

LARYNX



OUTLINE

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

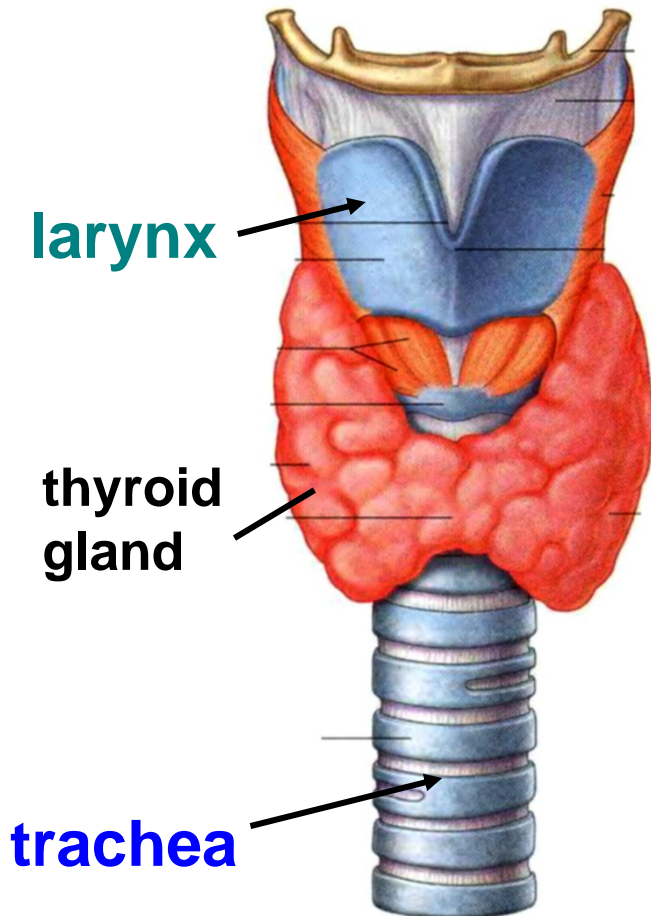
LARYNX IS SOUND GENERATOR; HOWEVER, SOUNDS ARE EXTENSIVELY MODIFIED IN SPEECH AND SINGING BY RESONANCE OF PHARYNX, NASAL CAVITY, ORAL CAVITY

LARYNX

Cartilages connected by membranes and ligaments, moved by muscles

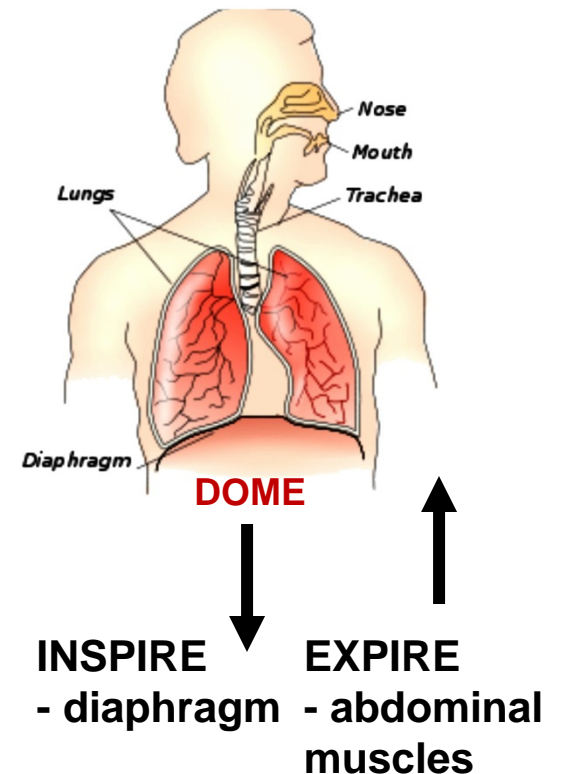
2 Functions: 1) Sound production

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



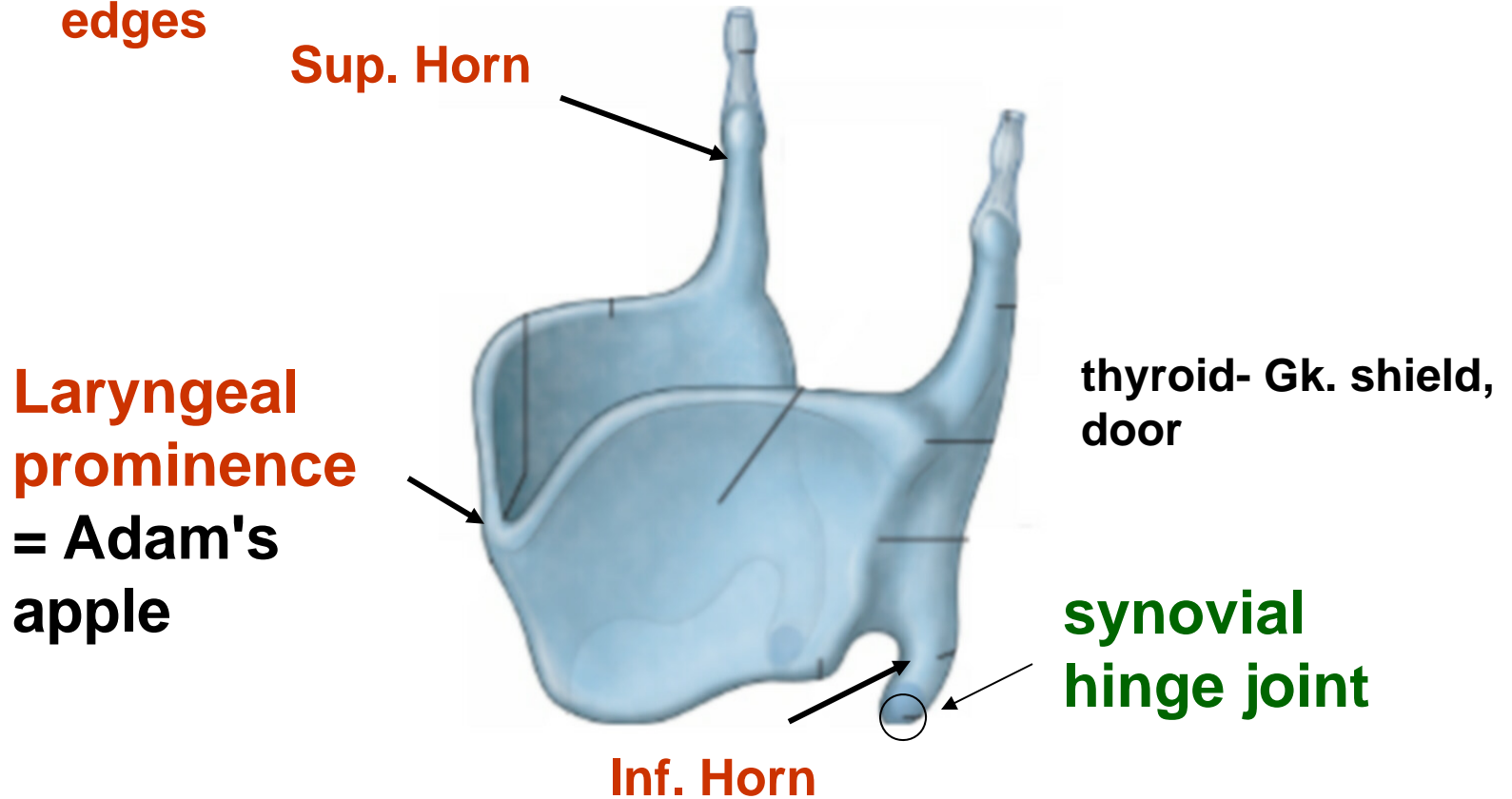
Note: In Respiration -
Inspire - Diaphragm;
Expire - **Some muscles but largely passive;**
Forced Expire -
Abdominal Muscles

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



I. LARYNX: CARTILAGES

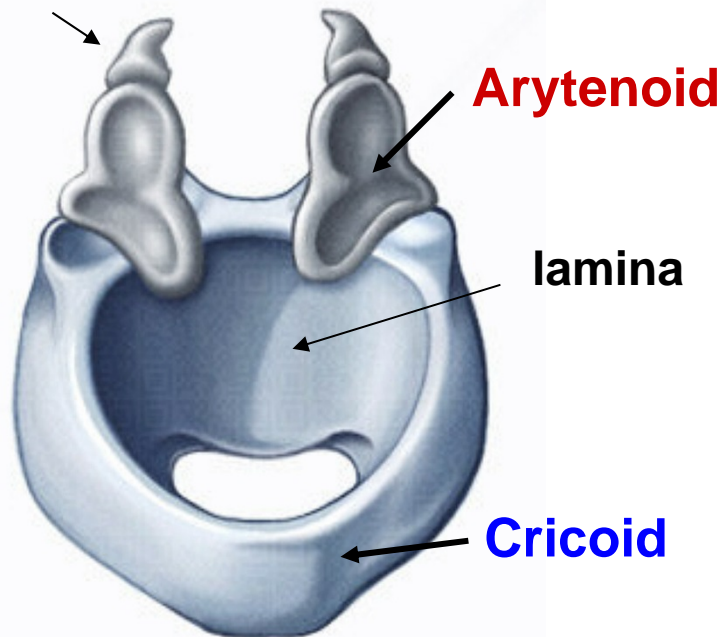
A. THYROID CARTILAGE – Shield shaped
- has Sup. and Inf. Horns from upper and lower edges



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

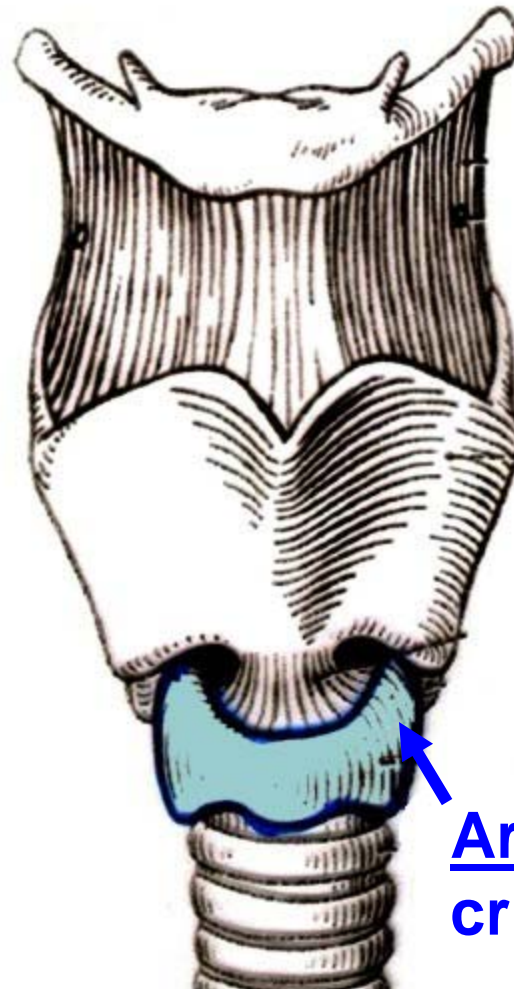
B. CRICOID-
complete ring of
cartilage has
narrow Arch ant.,
broad Lamina post.

