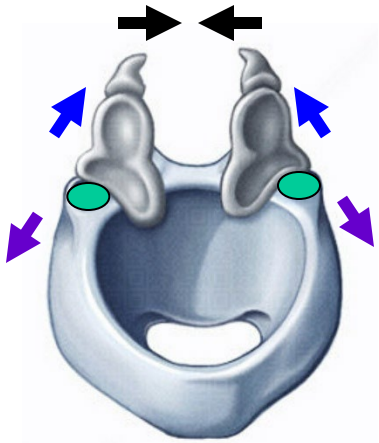
RELAX vocal ligament

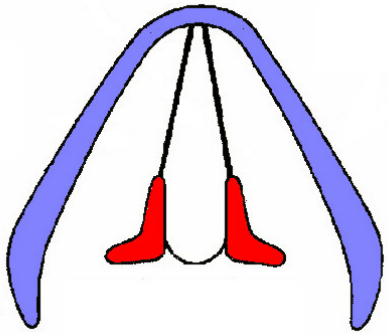
DECREASE PITCH - THYROARYTENOID

OPEN AND CLOSE RIMA GLOTTIDIS BY ROTATING/SLIDING ARYTENOIDS -

Rotate laterally opens; Rotate medially or slide closes

more close than open

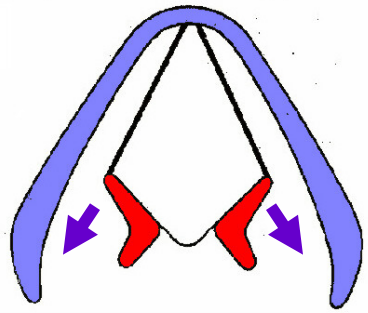




REST POSITION

OPEN

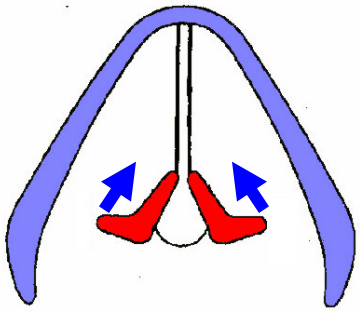
ROTATE LATERALLY



POSTERIOR CRICO-ARYTENOID

CLOSE

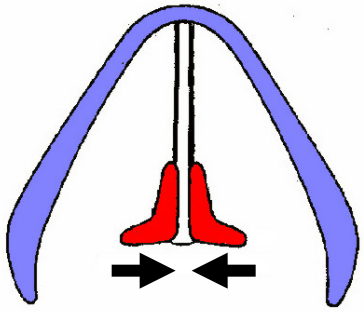
ROTATE MEDIALLY



LATERAL CRICO-ARYTENOID

CLOSE

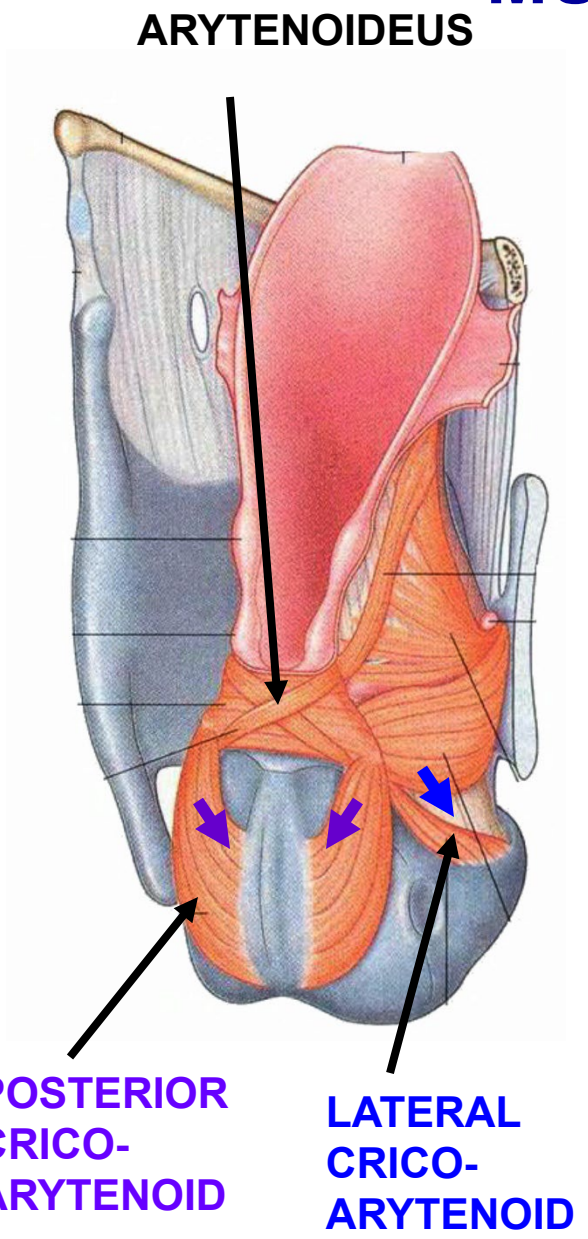
SLIDE



ARYTENOIDEUS

Larynx open for deep breathing; close for speech; completely close to raise abdominal pressure (Valsalva maneuver)

