

LARYNX

OUTLINE

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



BILLIE HOLLIDAY

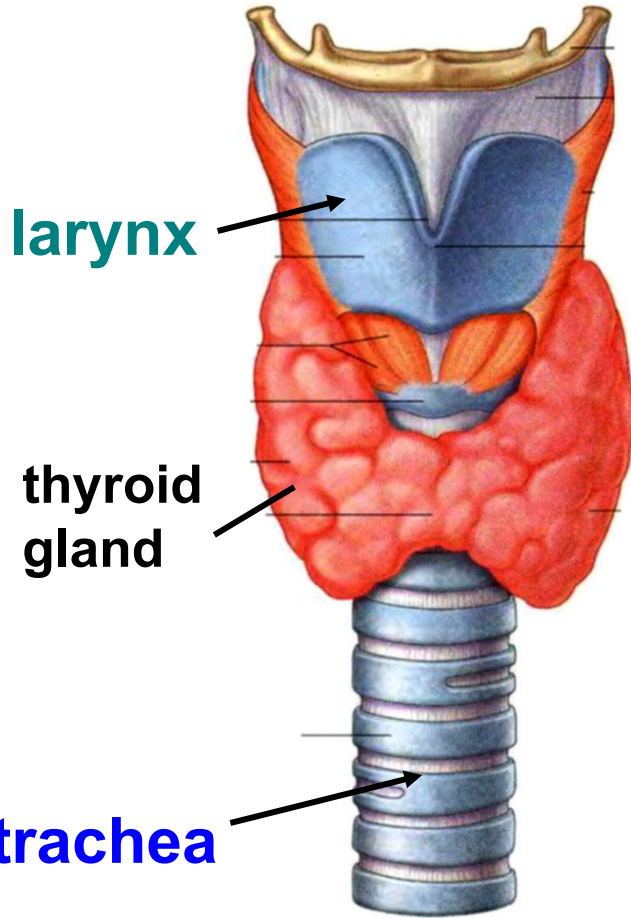
LARYNX IS SOUND GENERATOR; HOWEVER, SOUNDS ARE EXTENSIVELY MODIFIED IN SPEECH AND SINGING BY RESONANCE OF PHARYNX, NASAL CAVITY, ORAL CAVITY

LARYNX

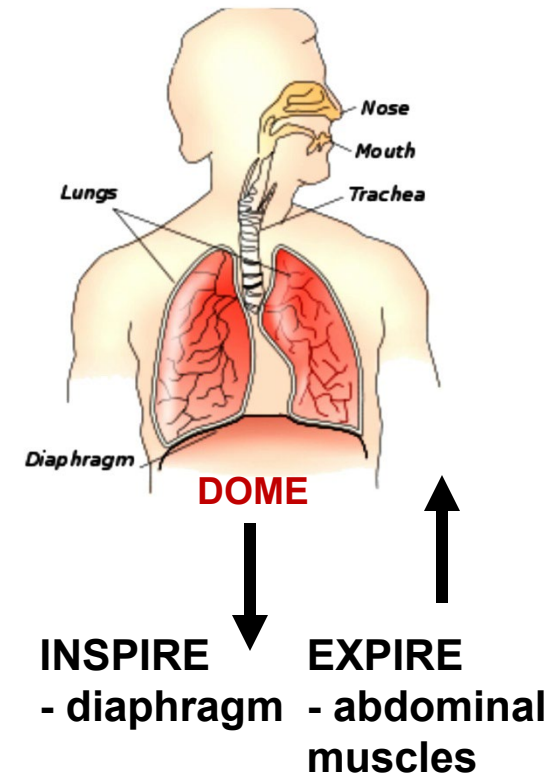
Cartilages connected by membranes and ligaments, moved by muscles

2 Functions: 1) Sound production

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



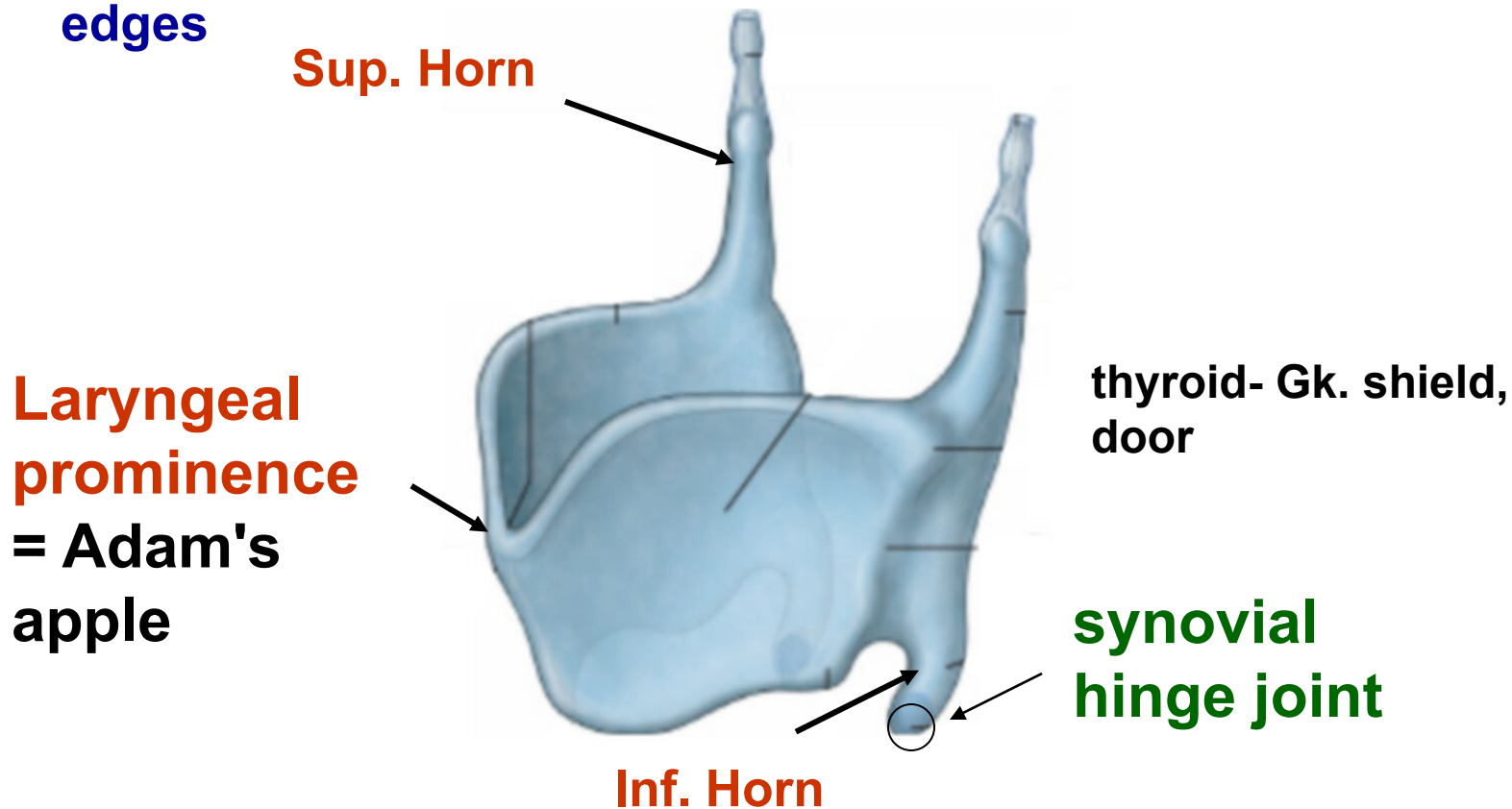
**Note: In Respiration -
Inspire - Diaphragm;
Expire - Some muscles
but largely passive;
Forced Expire -
Abdominal Muscles**