Corniculate
Cartilages



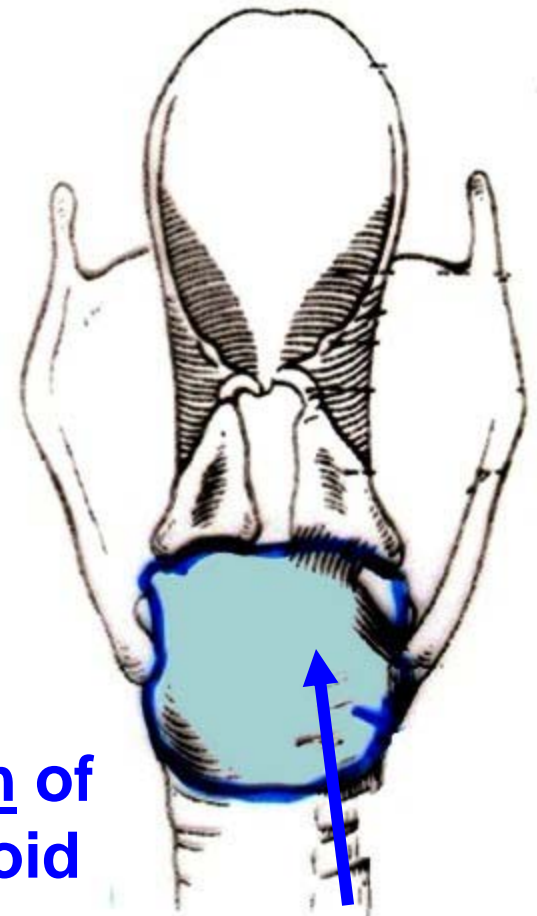
LARYNX: CARTILAGES

ANT VIEW



Cricoid means
Signet Ring

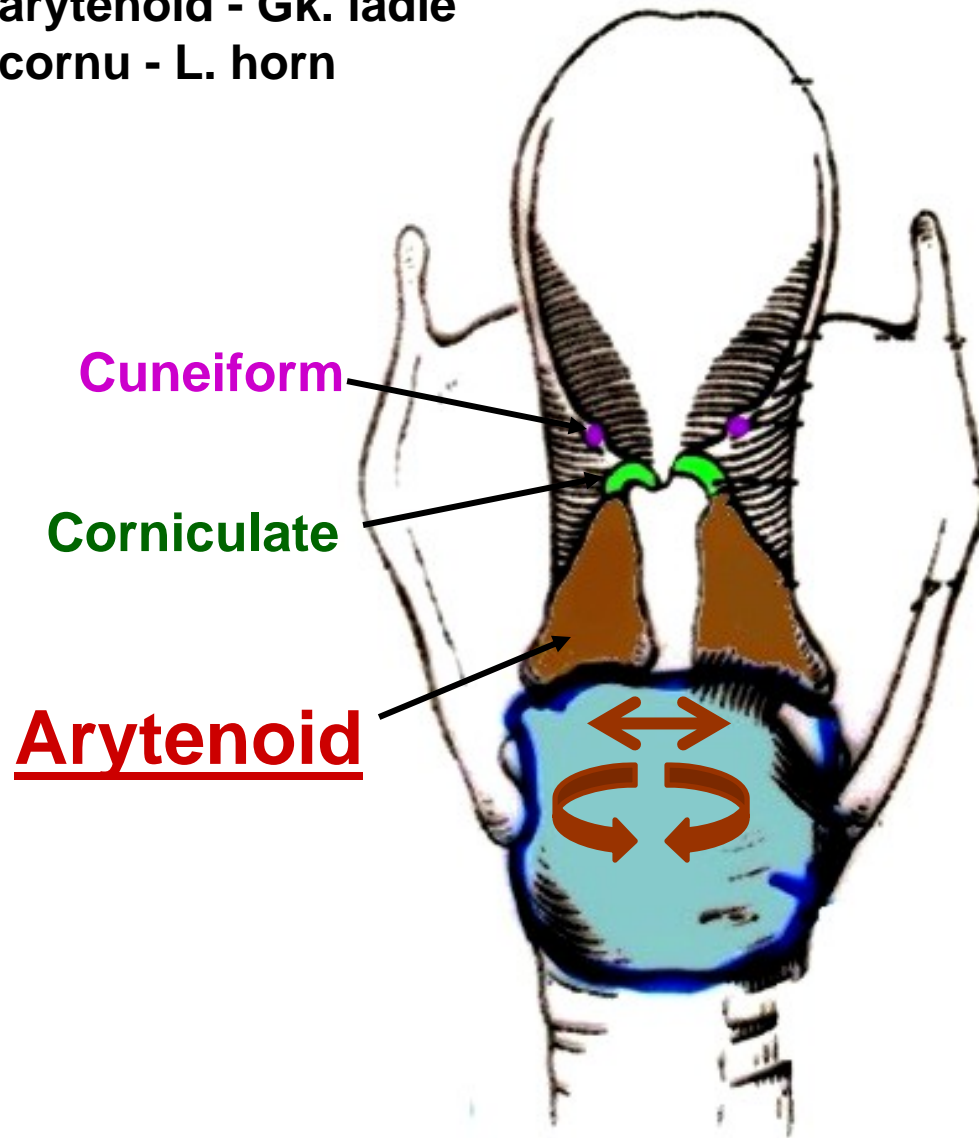
POST VIEW



Lamina of
cricoid

LARYNX: CARTILAGES

arytenoid - Gk. ladle
cornu - L. horn



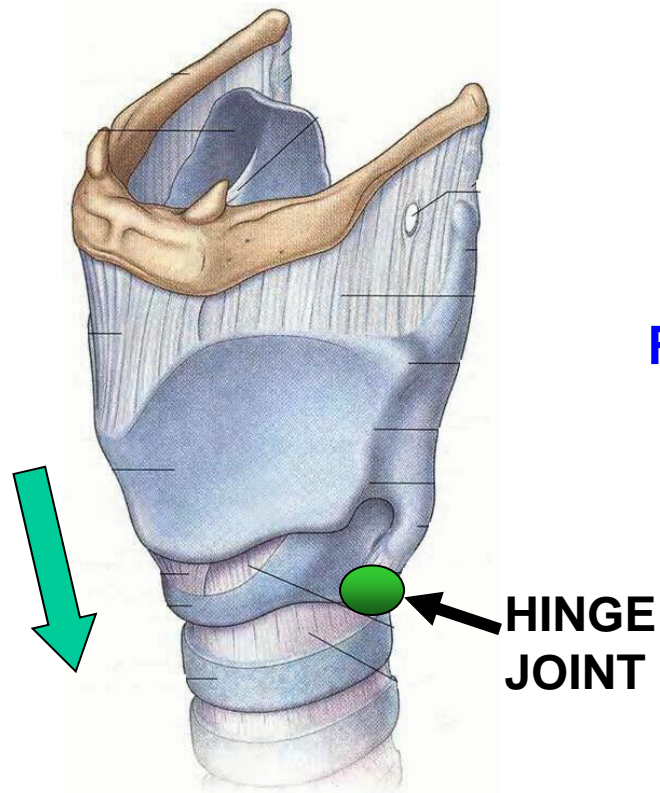
C. Arytenoid - 2
pyramidal shaped
cartilages above
lamina – have
synovial joints with
Cricoid permit
Swivel = Rotate
Sliding = Ab/Adduct

D. Corniculate -
nodules above
arytenoids in
aryepiglottic folds

E. Cuneiform - rod
shaped, above
corniculate cartilages

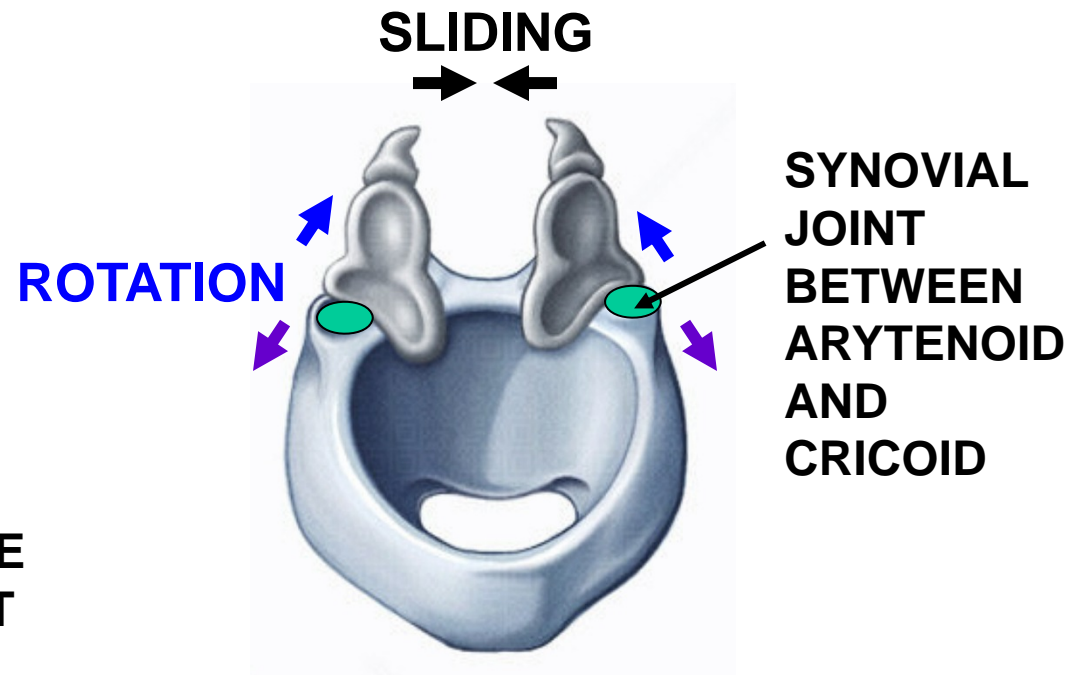
LARYNX: SYNOVIAL JOINTS

THYROID and CRICOID



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

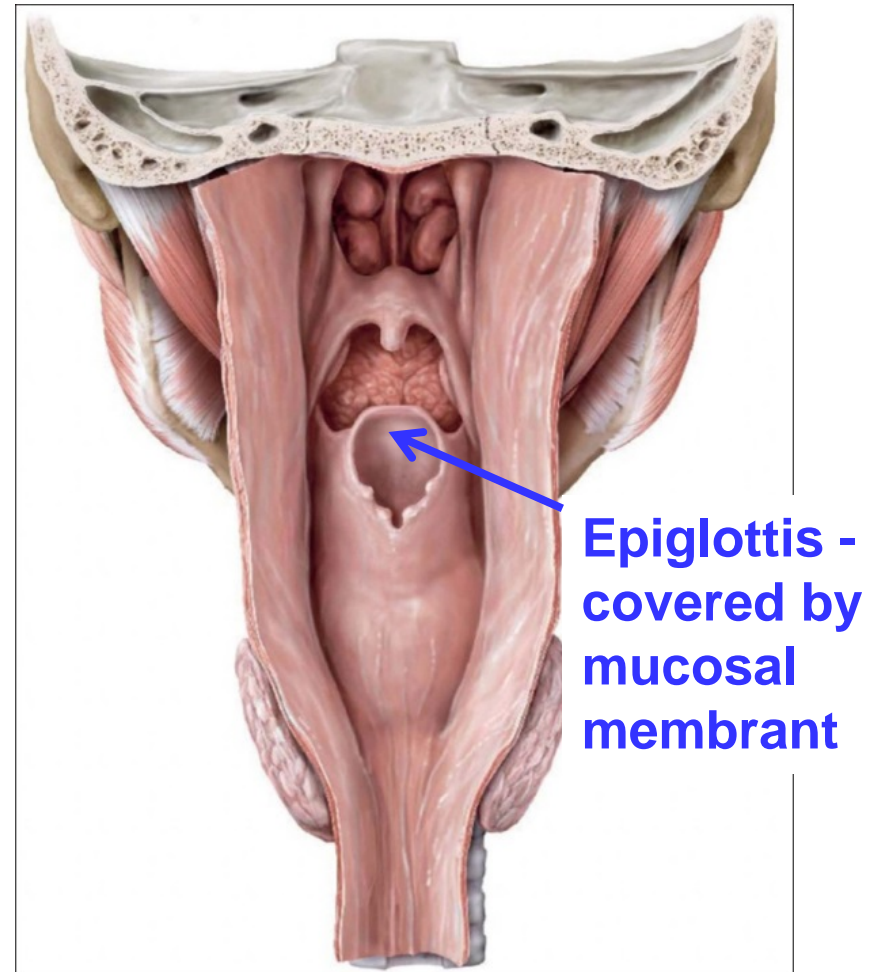
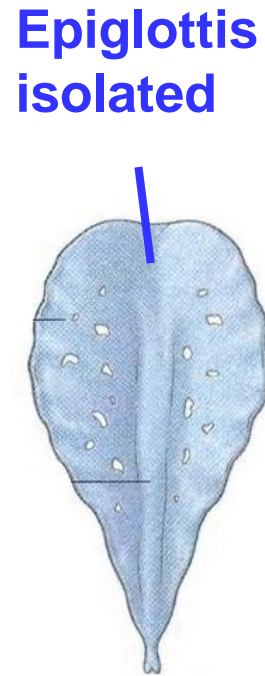
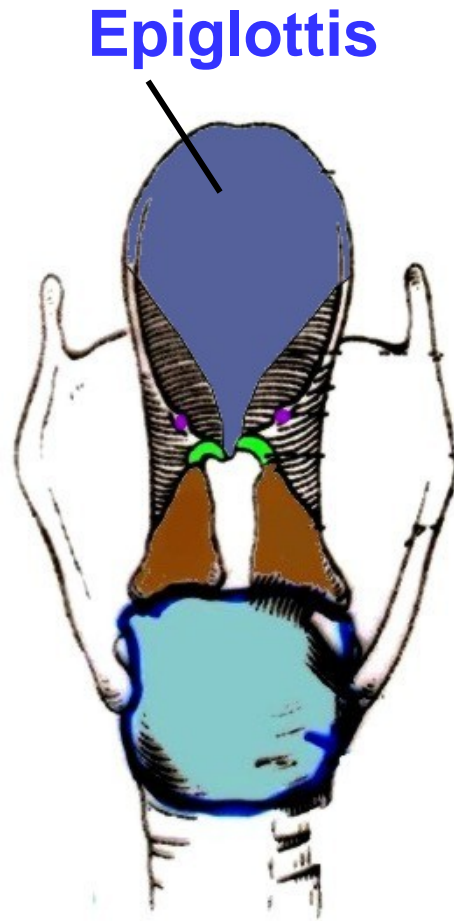
ARYTENOID and CRICOID