MUSCLES OF LARYNX



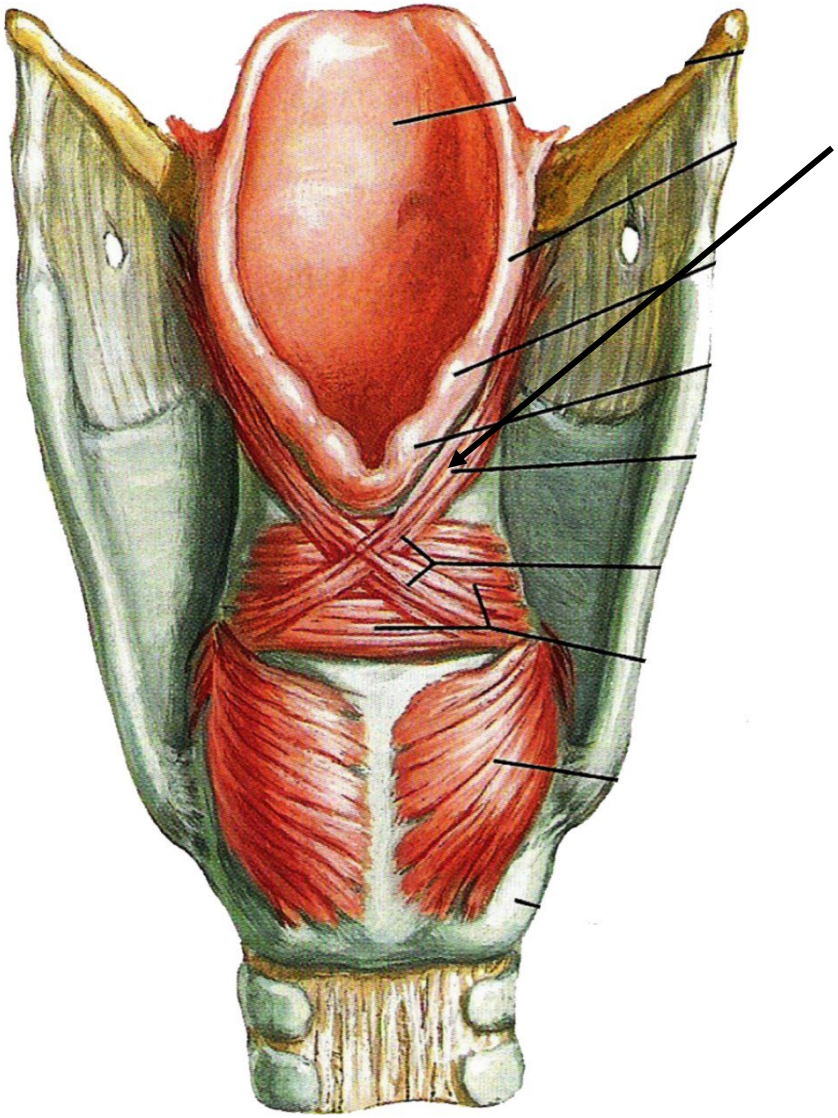
5) ARYTENOID (Transverse and oblique arytenoid) - Adduct vocal folds

4) LATERAL CRICO-ARYTENOID - Adduct vocal folds

3) POSTERIOR CRICO-ARYTENOID – Abducts vocal fold

Adduct closes rima glottidis
Abduct opens rima glottidis

MUSCLES OF LARYNX



5) ARYEPIGLOTTIC MUSCLE

Pulls epiglottis down during swallowing

- Covers inlet to larynx

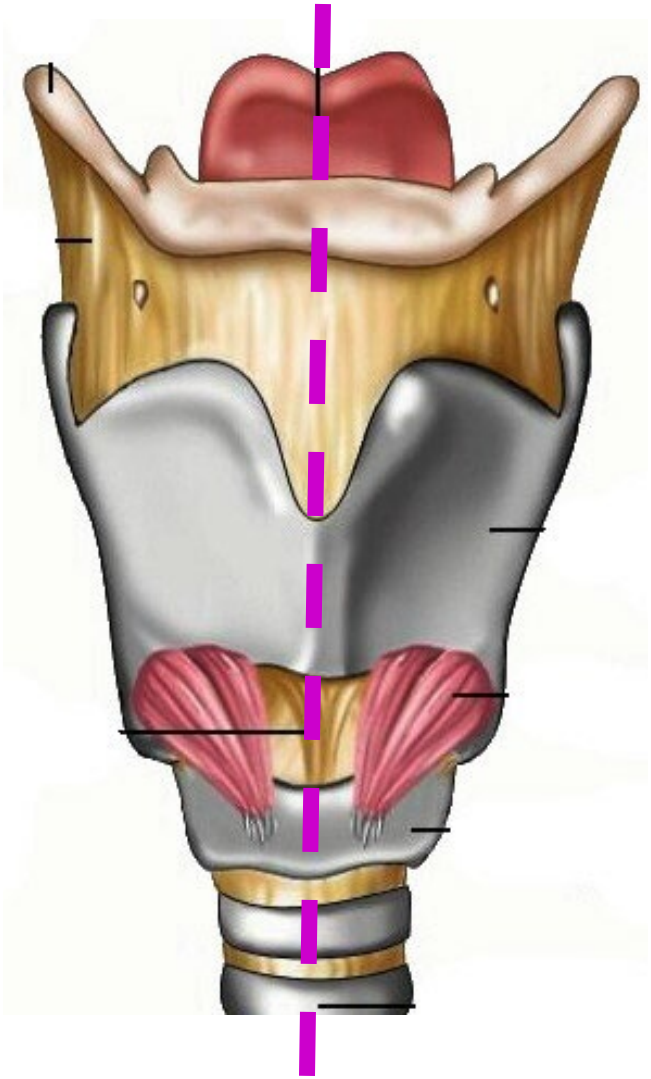
- Not necessary in adult humans

LARYNX MUSCLES - KNOW MUSCLE, ACTION, INNERVATION

***

MUSCLE	ACTION	NERVE
Cricothyroid	Tenses vocal fold, raises pitch of sound	External Laryngeal n. (X)
Thyroarytenoid	Relaxes vocal fold, decreases pitch of sound	Recurrent Laryngeal n. (X)
Posterior cricoarytenoid	Abducts vocal folds, opens rima glottidis	Recurrent Laryngeal n. (X)
Lateral cricoarytenoid	Adducts vocal folds, closes rima glottidis	Recurrent Laryngeal n. (X)
Arytenoid (Transverse arytenoid)	Adducts vocal folds, closes rima glottidis	Recurrent Laryngeal n. (X)
Aryepiglottic muscle	Pulls down epiglottis during swallowing	Recurrent Laryngeal n. (X)