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

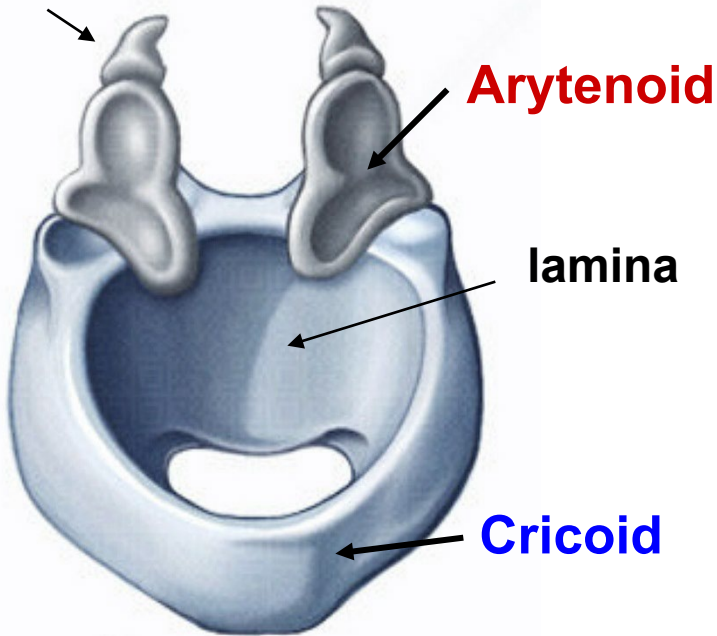


- Inferior horns make synovial hinge joints with Cricoid Cartilage; - Laryngeal Prominence = Adam's Apple, more prominent in males

B. CRICOID-

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

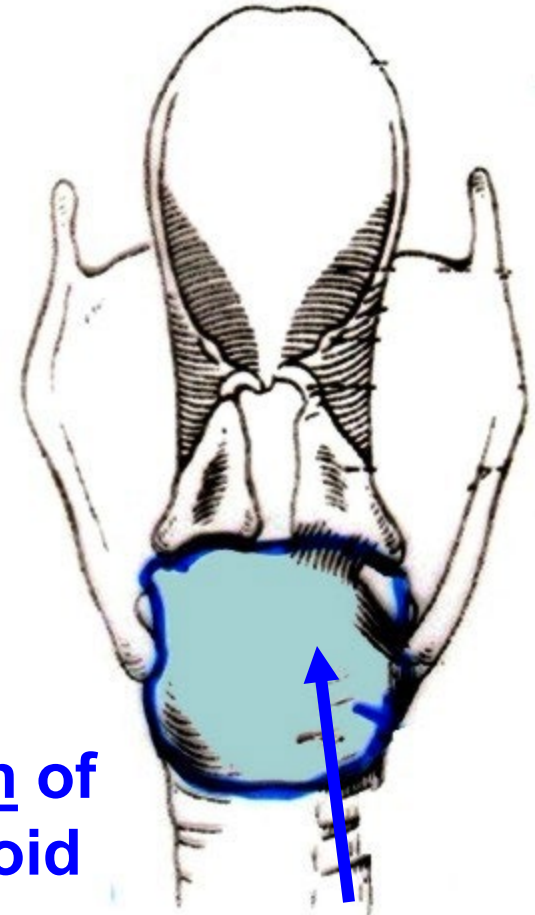
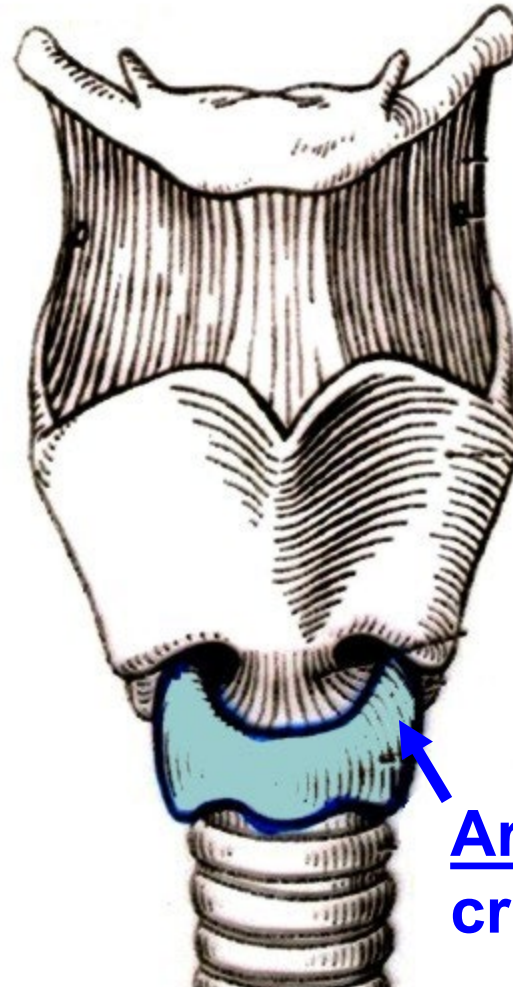
Corniculate Cartilages