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

LARYNX CARTILAGES: EPIGLOTTIS

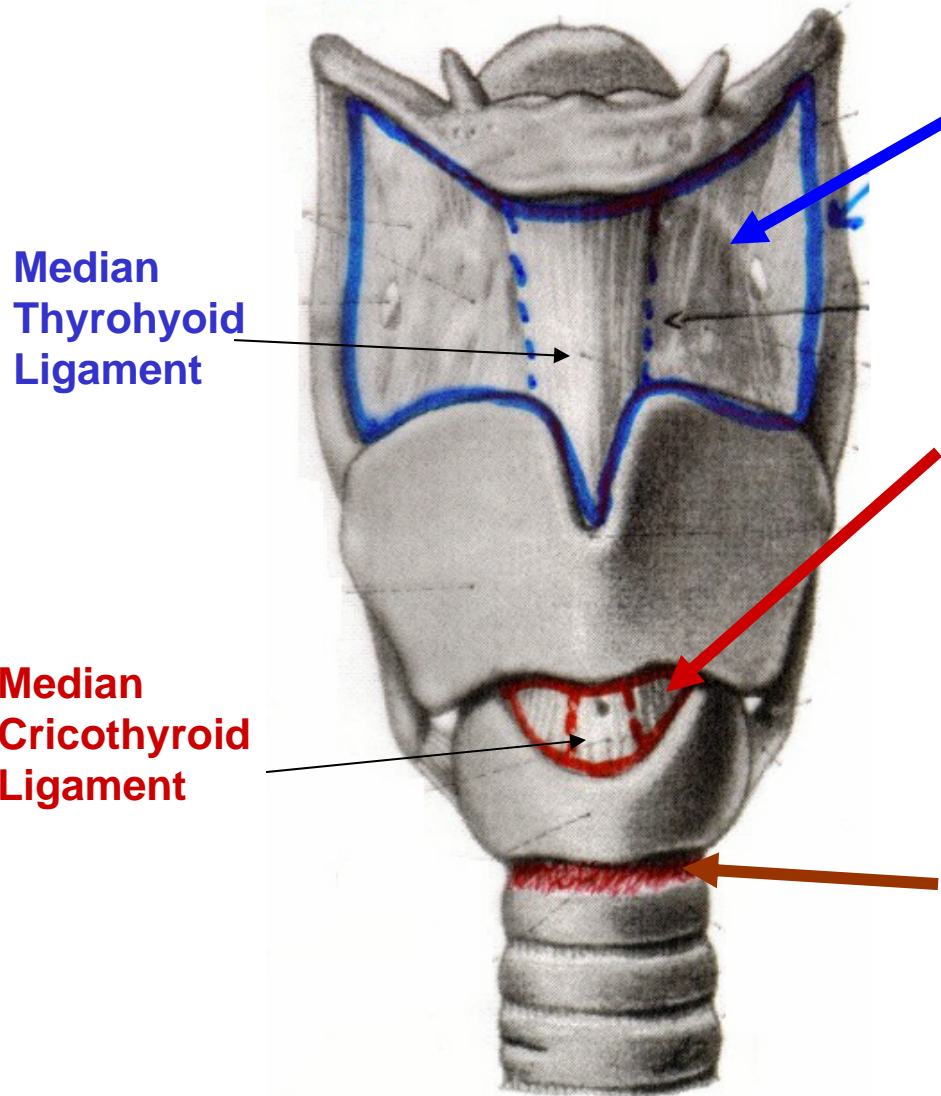
POST. VIEW



F. EPIGLOTTIS - leaf shaped 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

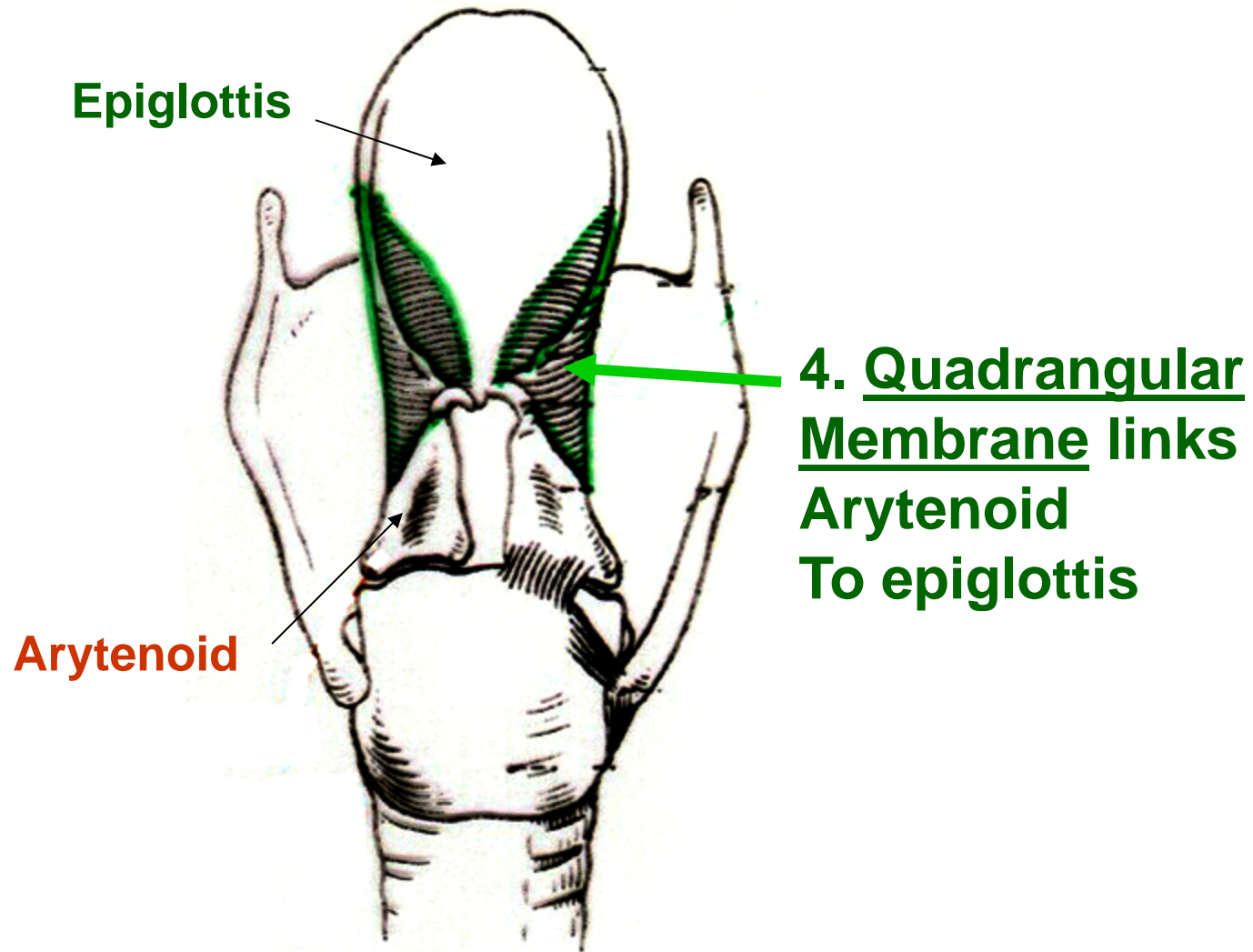


1. Thyrohyoid Membrane links larynx to hyoid; Median Thyrohyoid Ligament - thickened midline part

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

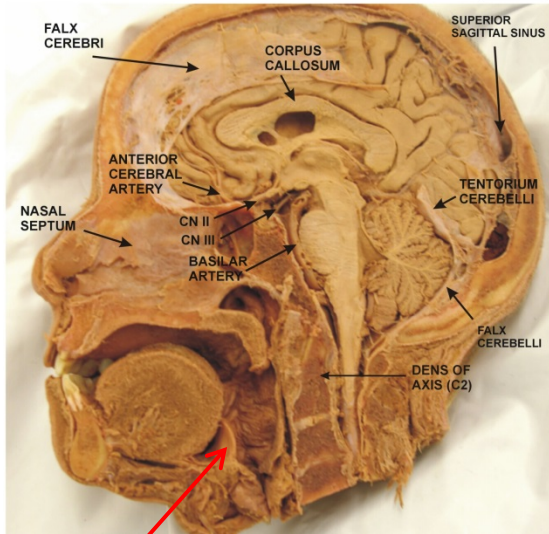
3. Cricotracheal ligament links Cricoid to first tracheal cartilage

STRUCTURAL LIGAMENTS

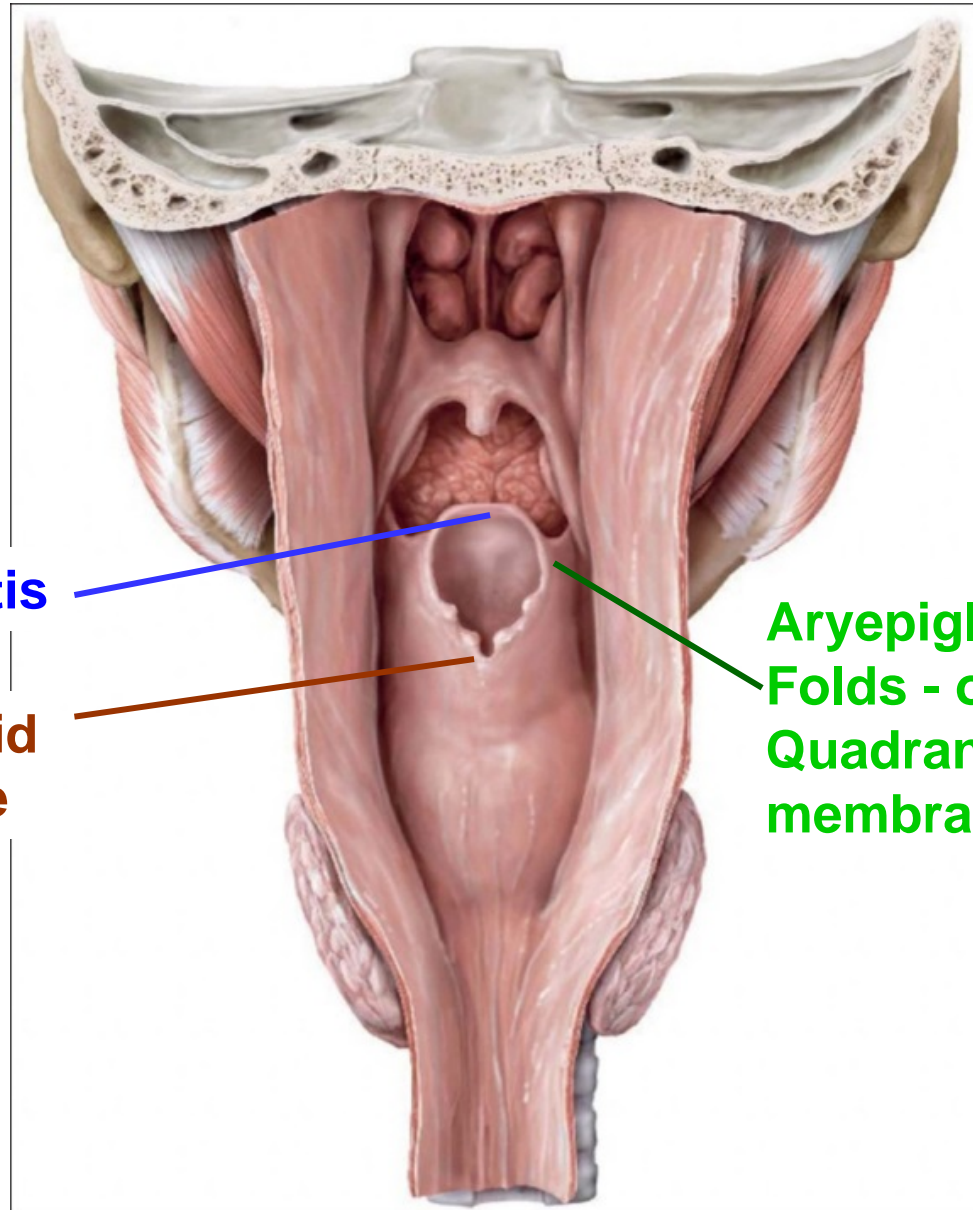


STRUCTURAL LIGAMENTS

MEDIAL VIEW OF BISECTED HEAD 1069



EPIGLOTTIS



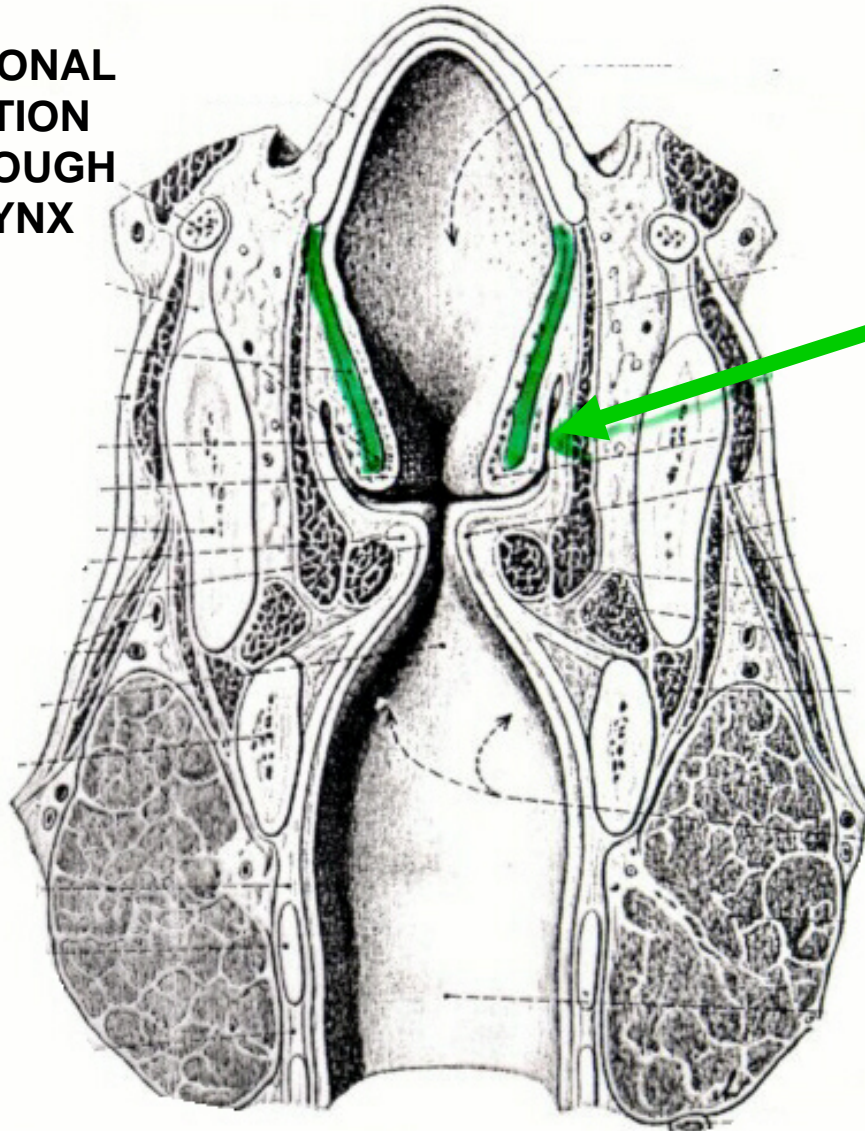
Epiglottis

**Arytenoid
cartilage**

**Aryepiglottic
Folds - overlie
Quadrangular
membrane**

STRUCTURAL LIGAMENTS

CORONAL
SECTION
THROUGH
LARYNX



trachea

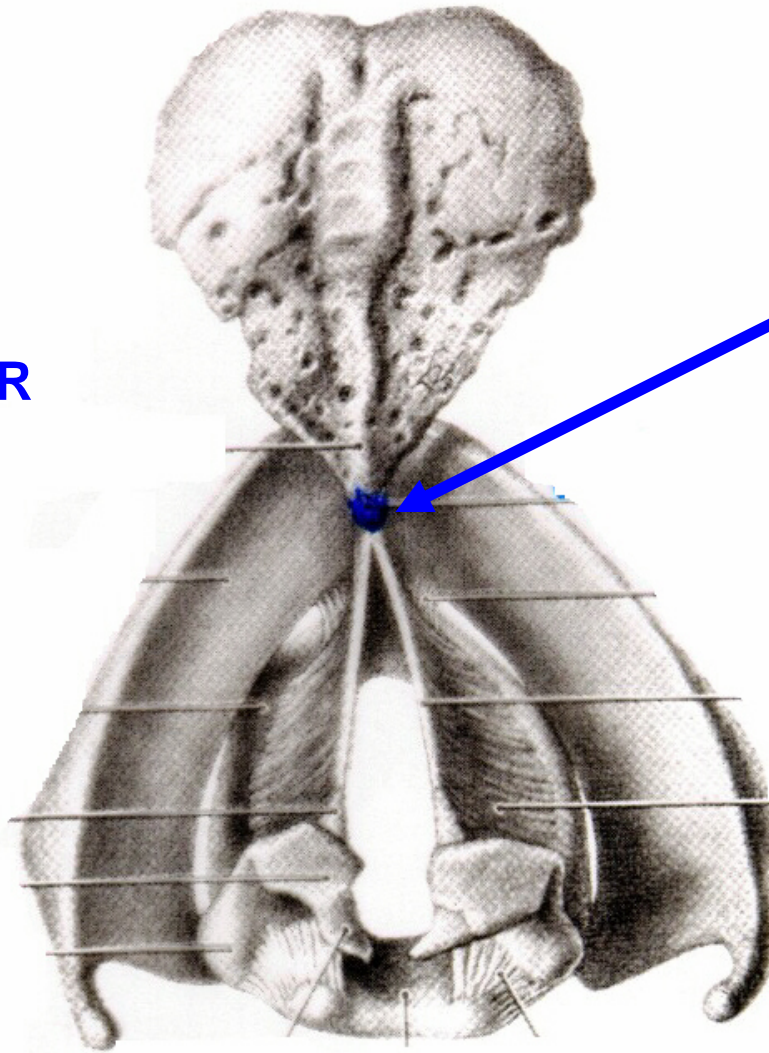
Lower free
edge of
Quadrangular
membrane is
Called
Vestibular
Ligament; deep
to Vestibular
(False Vocal)
Folds