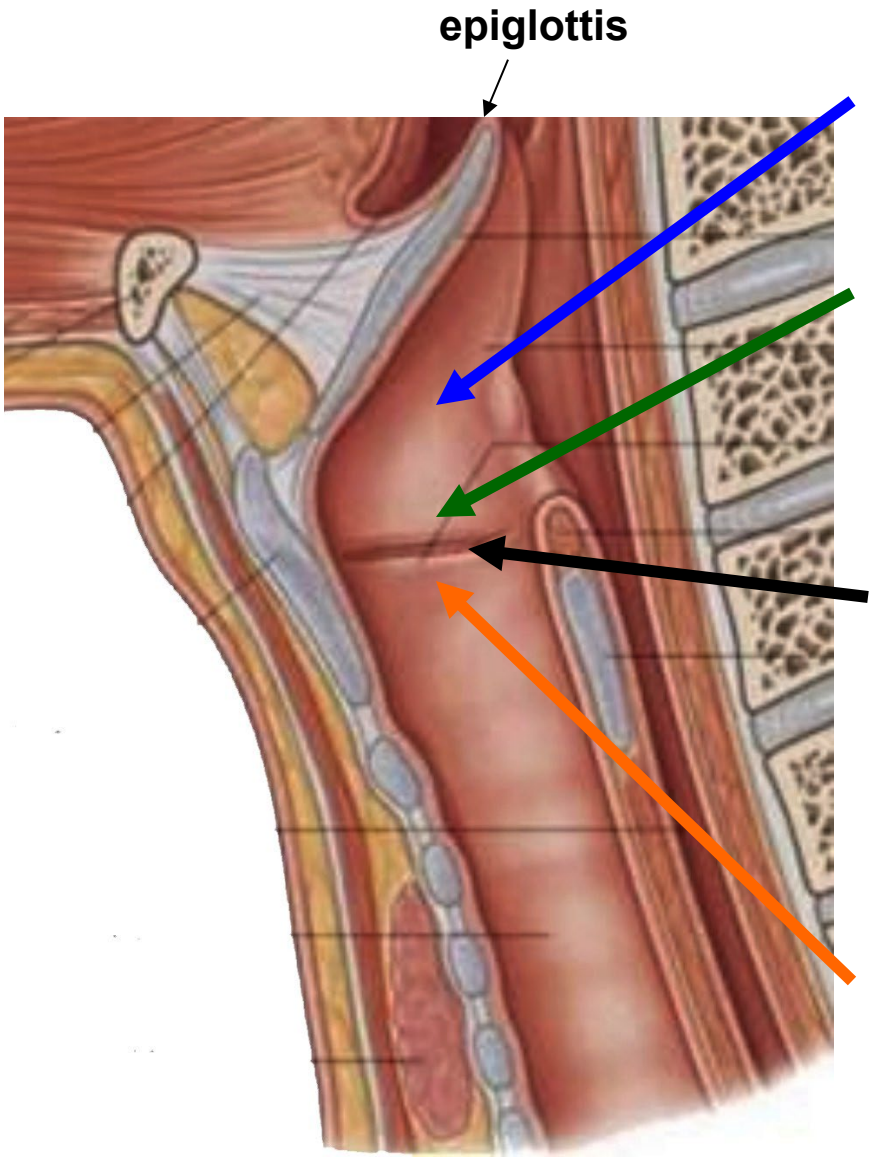
IV. TERMS ASSOCIATED WITH LARYNX



Bisect Larynx to see interior structures

NOSE

TERMS ASSOCIATED WITH LARYNX



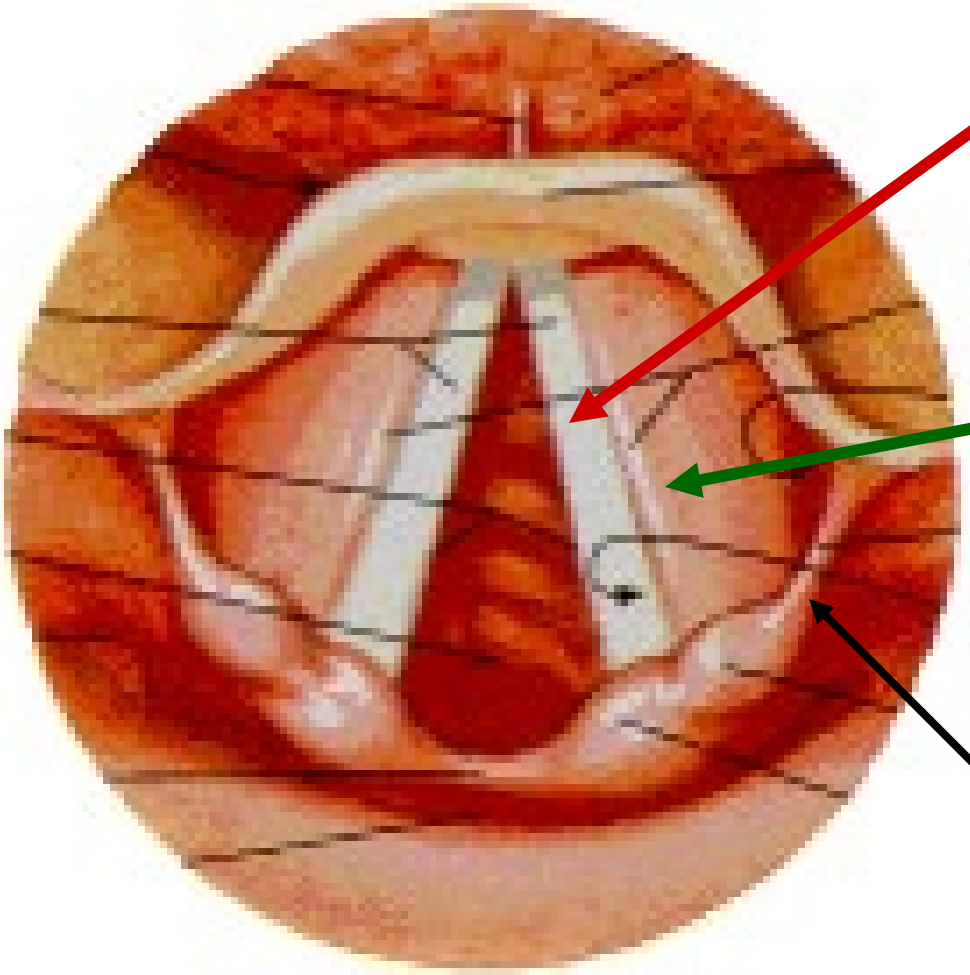
VESTIBULE - inlet above false vocal folds

VESTIBULAR (FALSE VOCAL) FOLDS - overlie vestibular ligaments

VENTRICLE - area between true and false vocal folds; lateral extension is Laryngeal Sinus