LARYNX: CARTILAGES

ANT VIEW

POST VIEW

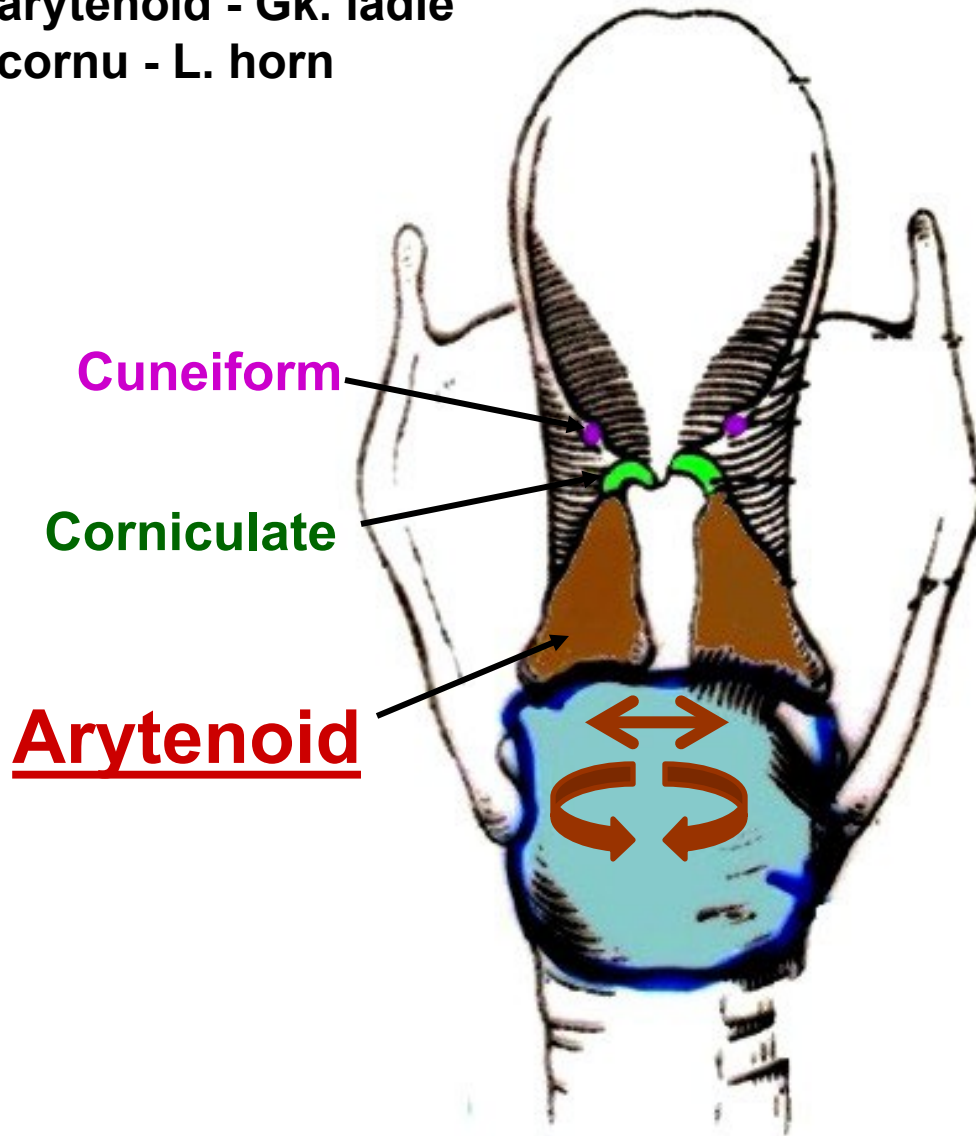


Cricoid means Signet Ring

Lamina of cricoid

LARYNX: CARTILAGES

arytenoid - Gk. ladle
cornu - L. horn



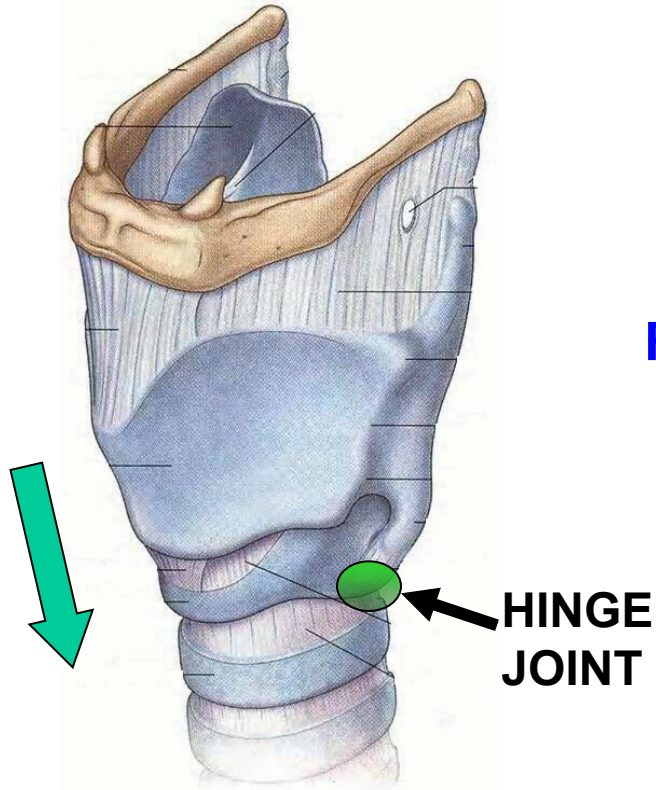
C. Arytenoid - 2
pyramidal shaped
cartilages above
lamina – have
synovial joints with
Cricoid permit
Swivel = Rotate
Sliding = Ab/Adduct

D. Corniculate -
nodules above
arytenoids in
aryepiglottic folds

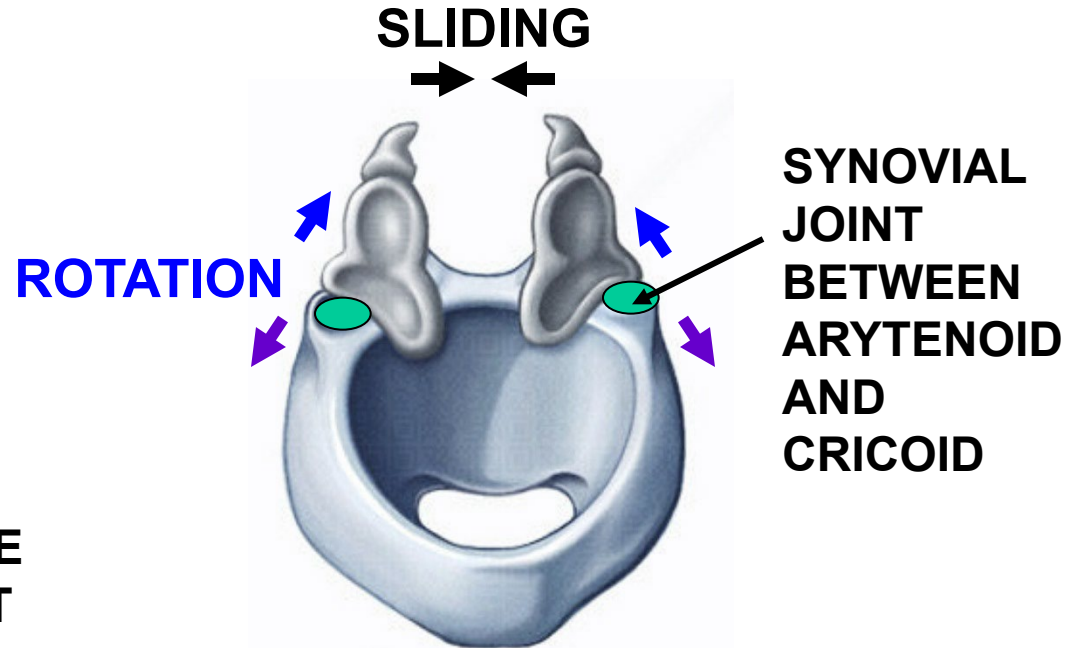
E. Cuneiform - rod
shaped, above
corniculate cartilages