STRUCTURAL LIGAMENTS



NOSE

SUPERIOR
VIEW
ABOVE
LARYNX



5. Thyroepiglottic Ligament
links epiglottis to
thyroid cartilage



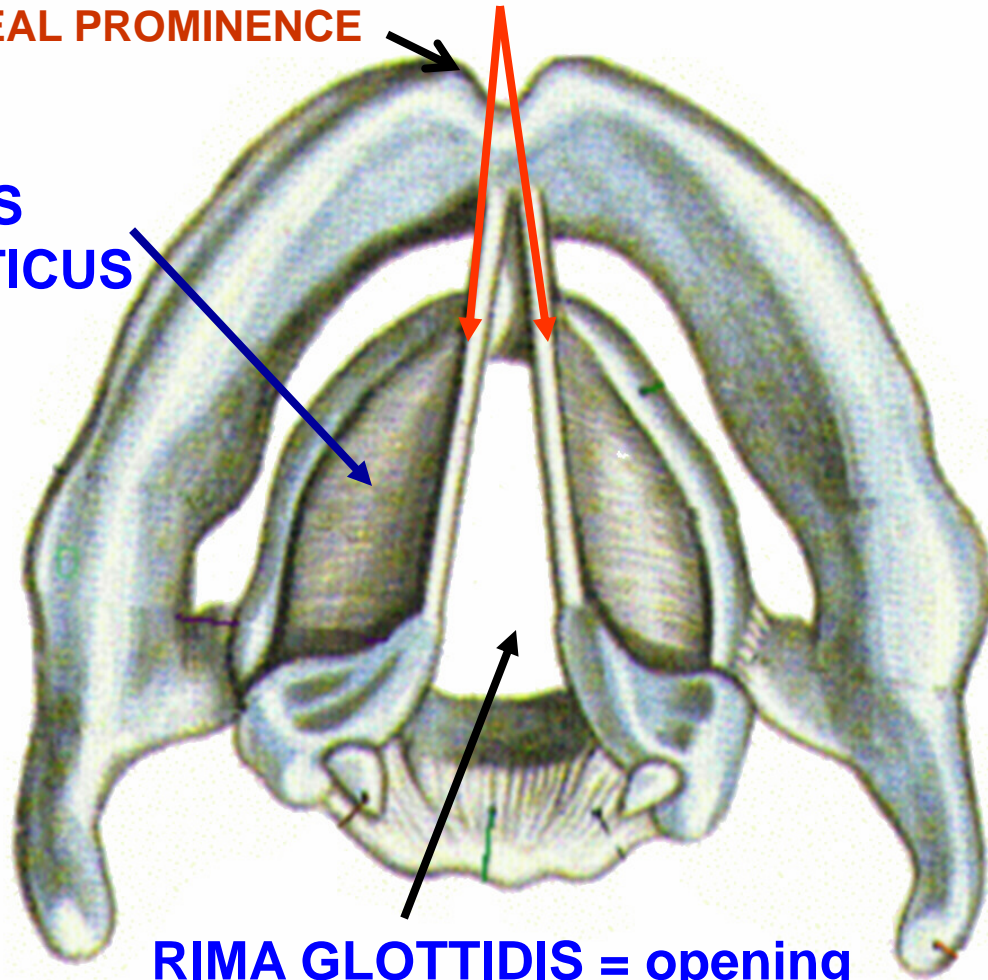
NOSE
top view

B. FUNCTIONAL LIGAMENTS

**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

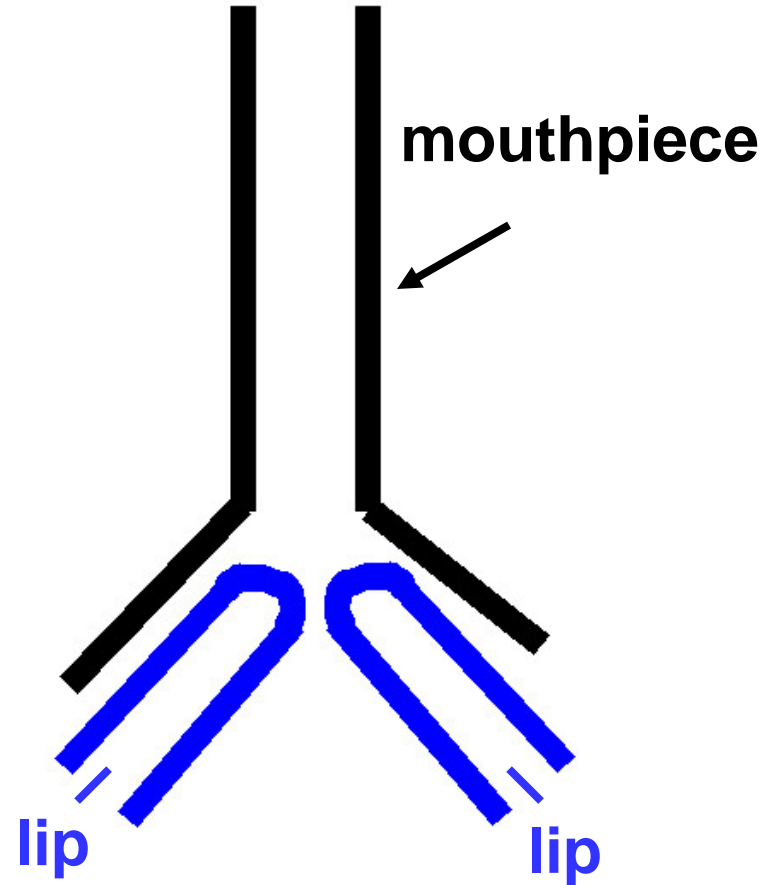
Attach: ant. to
Thyroid, post. to
Arytenoid

**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**



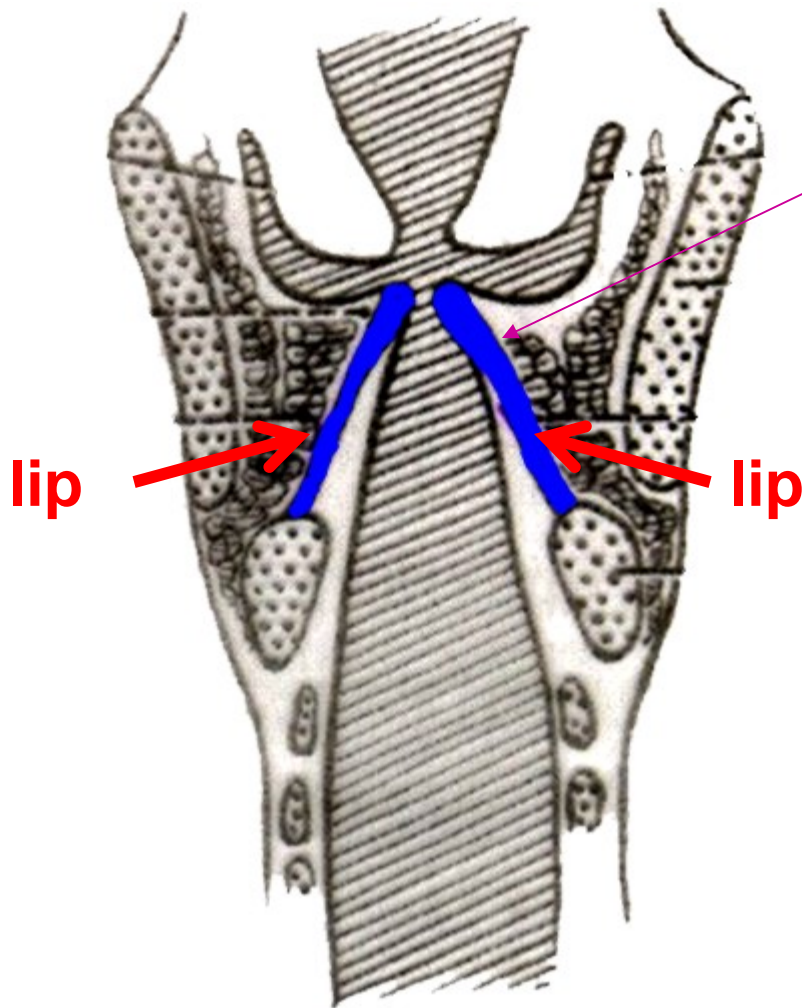
**Tense lips - raise pitch
Relax lips - lower pitch**

FUNCTIONAL LIGAMENTS

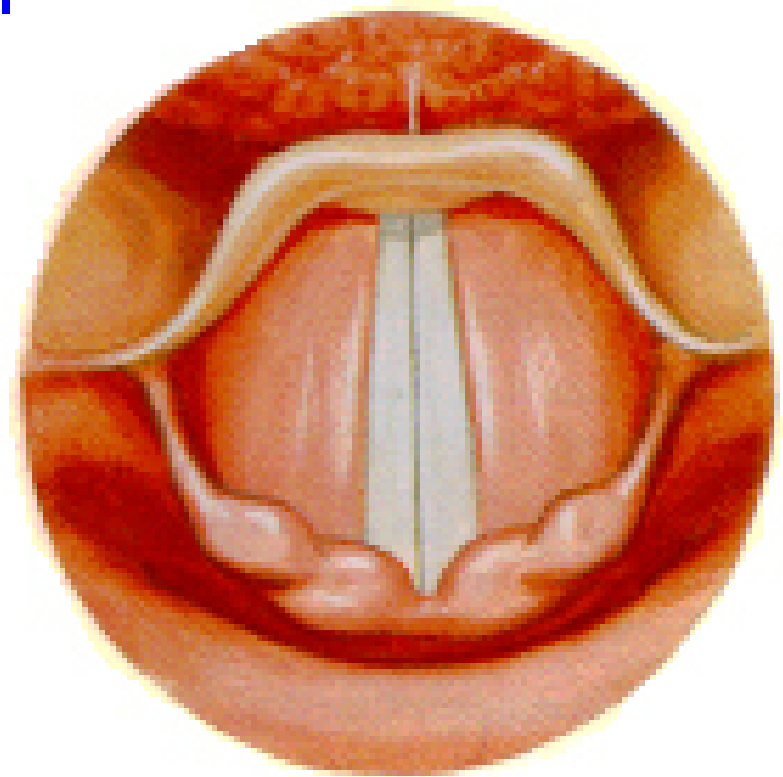
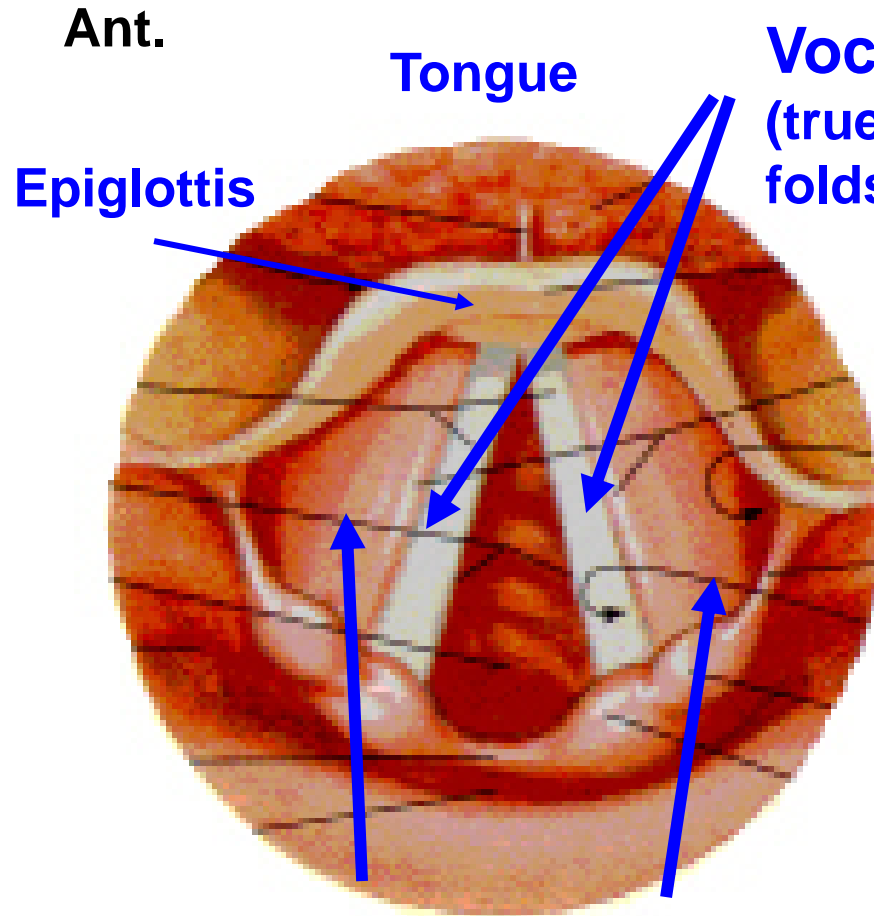
(In Coronal Section)

Conus Elasticus Functions

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



LARYNGOSCOPE VIEW OF LARYNX



Post.

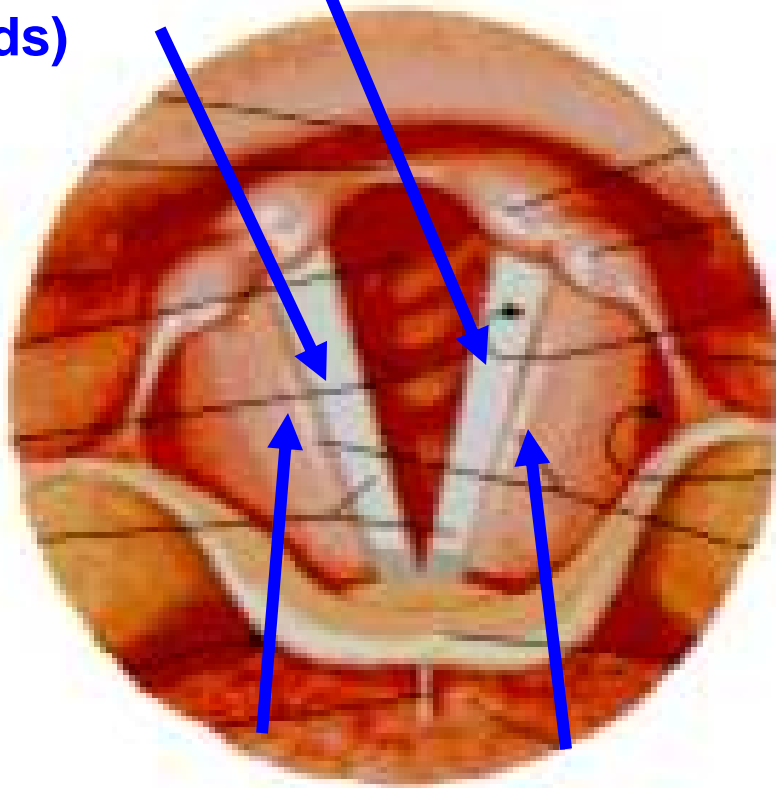
Vestibular Folds
(false vocal folds)

vocal folds
adducted when
talking or singing

LARYNGOSCOPE VIEW OF LARYNX

Post.