VOCAL (TRUE VOCAL) FOLDS - overlie vocal ligaments

LARYNGOSCOPE VIEW OF LARYNX



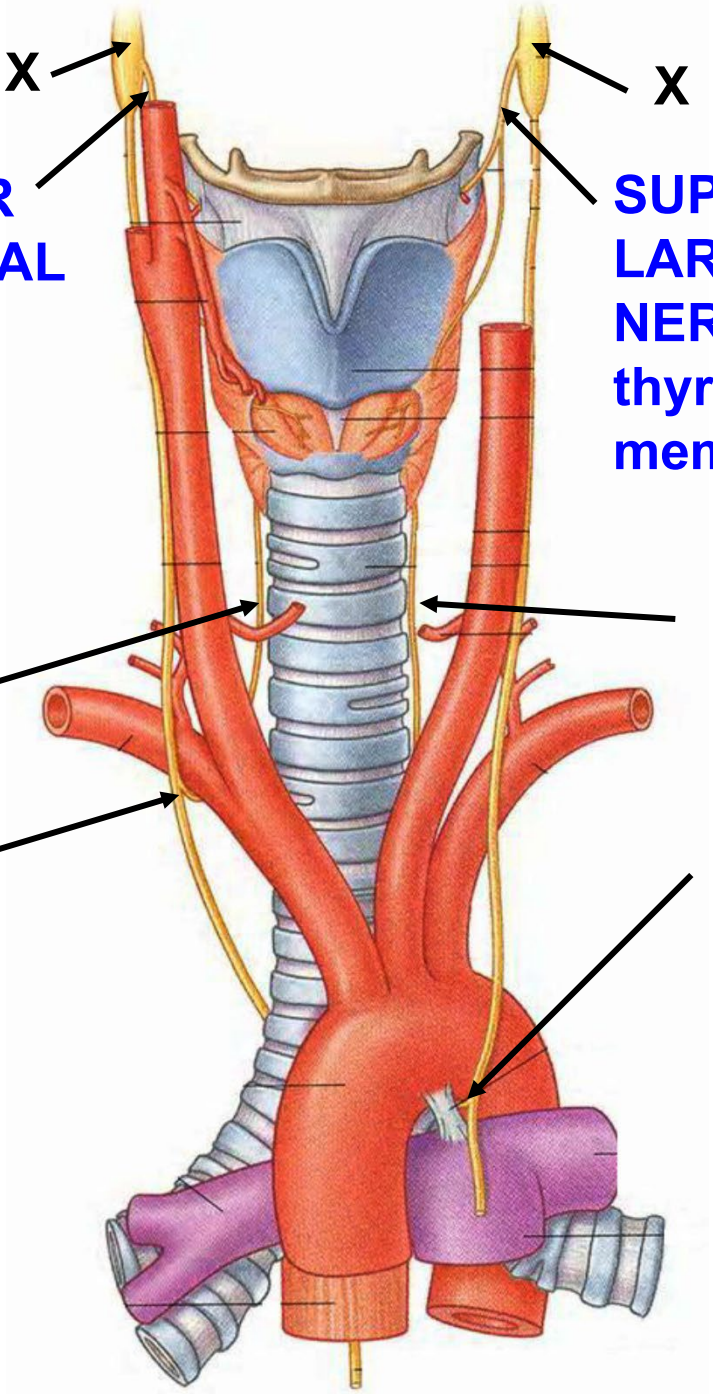
TRUE VOCAL FOLDS -overlie vocal ligaments

FALSE VOCAL FOLDS - overlie vestibular ligaments

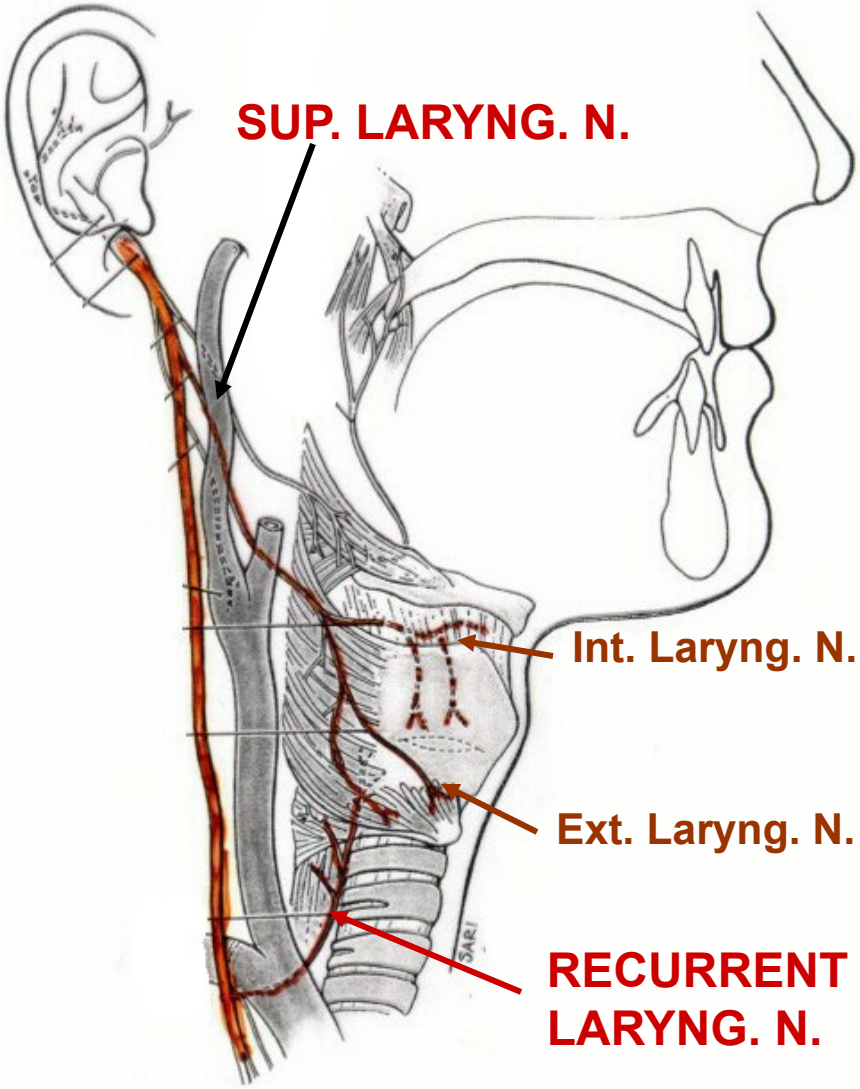
ARYEPIGLOTTIC FOLD - overlie Quadrangular membrane