LARYNX: SYNOVIAL JOINTS

THYROID and CRICOID



ARYTENOID and CRICOID

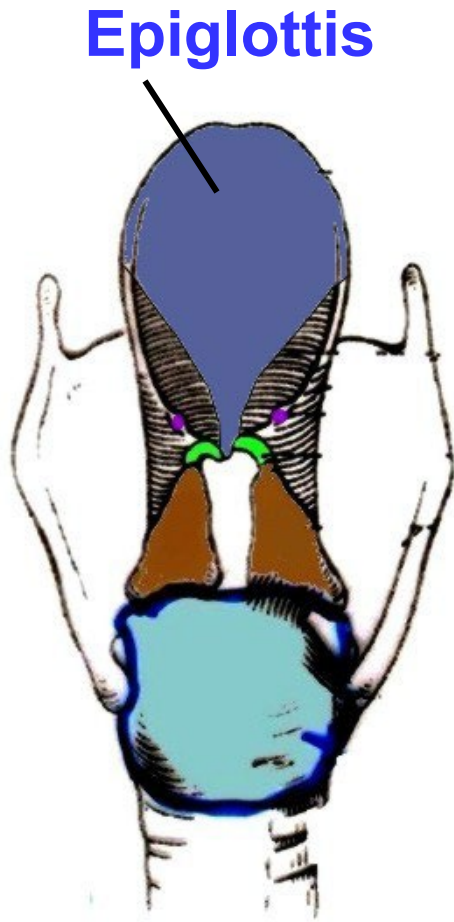


**JOINTS PERMIT TILTING OF THYROID-CRICOID:
- CHANGE PITCH OF SOUND (TENSE OR RELAX VOCAL LIGAMENTS)**

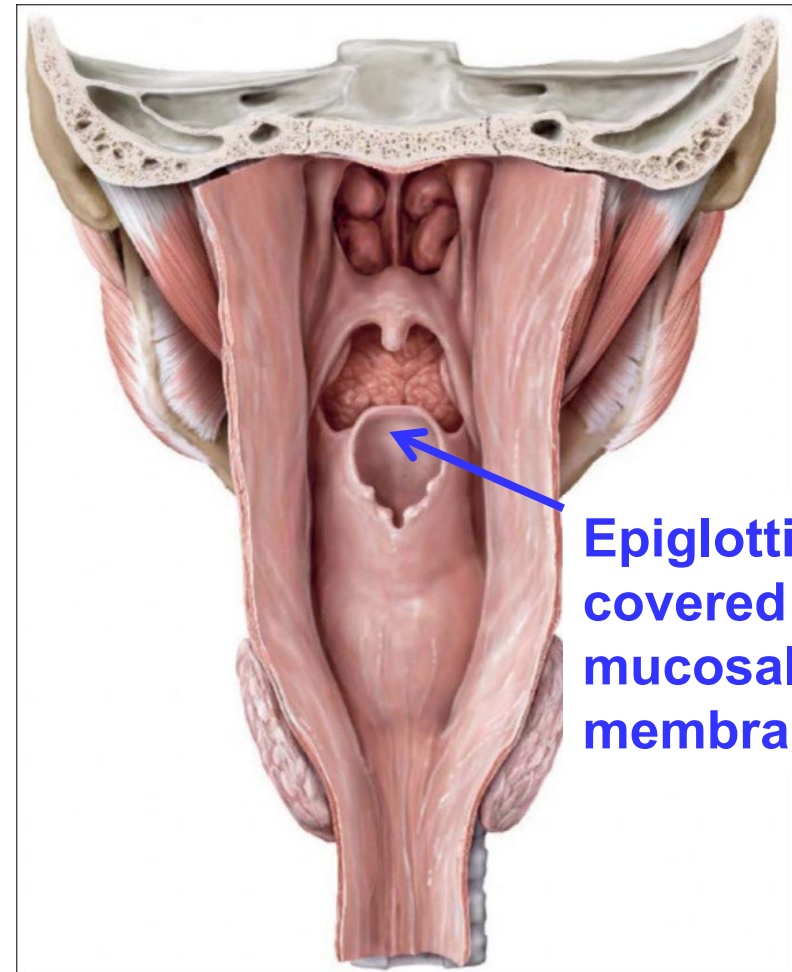
**JOINTS PERMIT ROTATION AND SLIDING:
- OPEN OR CLOSE LARYNX (ABDUCT OR ADDUCT VOCAL LIGAMENTS)**