Vocal Folds
(true vocal folds)



Vestibular Folds
(false vocal folds)

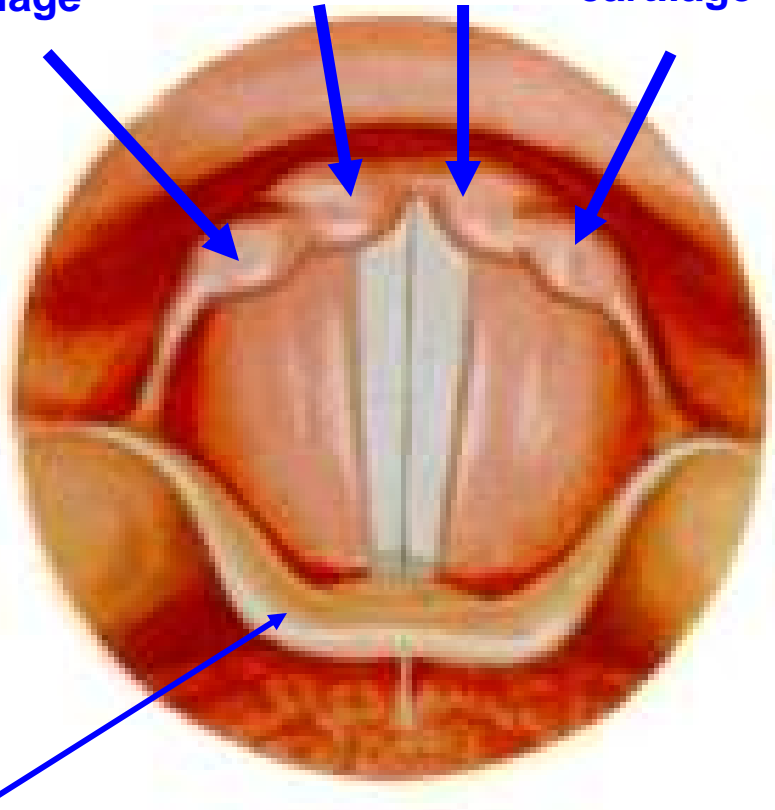
Ant.

Tongue

Cuneiform cartilage

Corniculate cartilages

Cuneiform cartilage



Epiglottis

vocal folds adducted when talking or singing

BREATHING (INHALATION)

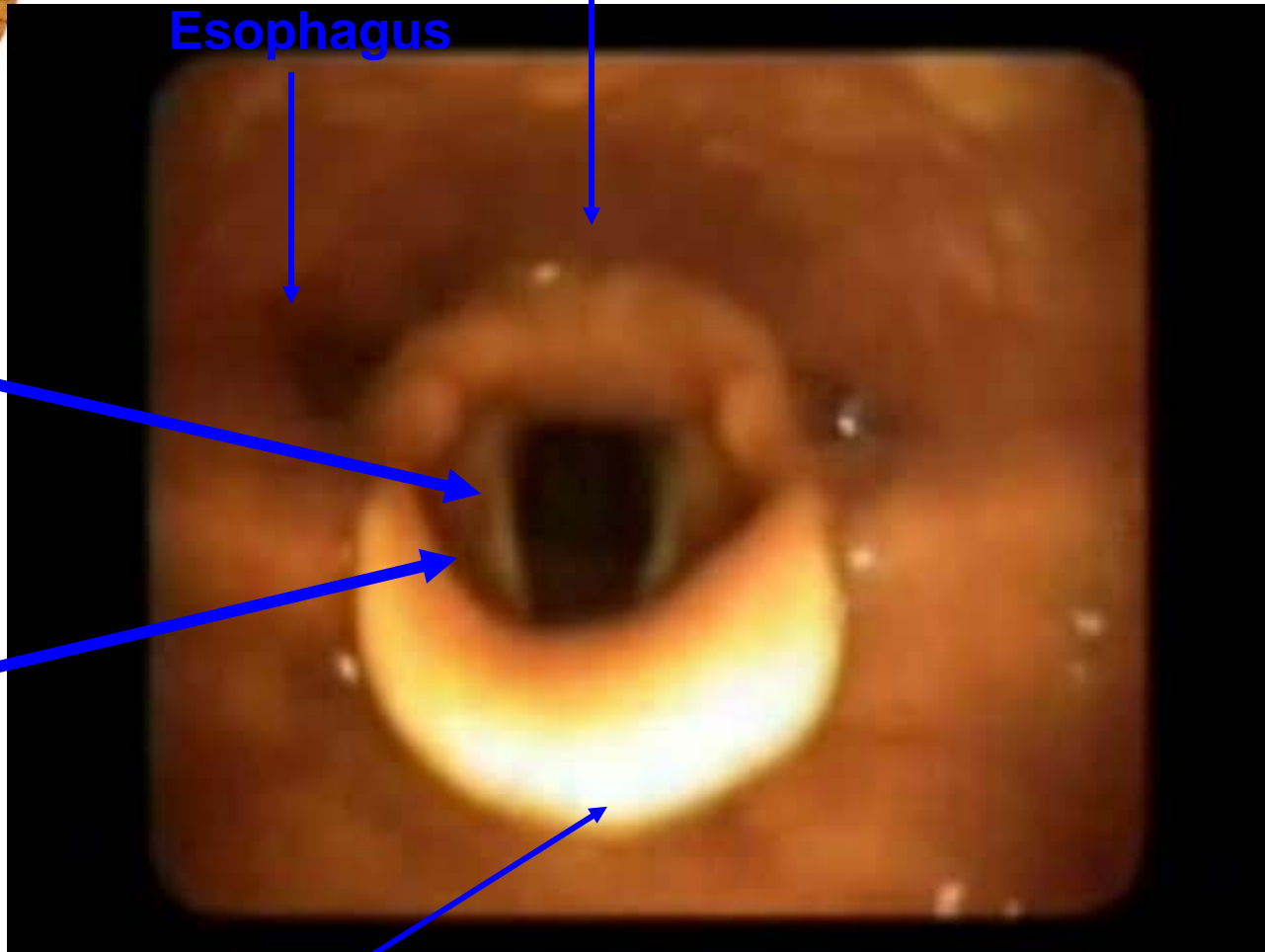


Leads to
Esophagus

Leads to
Esophagus

Vocal
Folds
(True,
white)

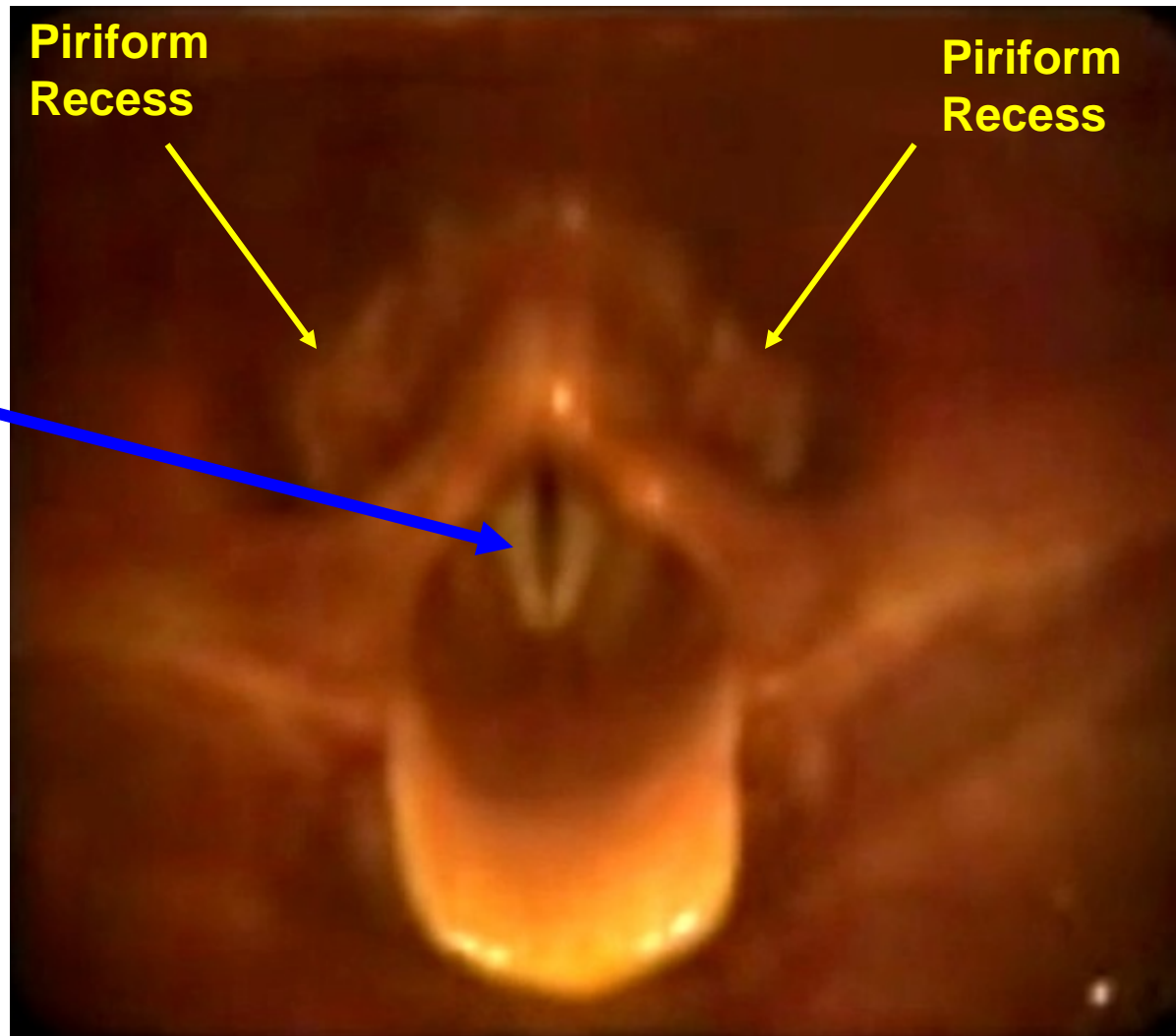
Vestib-
ular
Folds
(False,
Reddish)



Epiglottis

LARYNX PRODUCING SOUND

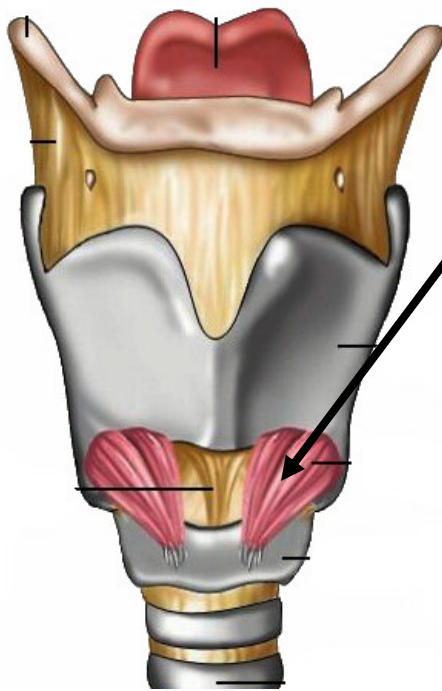
Vocal
Folds
(True,
white)
brought
together



III. MUSCLES OF LARYNX - well named

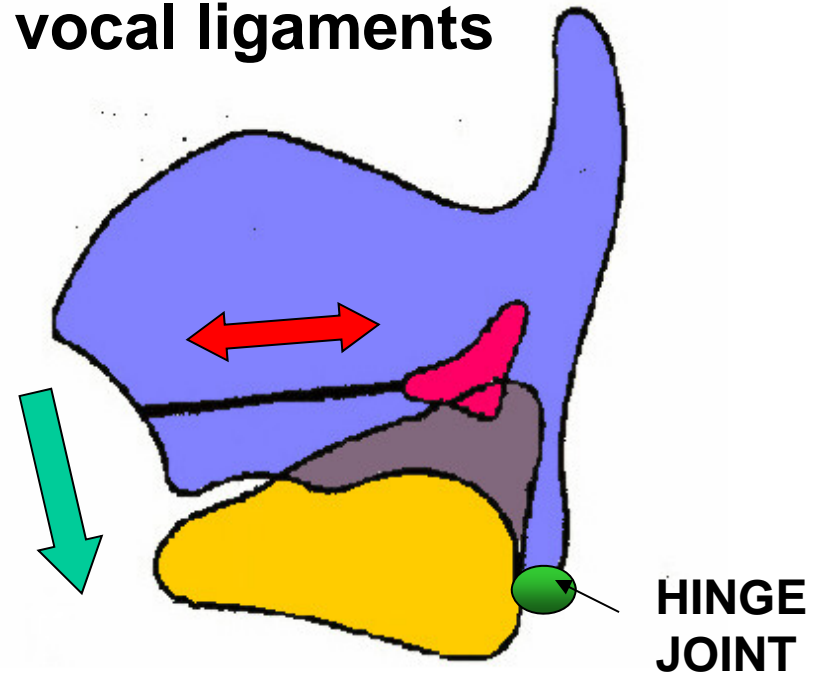
A. Extrinsic muscles (ex. hyoid muscles) - Move whole larynx as in swallowing