NERVES OF LARYNX –

All are Branches of Vagus CN X



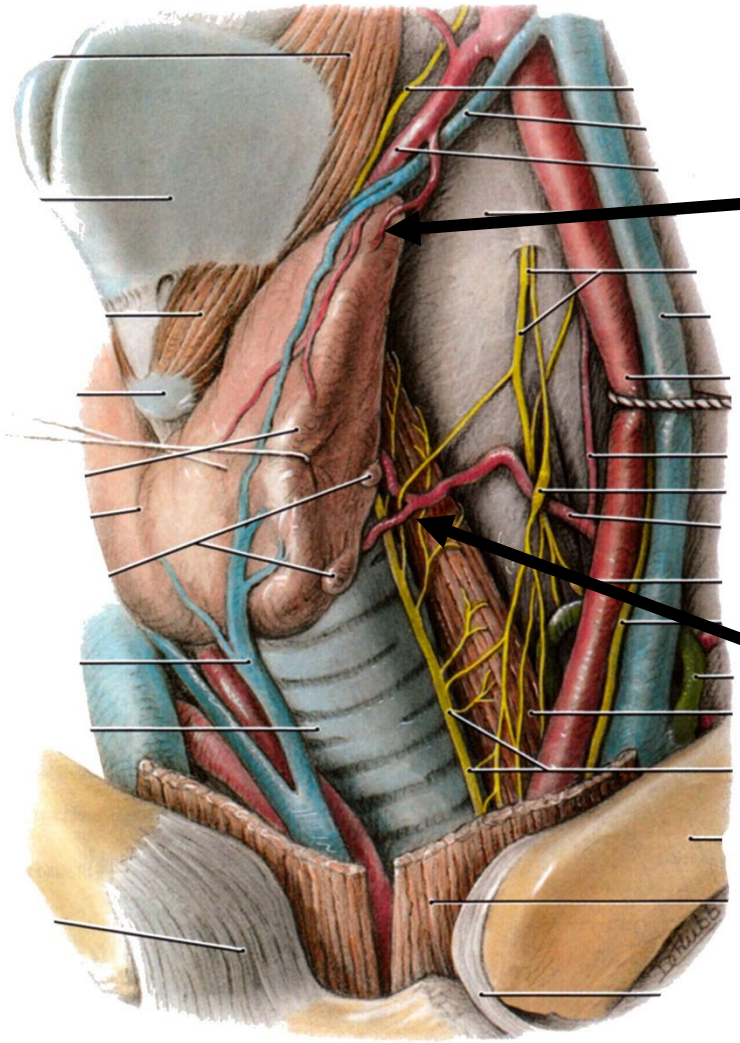
V. NERVES OF LARYNX – Branches of Vagus



A. <u>Superior Laryngeal N.</u>
divides to -
1. Internal Laryngeal N.
Visceral Sensory to Larynx
<u>Above</u> True Vocal Folds
2. External Laryngeal N.
Branchiomotor to Cricothyroid

B. <u>Recurrent Laryngeal N.</u>
- Visceral Sensory to Larynx
<u>Below</u> True Vocal Folds
- Branchiomotor to all other Muscles of Larynx

VI. LARYNX - ARTERIAL SUPPLY



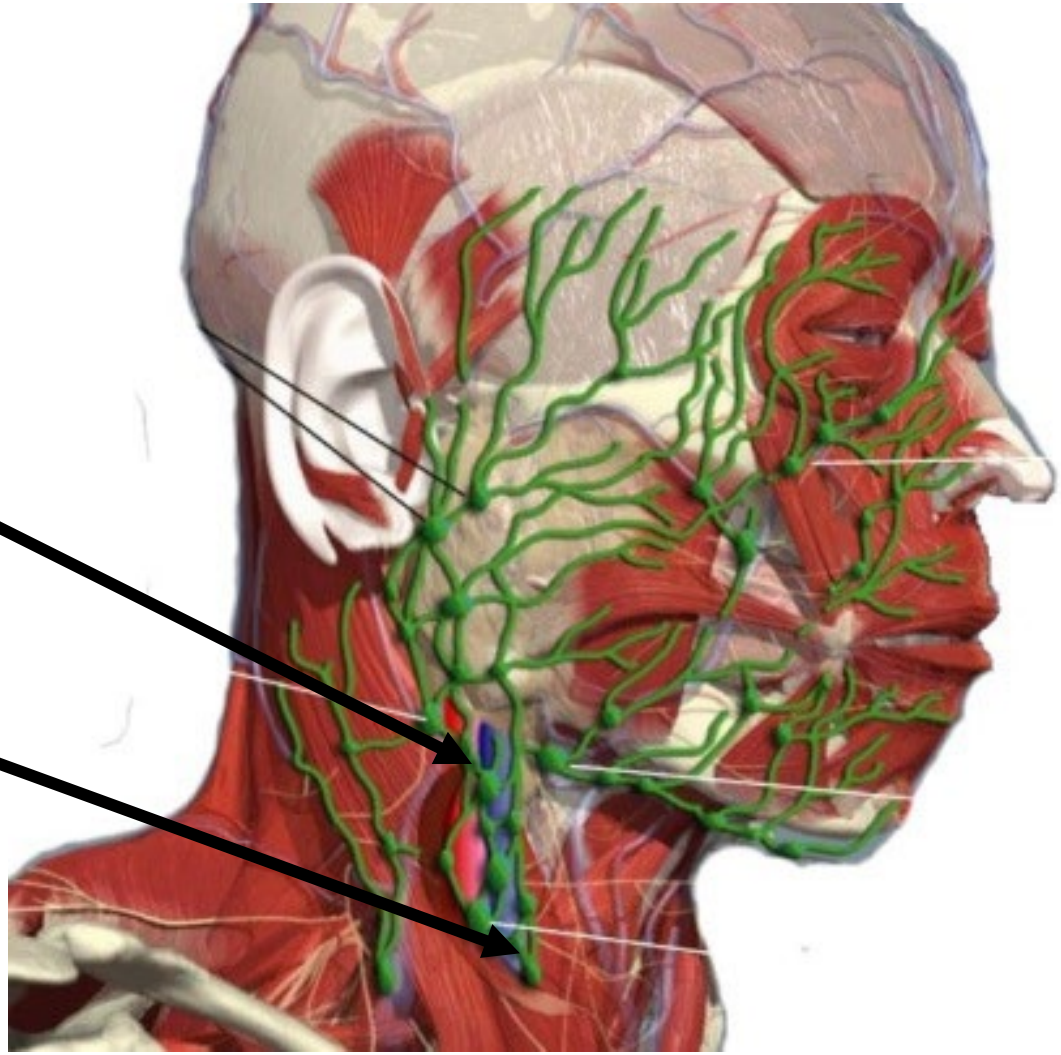
Superior Laryngeal Artery from Superior Thyroid artery