LARYNX CARTILAGES: EPIGLOTTIS

POST. VIEW



Epiglottis
isolated

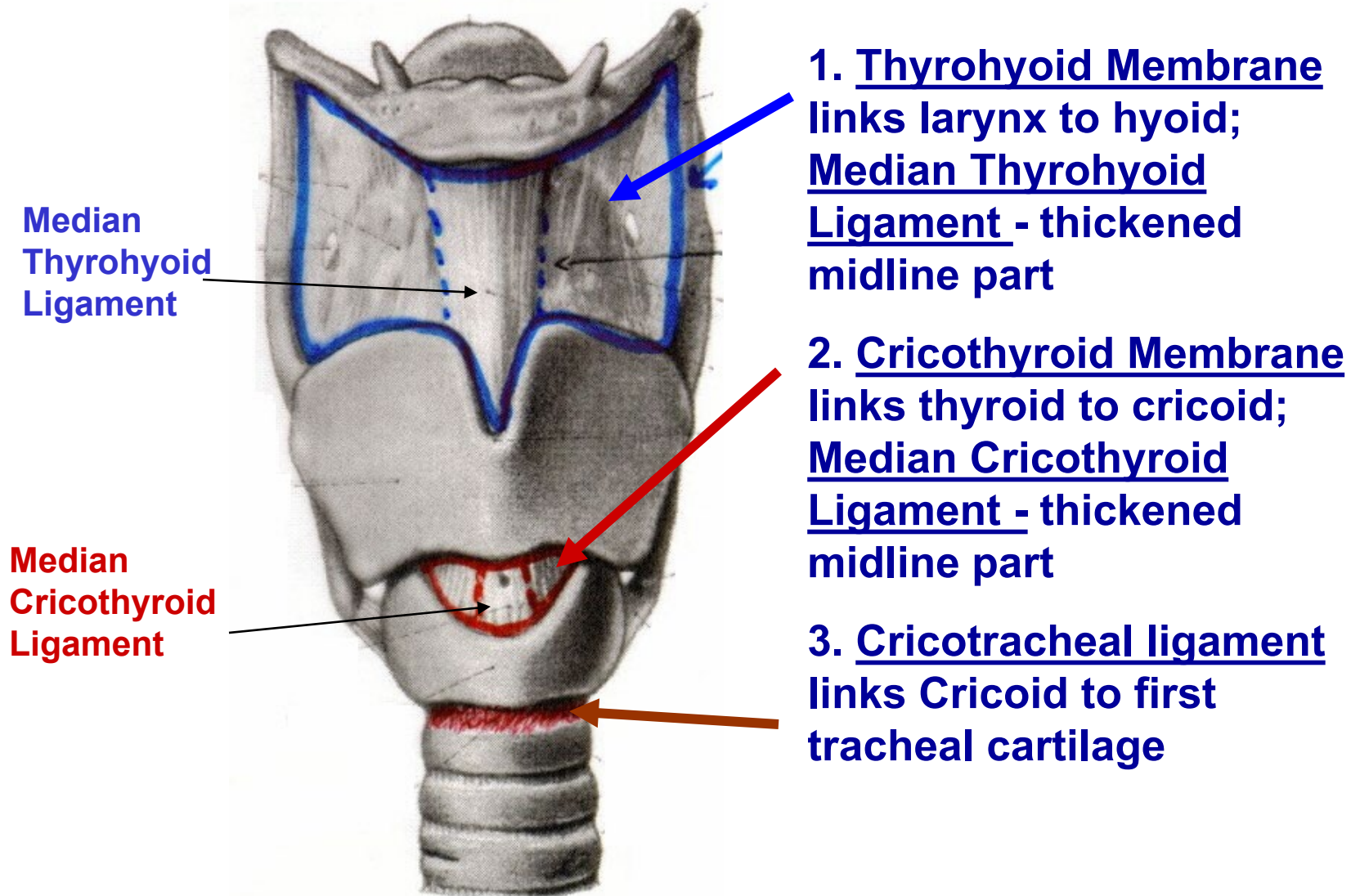


Epiglottis -
covered by
mucosal
membrant

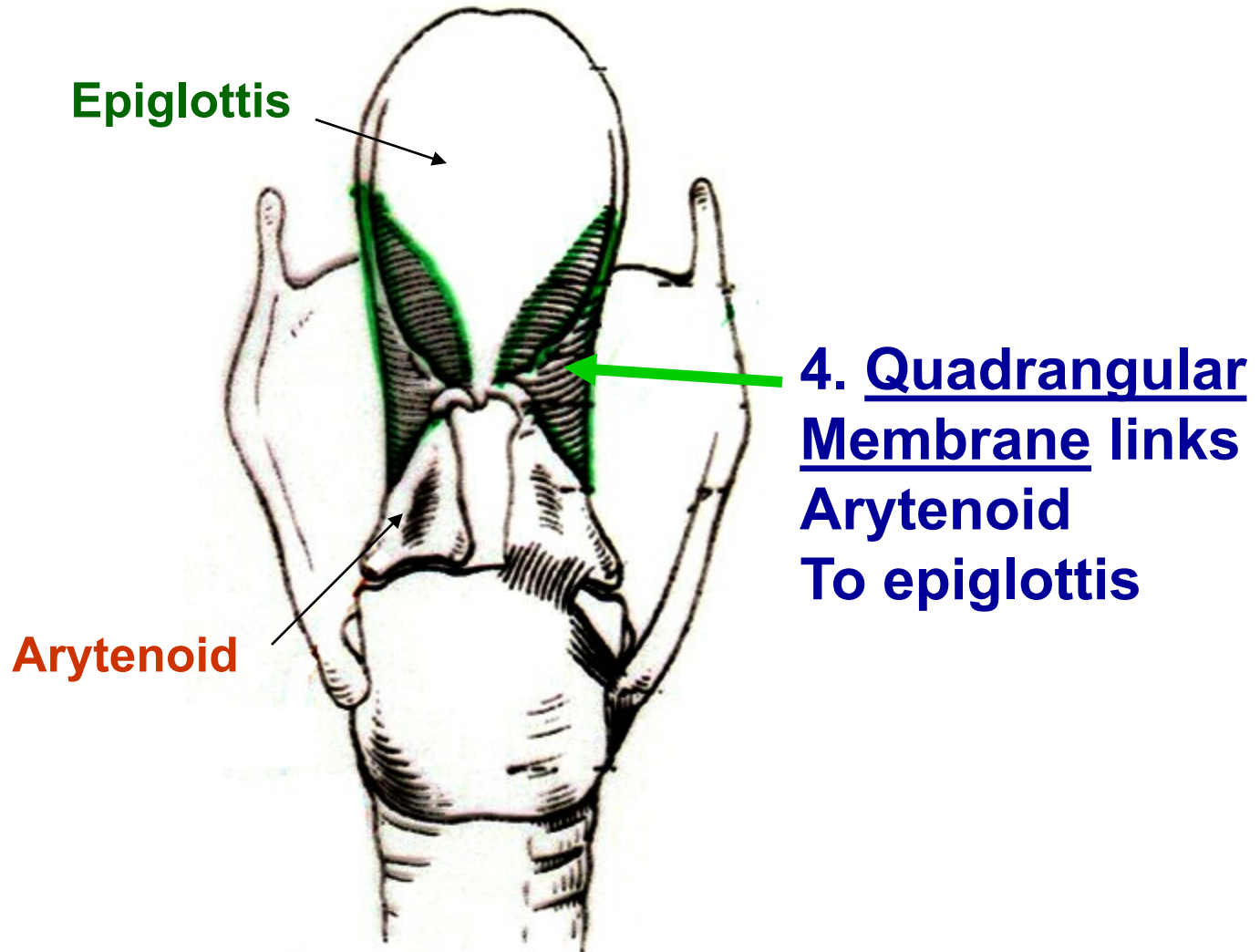
F. EPIGLOTTIS - leaf shaped cartilage posterior to root of tongue; connected to body of hyoid and post side of thyroid cartilage

II. LIGAMENTS OF LARYNX

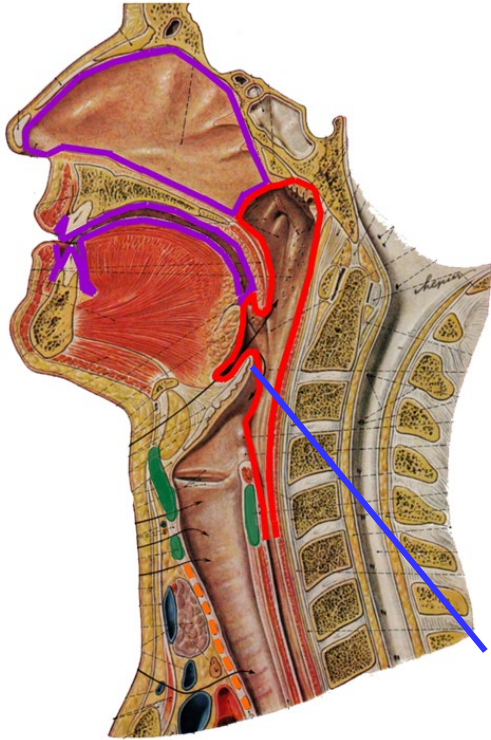
A. Structural ligaments - hold larynx, hyoid, trachea together