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

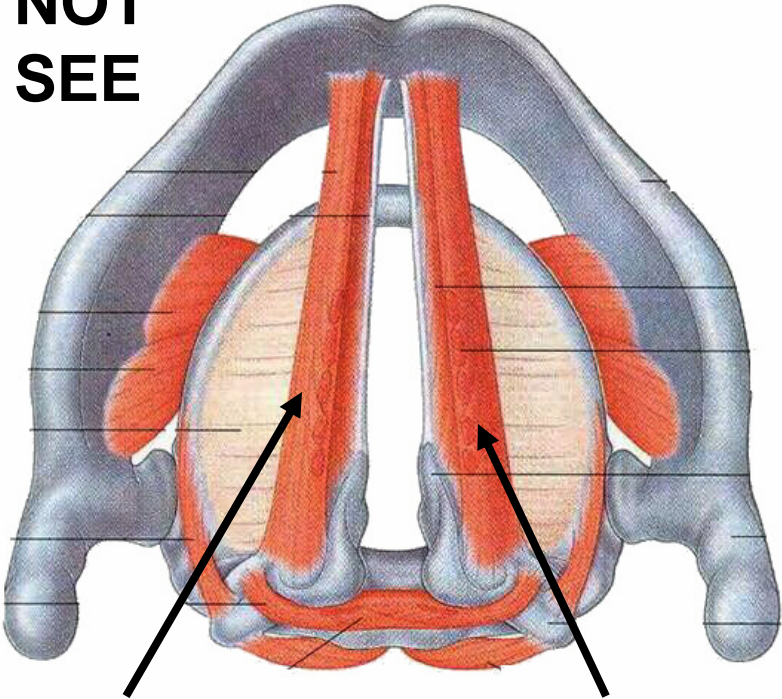
Tilting - **STRETCHES** vocal ligaments



STRETCH vocal ligament
INCREASE PITCH -
CRICOTHYROID

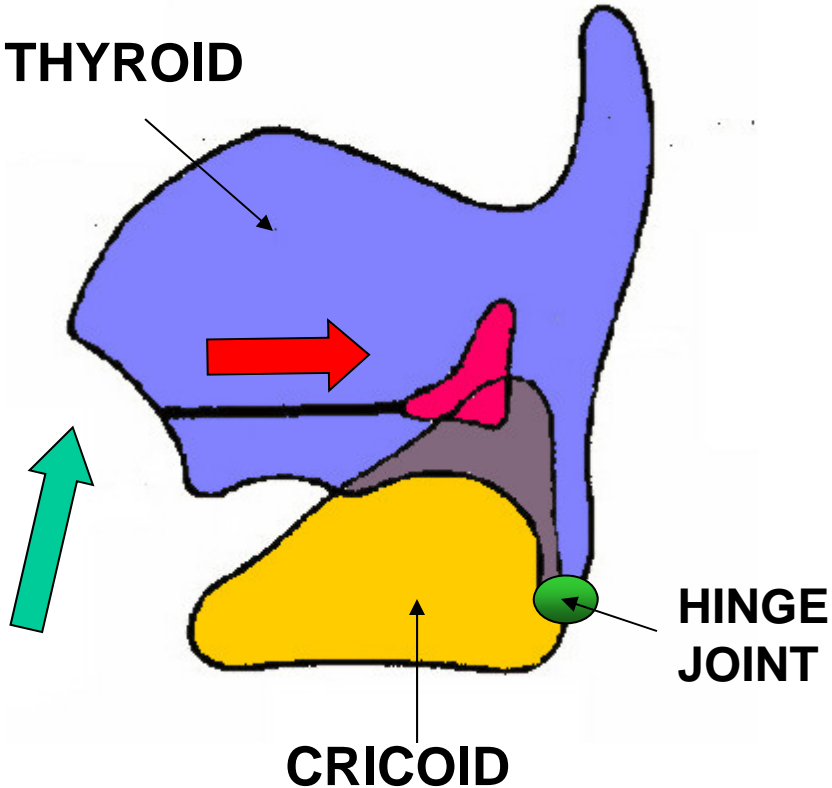
MUSCLES OF LARYNX

**NOT
SEE**



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

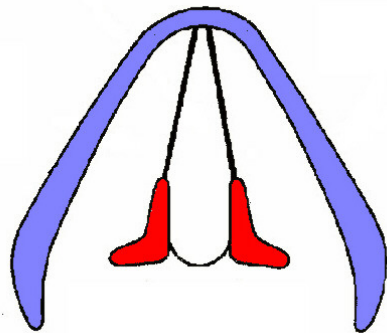
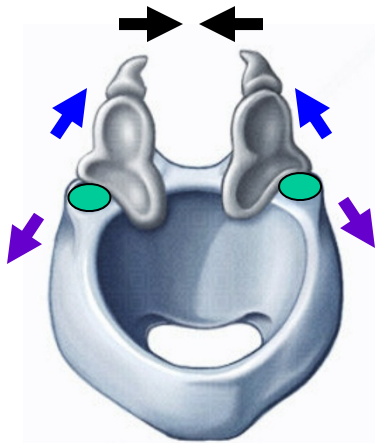
THYROID



**RELAX vocal ligament
DECREASE PITCH -
THYROARYTENOID**

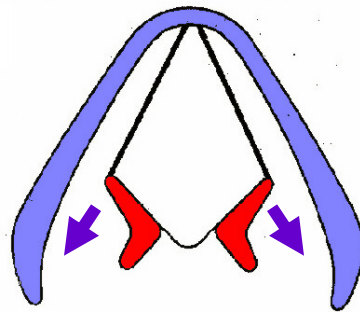
OPEN AND CLOSE RIMA GLOTTIDIS BY ROTATING/SLIDING ARYTENOIDS -

Rotate laterally opens; Rotate medially or slide closes
 more close than open



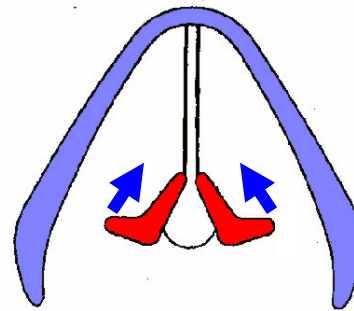
**REST
POSITION**

OPEN
ROTATE
LATERALLY



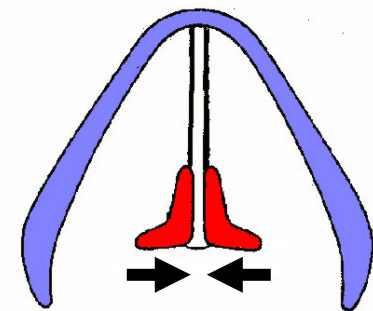
**POSTERIOR
CRICO-
ARYTENOID**

CLOSE
ROTATE
MEDIANLY



**LATERAL
CRICO-
ARYTENOID**

CLOSE
SLIDE

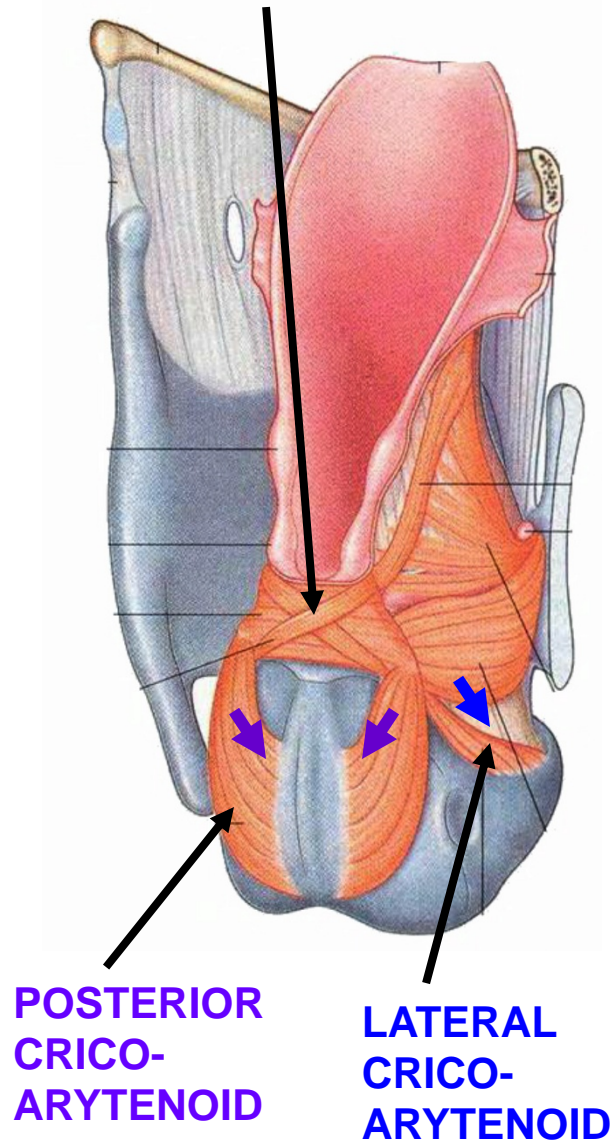


ARYTENOIDEUS

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

MUSCLES OF LARYNX

ARYTENOIDEUS



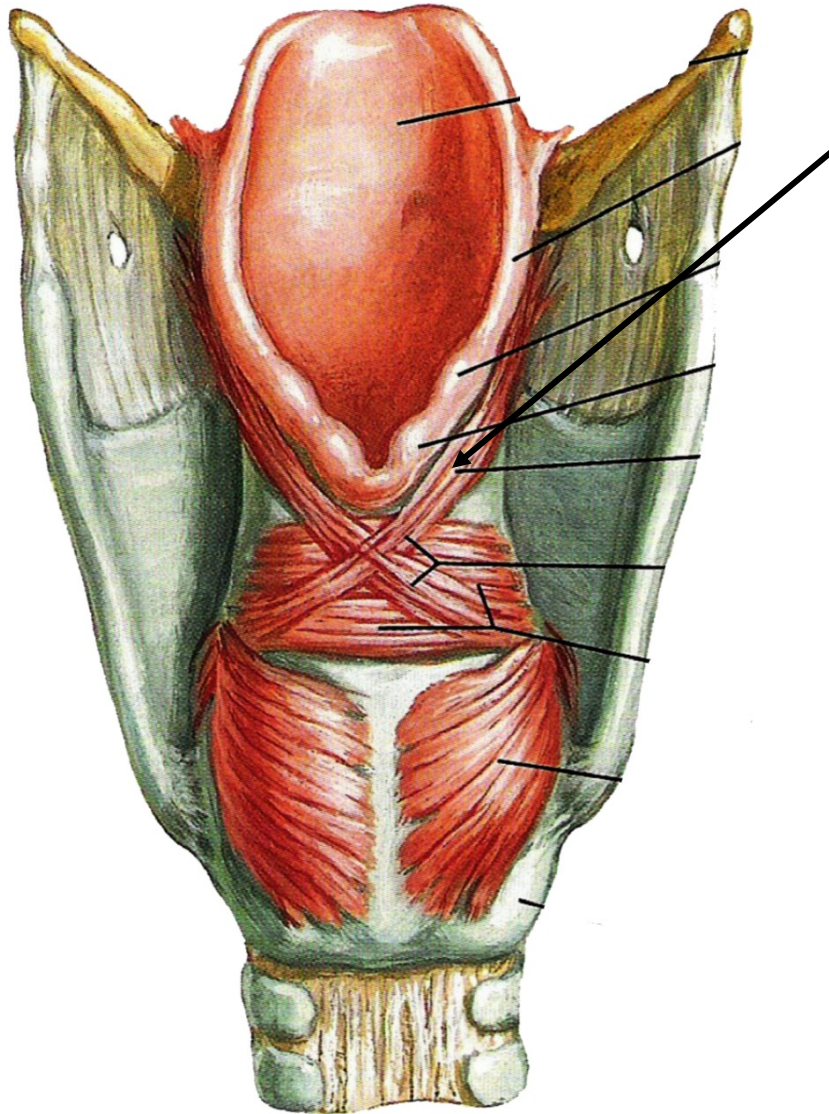
5) ARYTENOID (Transverse and oblique arytenoid) - Adduct vocal folds

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

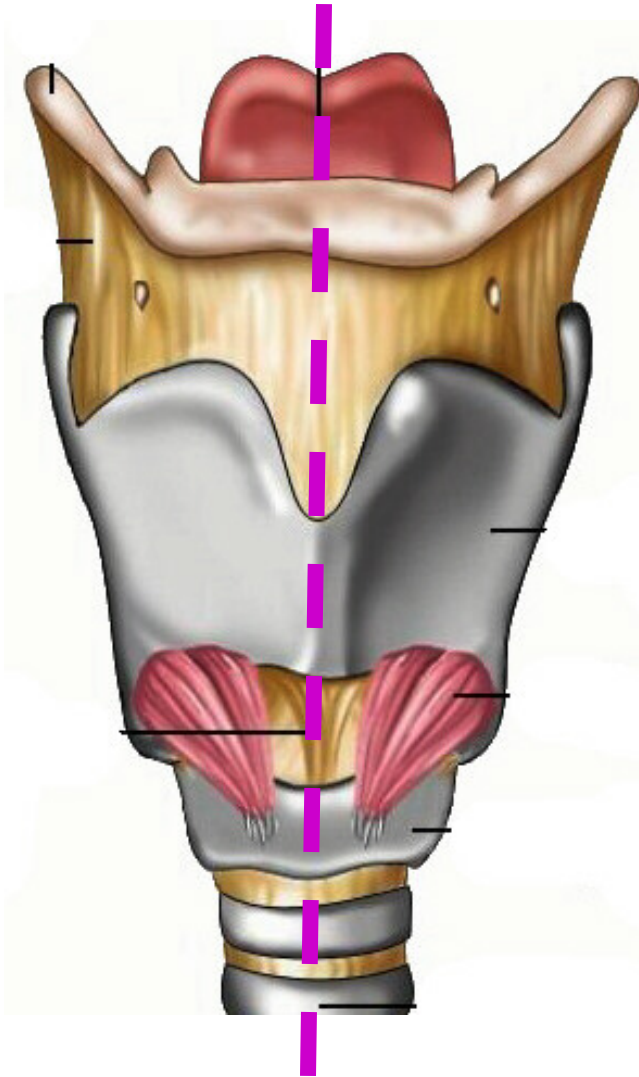
- Covers inlet to larynx
- Not necessary in adult humans

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



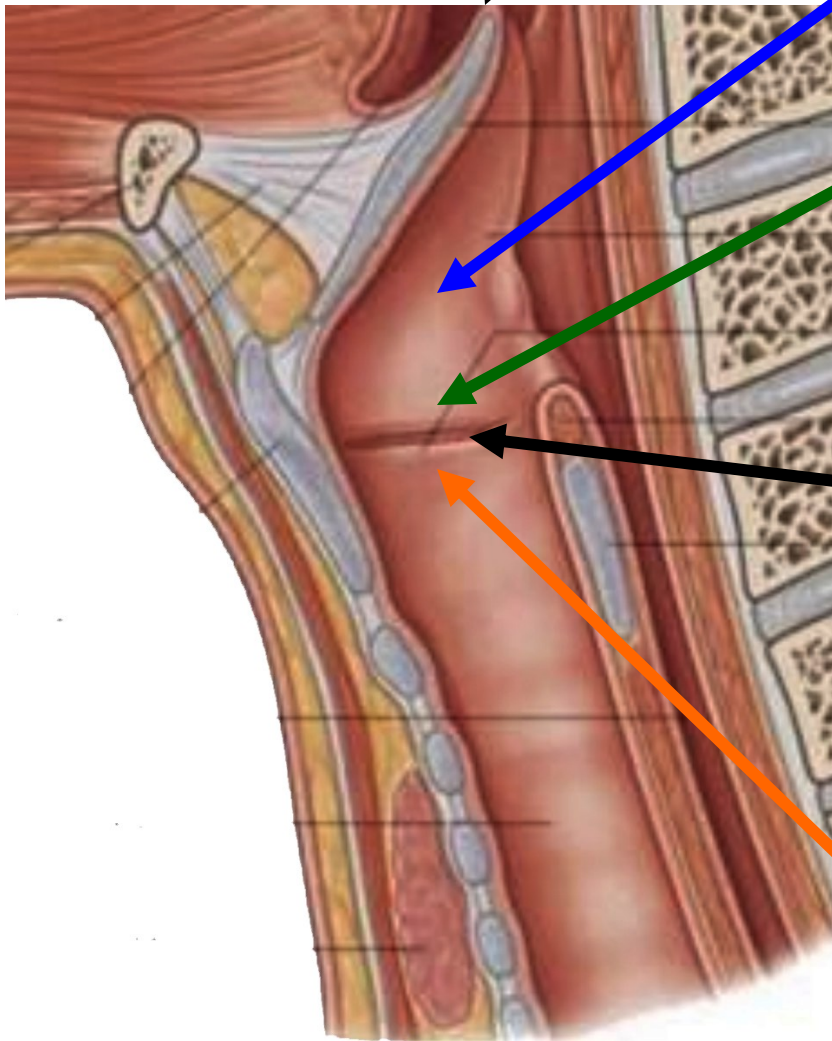
Bisect
Larynx to see
interior
structures