Inferior Laryngeal Artery from Inferior Thyroid artery

VII. LARYNX - LYMPHATICS

Superior Deep Cervical Nodes - drain Larynx above true vocal folds

Inferior Deep Cervical Nodes - drain Larynx below true vocal folds



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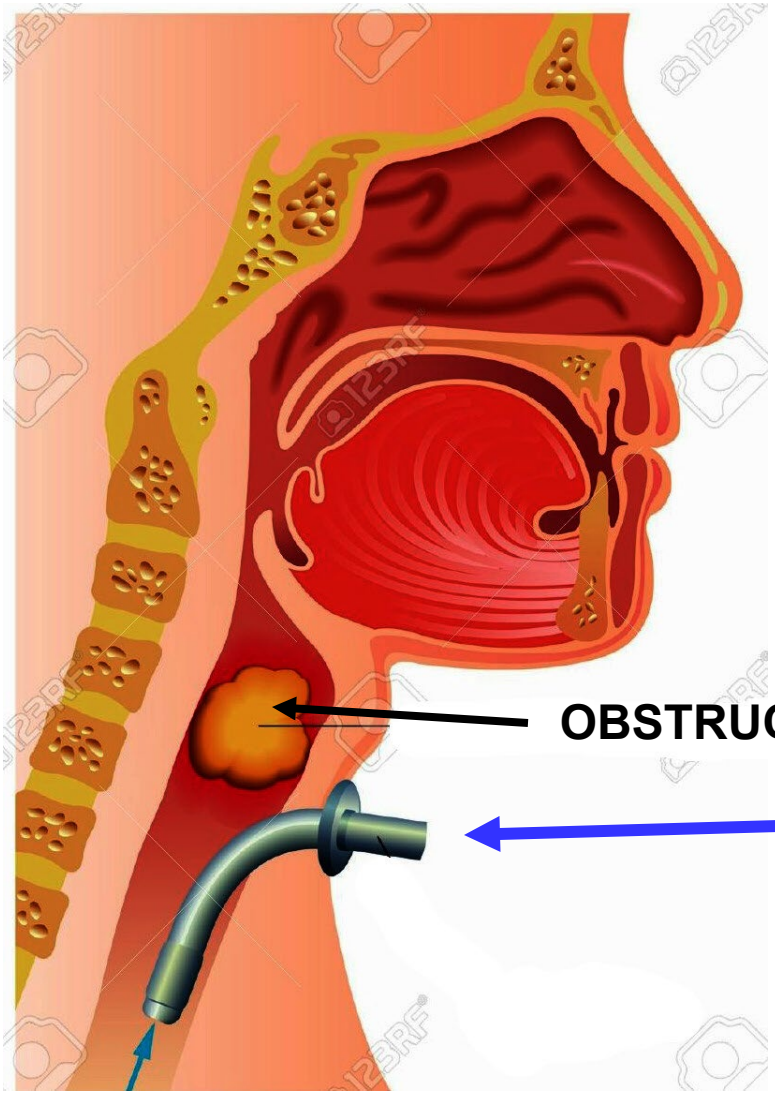
CLINICAL Note: Mucosa is tightly attached to vocal folds; in **Anaphylactic Shock** (acute allergic reaction) swelling of Vestibular folds can constrict airway and lead to Suffocation)

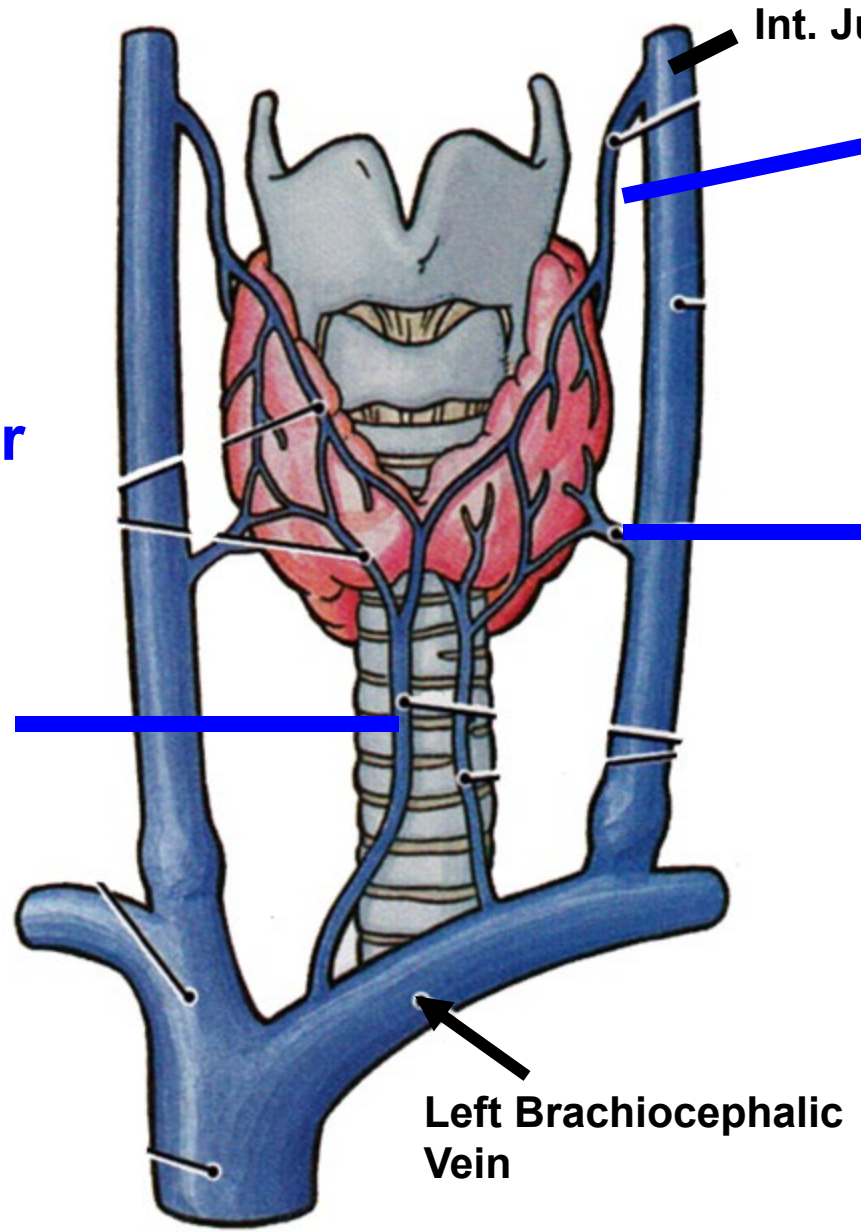
VIII. OBSTRUCTION OF LARYNX: TRACHEOTOMY