STRUCTURAL LIGAMENTS

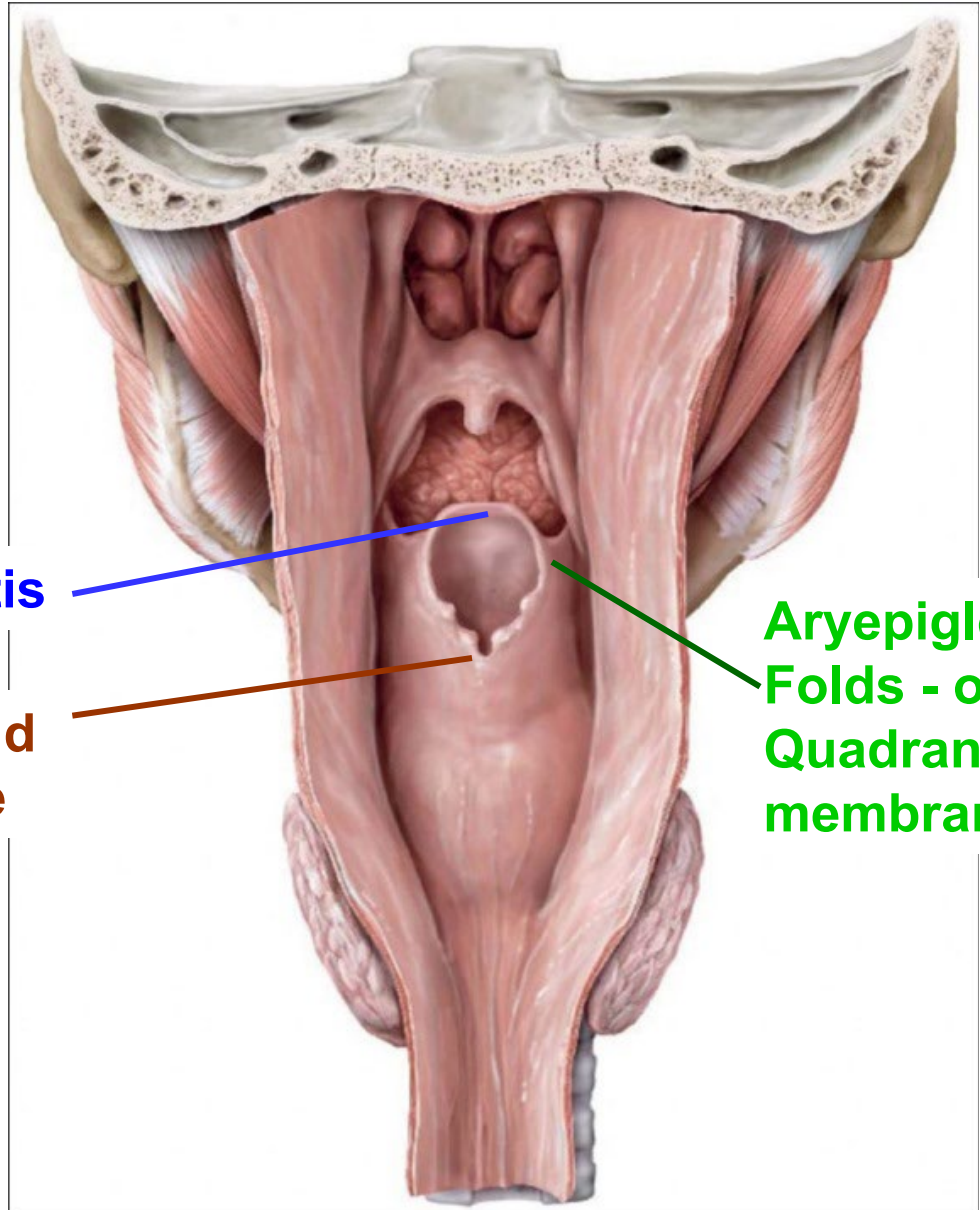


STRUCTURAL LIGAMENTS



Epiglottis

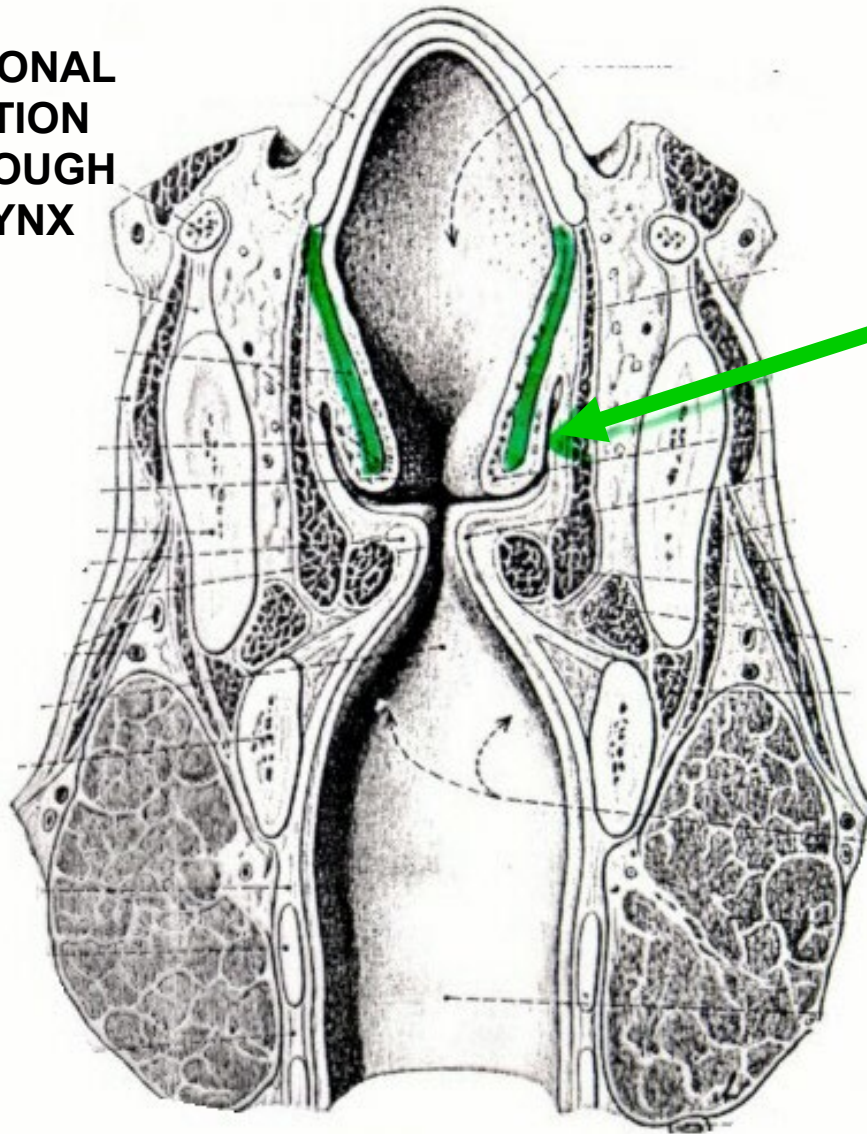
**Arytenoid
cartilage**



**Aryepiglottic
Folds - overlie
Quadrangular
membrane**

STRUCTURAL LIGAMENTS

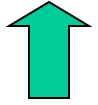
CORONAL
SECTION
THROUGH
LARYNX



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

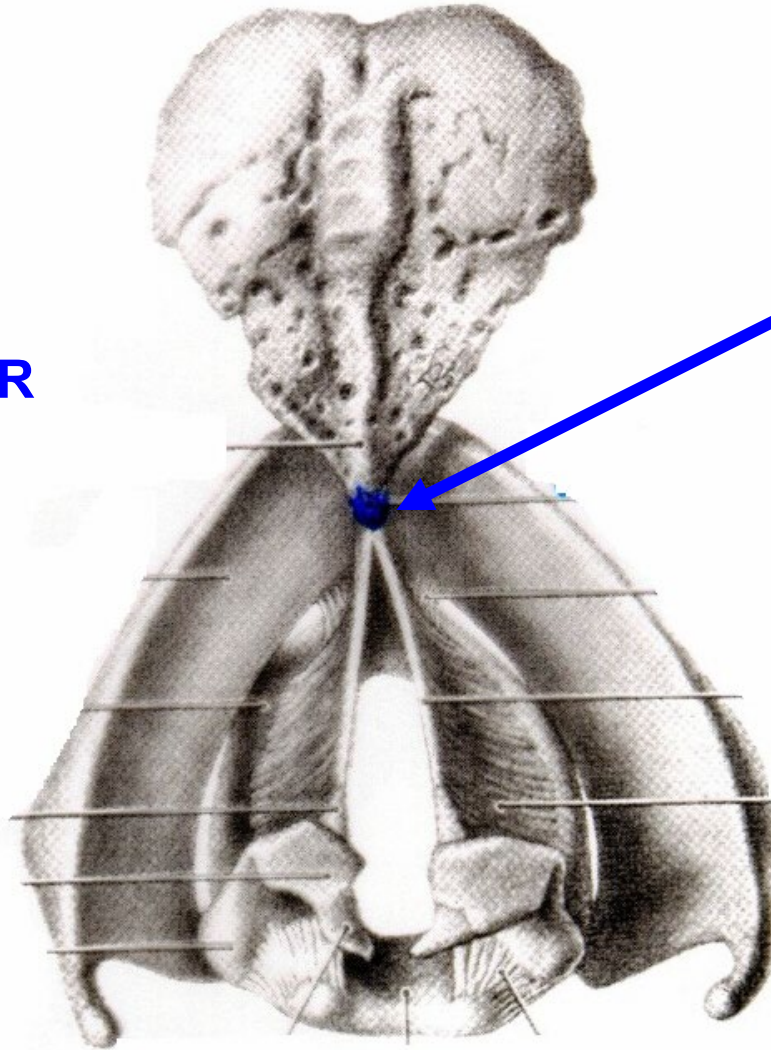
trachea

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**