TERMS ASSOCIATED WITH LARYNX

NOSE



epiglottis



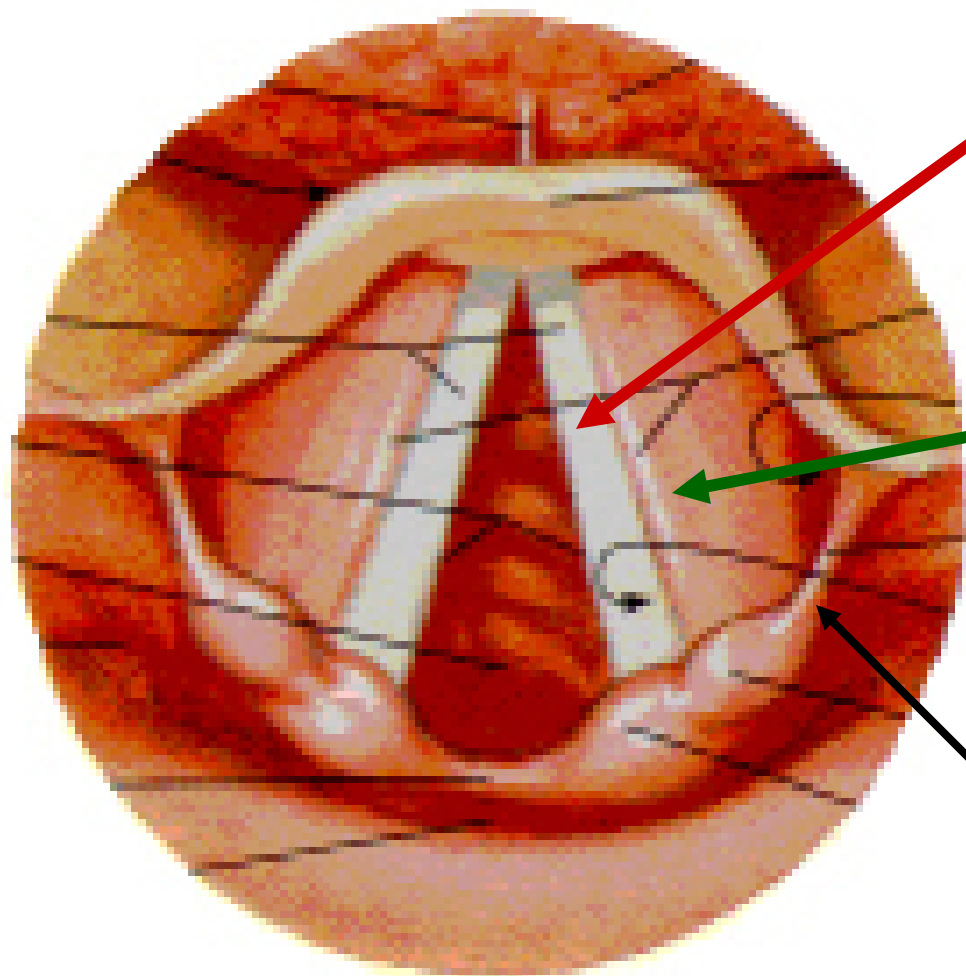
VESTIBULE - inlet above false vocal folds

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



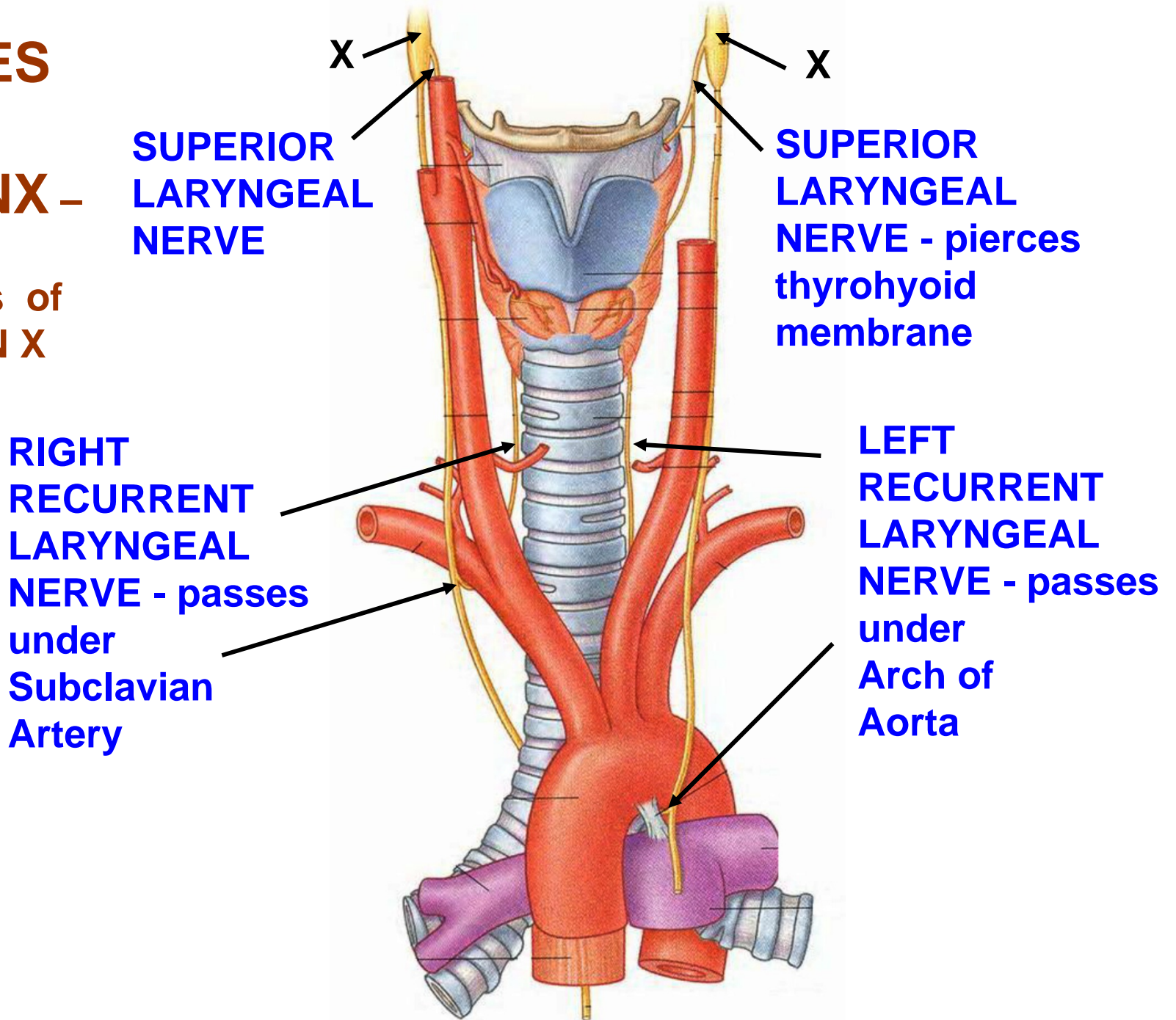
TRUE VOCAL FOLDS
-overlie vocal
ligaments

**FALSE VOCAL
FOLDS - overlie
vestibular ligaments**

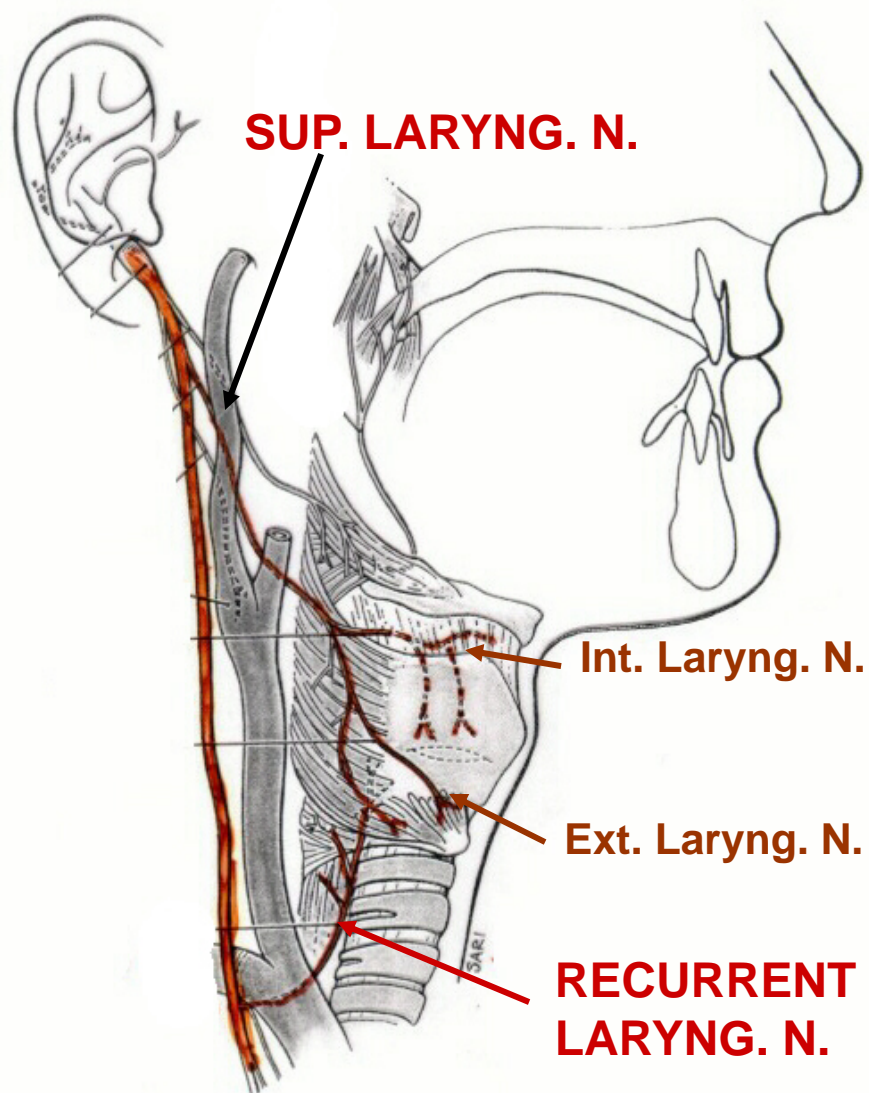
**ARYEPIGLOTTIC
FOLD - overlie
Quadrangular
membrane**

NERVES OF LARYNX –

All are Branches of Vagus CN X



V. NERVES OF LARYNX – Branches of Vagus



A. Superior Laryngeal N.
divides to -

1. Internal Laryngeal N.
Visceral Sensory to Larynx
Above True Vocal Folds

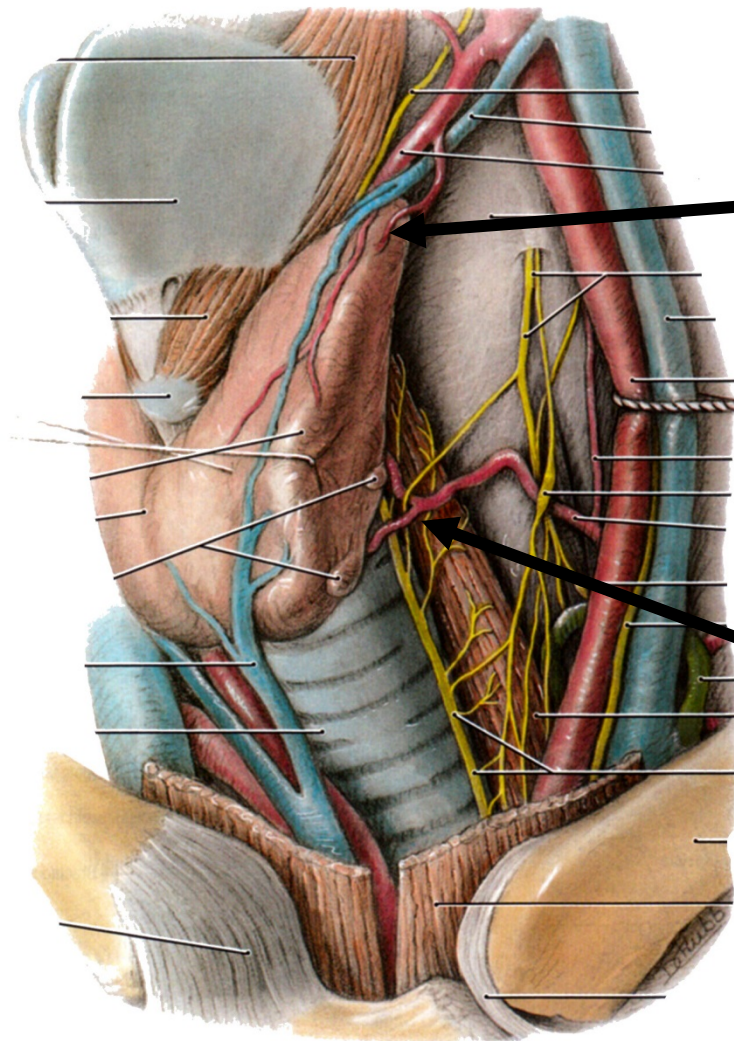
2. External Laryngeal N.
Branchiomotor to Cricothyroid