open airway to lungs below obstructed larynx

Tracheotomy - cut between 1st and 2nd or 2nd and 3rd Tracheal cartilages

THYROID GLAND - LOTS OF VEINS



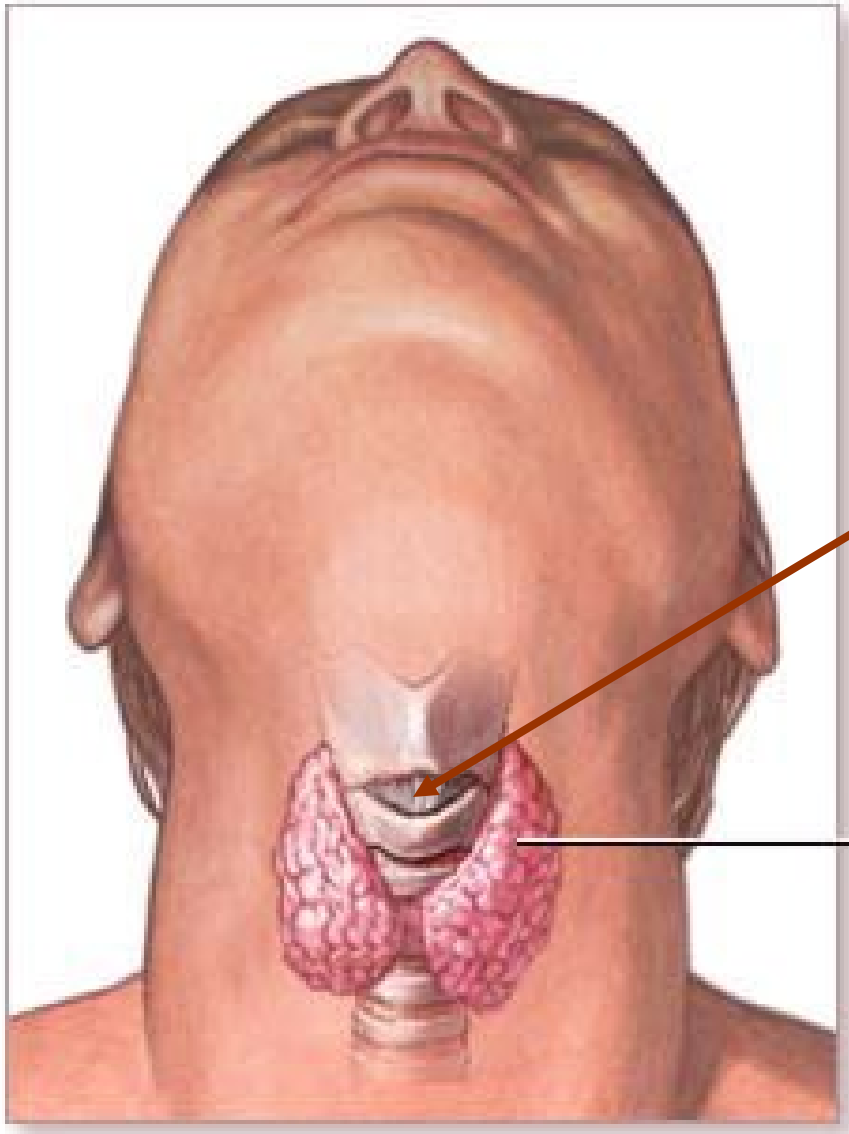
1) Superior Thyroid vein follows SuperiorThyroid artery

2) Middle Thyroid vein - to Internal Jugular

3) Inferior Thyroid vein(s) - drain to Left Brachio-cephalic Vein

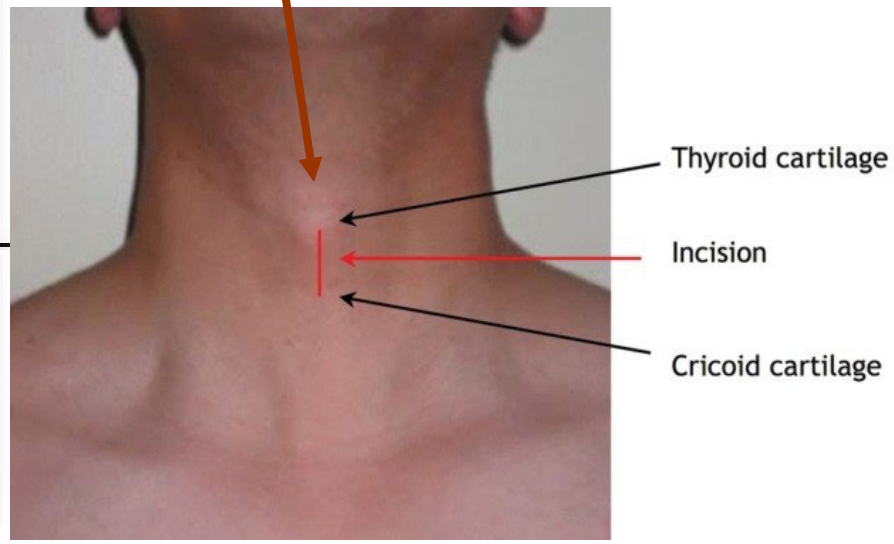
CLINICAL NOTE: THERE CAN BE A LARGE VEIN IN FRONT OF (ANTERIOR TO) THE TRACHEA - IMPORTANT IN TRACHEOTOMY; BLEEDING AVOIDED BY CRICOTHYROTOMY