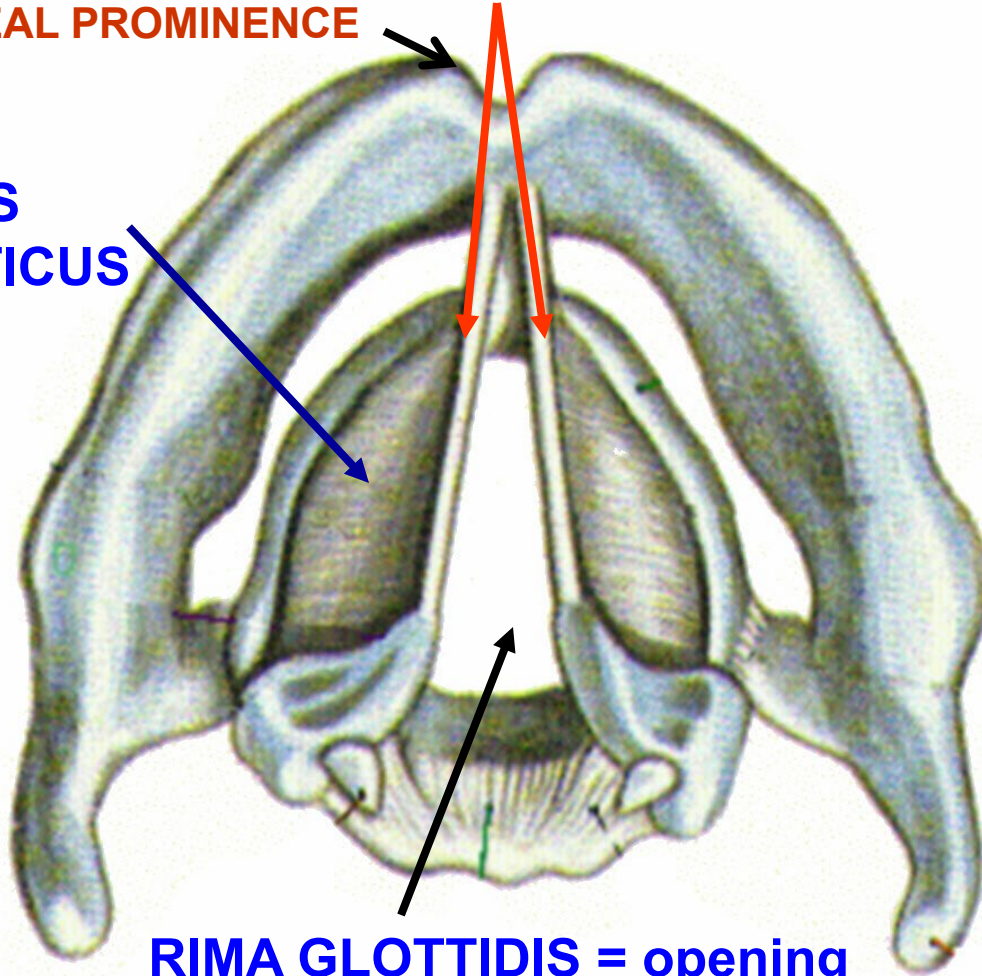
Functional
ligaments: **Conus
Elasticus** -

Vibrating lips that
arise from entire
upper edge of arch
of cricoid

Attach: ant. to
Thyroid, post. to
Arytenoid

LARYNGEAL PROMINENCE

CONUS
ELASTICUS



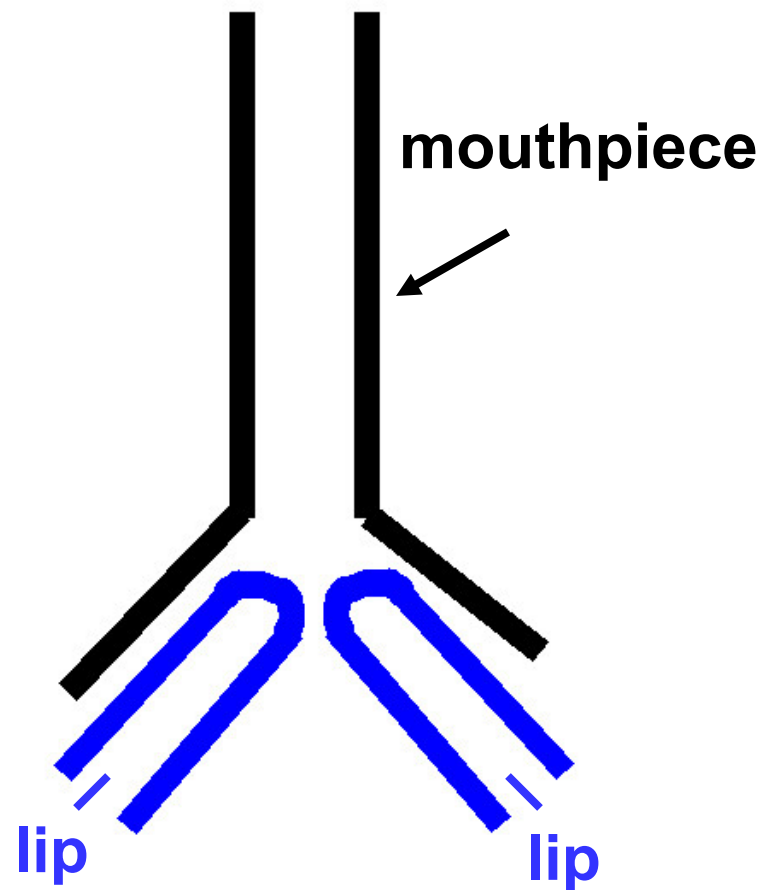
RIMA GLOTTIDIS = opening
between Vocal ligaments

**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



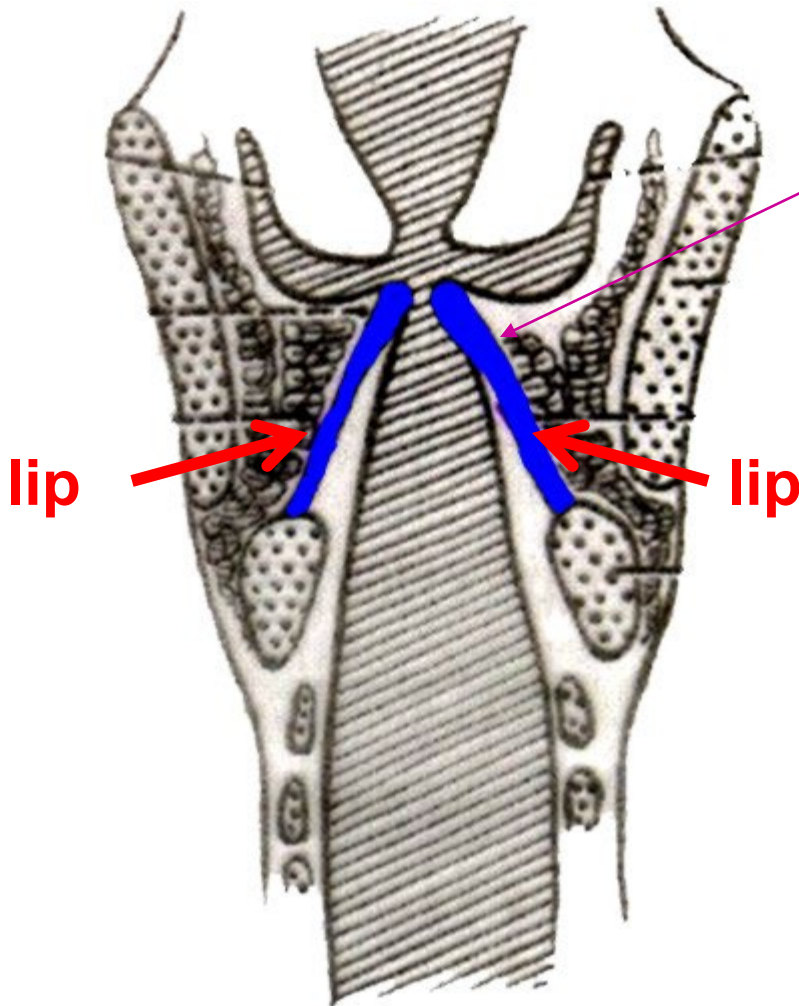
Tense lips - raise pitch
Relax lips - lower pitch