B. Recurrent Laryngeal N.

- **Visceral Sensory to Larynx**
Below True Vocal Folds

- **Branchiomotor to all other**
Muscles of Larynx

VI. LARYNX - ARTERIAL SUPPLY



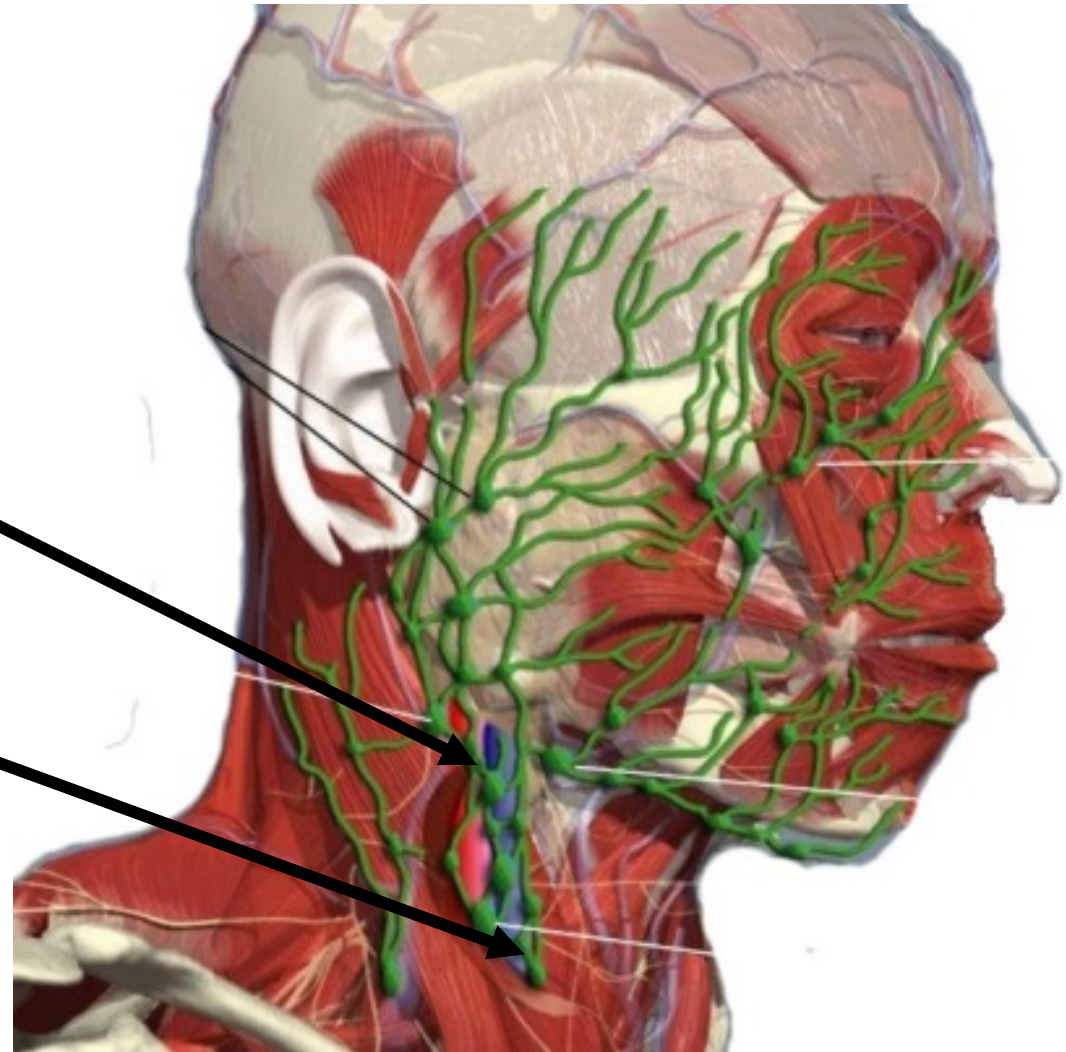
**Superior
Laryngeal Artery
from Superior
Thyroid artery**

**Inferior Laryngeal
Artery from
Inferior Thyroid
artery**

VII. LARYNX - LYMPHATICS

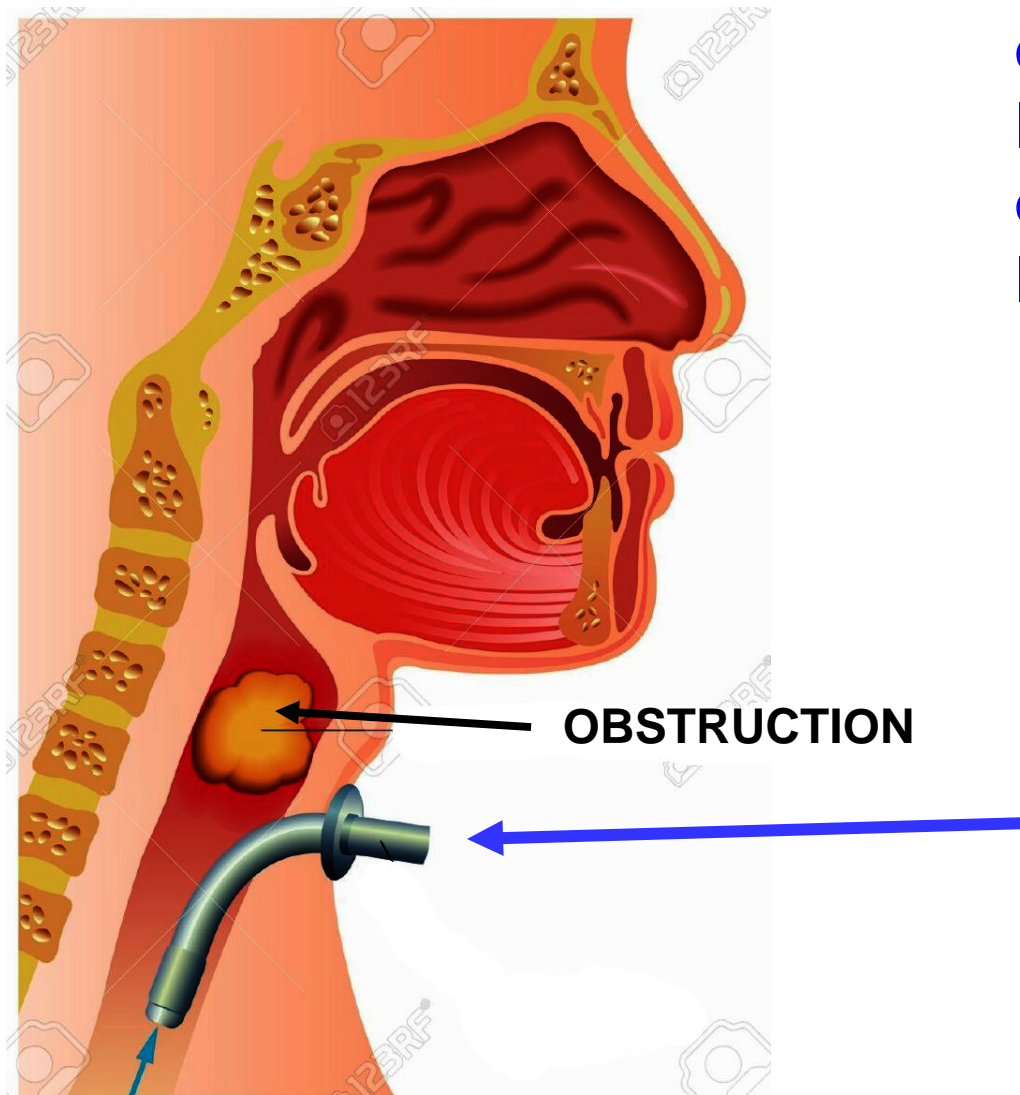
Superior Deep Cervical Nodes - drain Larynx above true vocal folds

Inferior Deep Cervical Nodes - drain Larynx below true vocal folds



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)

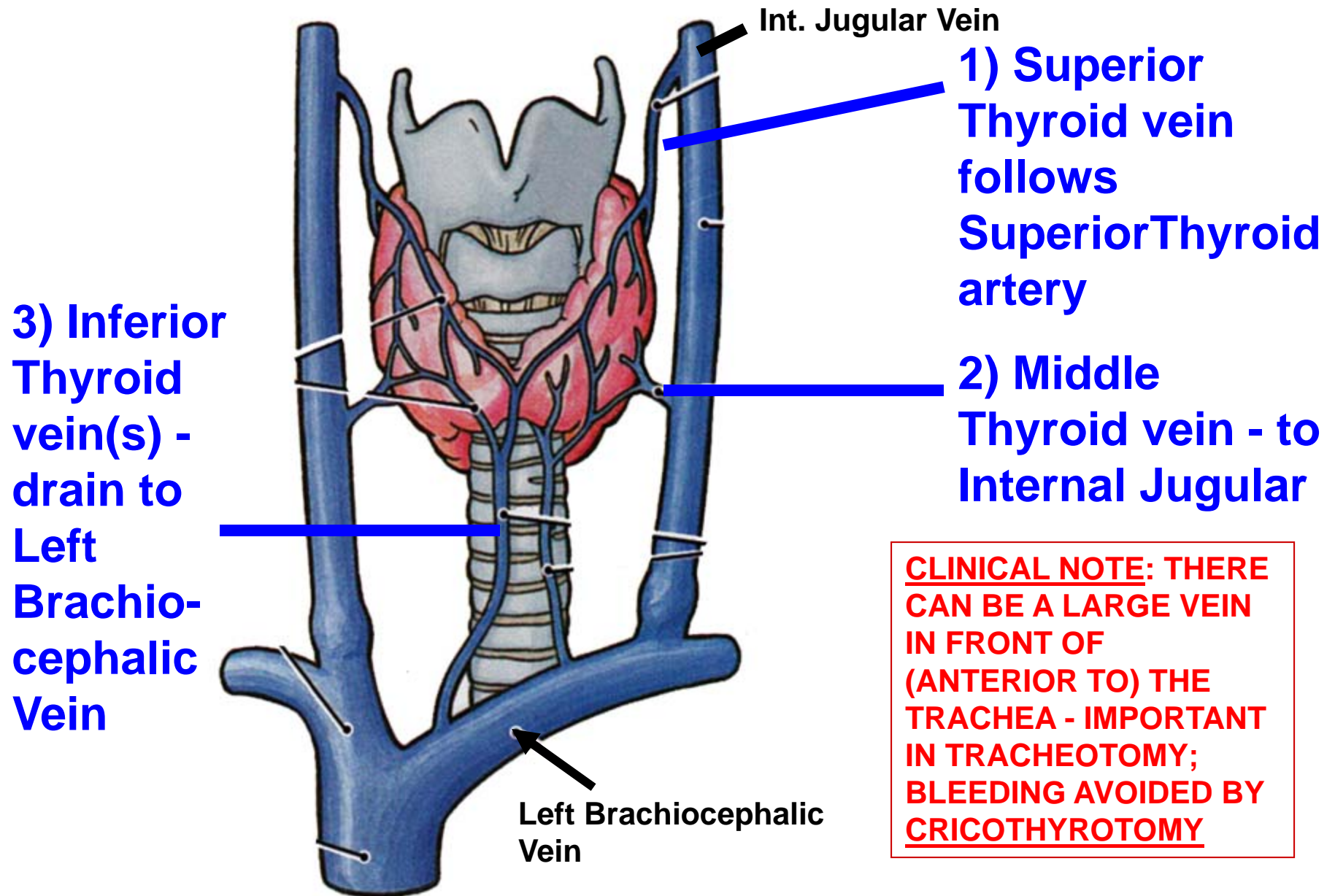
VIII. OBSTRUCTION OF LARYNX: TRACHEOTOMY



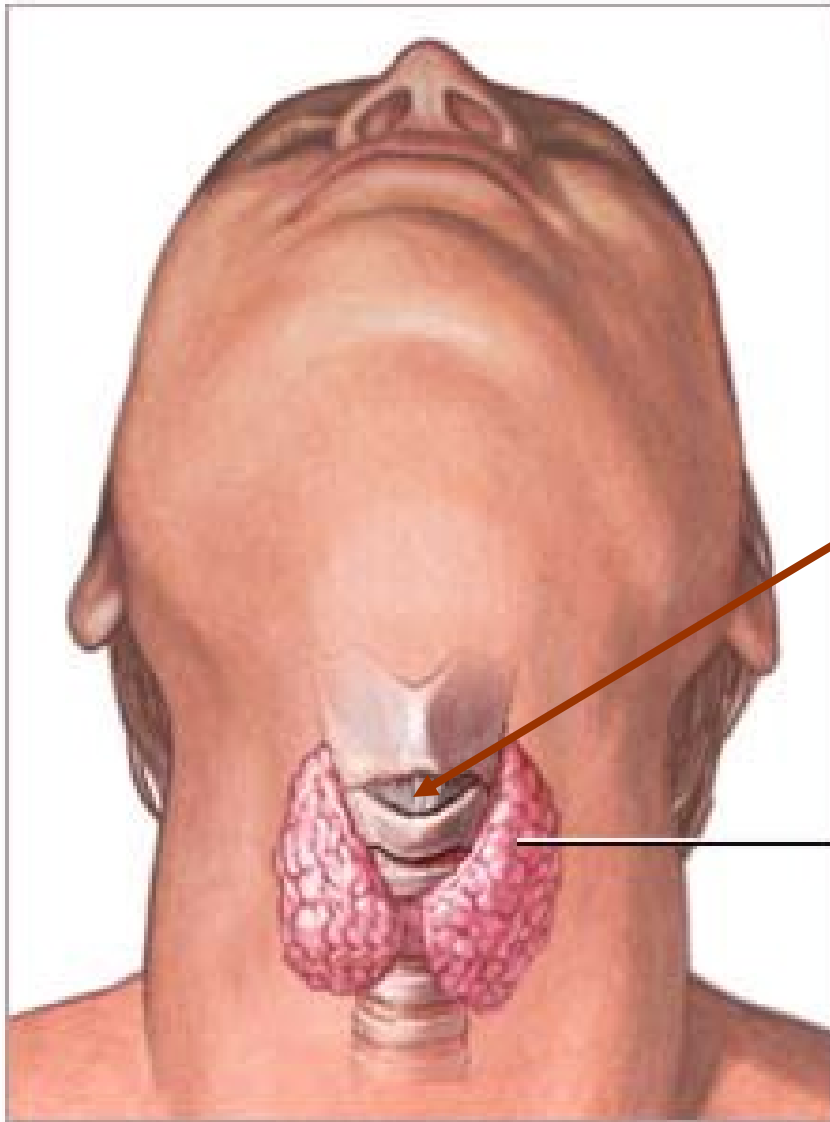
open airway to
lungs below
obstructed
larynx

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

THYROID GLAND - LOTS OF VEINS



OBSTRUCTION OF LARYNX: CRICOTHYROTOMY



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

**Cricothyroid
Membrane**