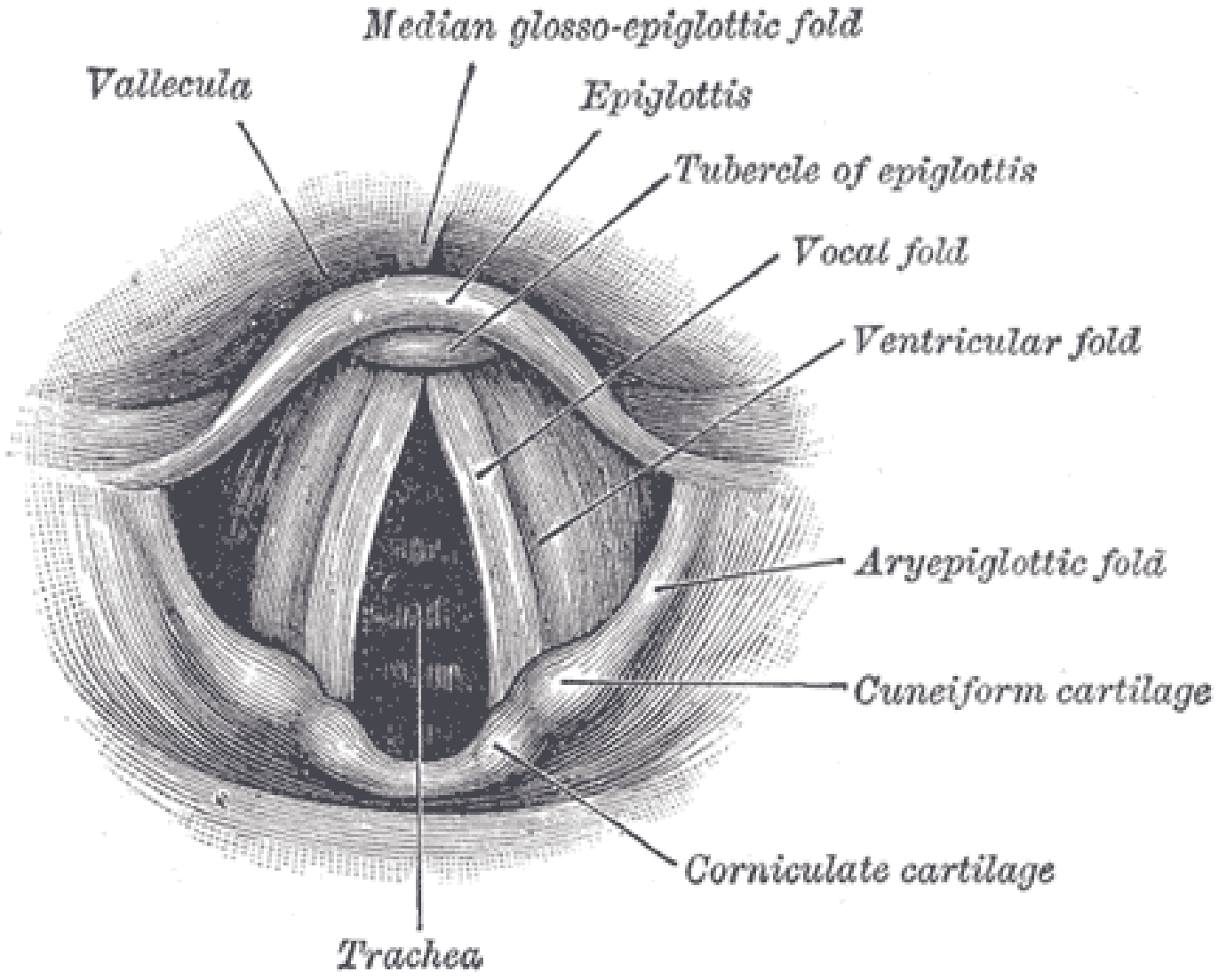
OBSTRUCTION OF LARYNX: CRICOTHYROTOMY

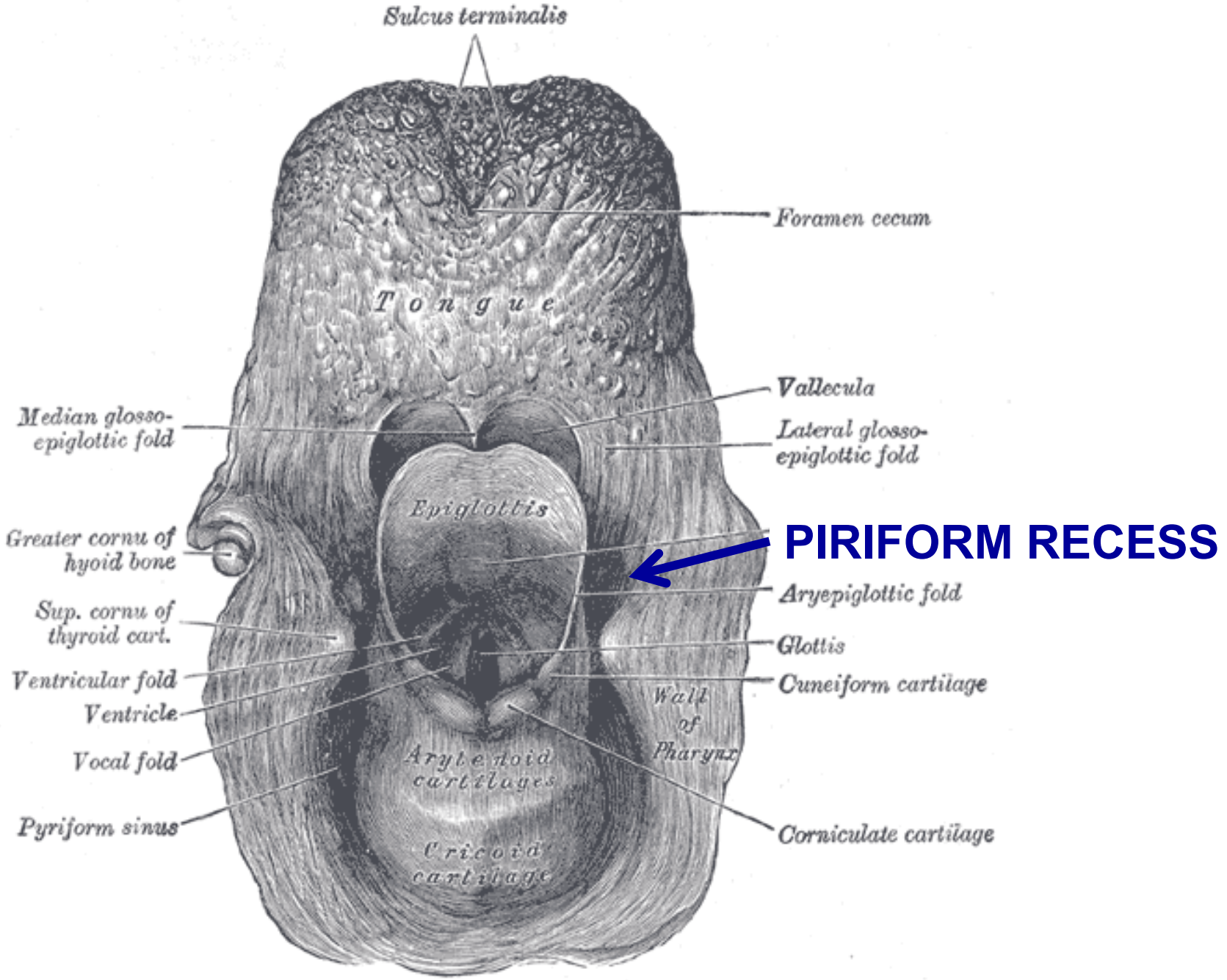


CLINICALLY IMPORTANT:
IN ANAPHYLACTIC SHOCK, INSERT TUBE TO CRICOTHYROID MEMBRANE (LESS BLEEDING)

Cricothyroid Membrane




Median glosso-epiglottic fold
Vallecula
Epiglottis
Tubercle of epiglottis
Vocal fold
Ventricular fold
Aryepiglottic fold
Cuneiform cartilage
Corniculate cartilage
Trachea


Sulcus terminalis
Foramen cecum
Tongue
Vallecula
Median glosso-epiglottic fold
Lateral glosso-epiglottic fold
Epiglottis
Greater cornu of hyoid bone
PIRIFORM RECESS
Aryepiglottic fold
Sup. cornu of thyroid cart.
Glottis
Ventricular fold
Cuneiform cartilage
Ventricle
Wall of Pharynx
Vocal fold
Arytenoid cartilages
Pyriform sinus
Corniculate cartilage
Cricoid cartilage