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



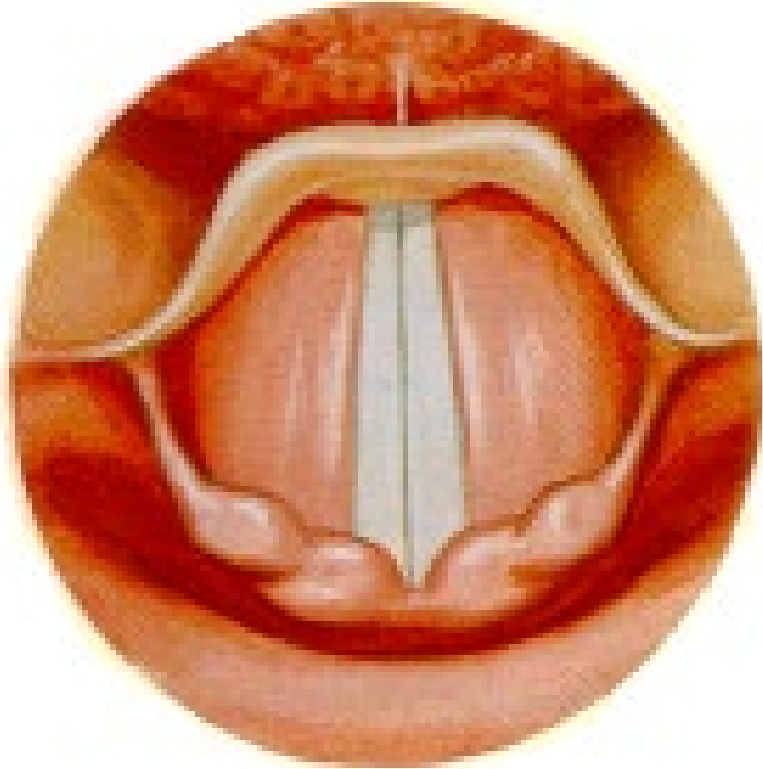
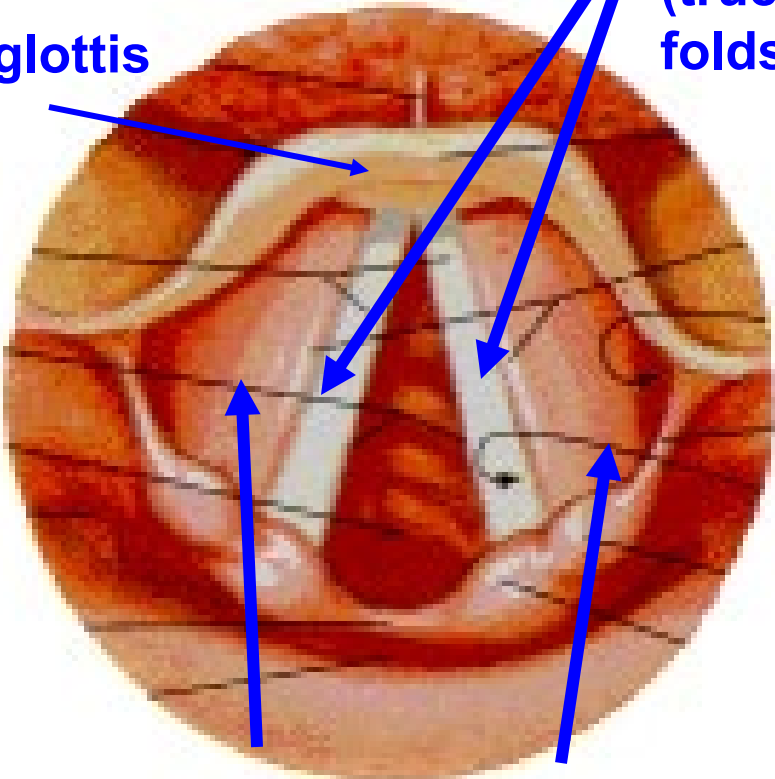
LARYNGOSCOPE VIEW OF LARYNX

Ant.

Tongue

Vocal Folds
(true vocal folds)

Epiglottis



Post.

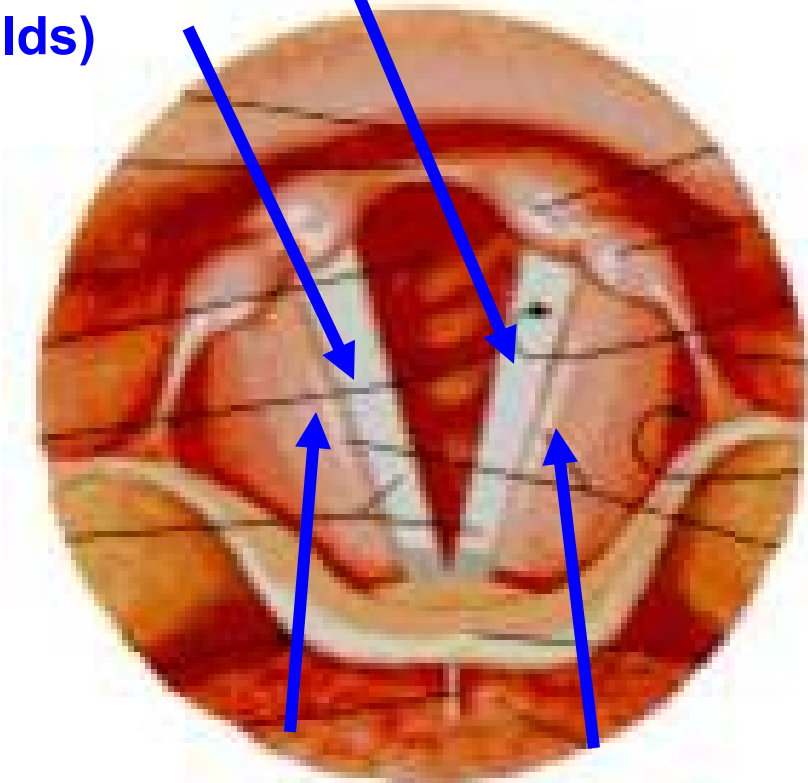
Vestibular Folds
(false vocal folds)

vocal folds
adducted when
talking or singing

LARYNGOSCOPE VIEW OF LARYNX

Post.

Vocal Folds
(true vocal folds)



Vestibular Folds
(false vocal folds)

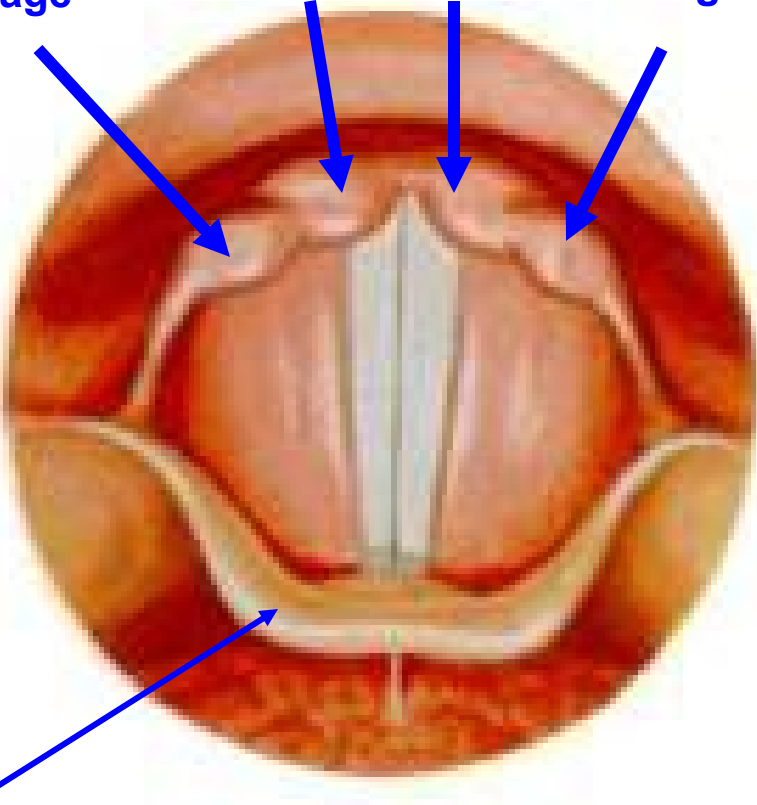
Ant.

Tongue

Cuneiform cartilage

Corniculate cartilages

Cuneiform cartilage



Epiglottis

vocal folds adducted when talking or singing



Leads to
Esophagus

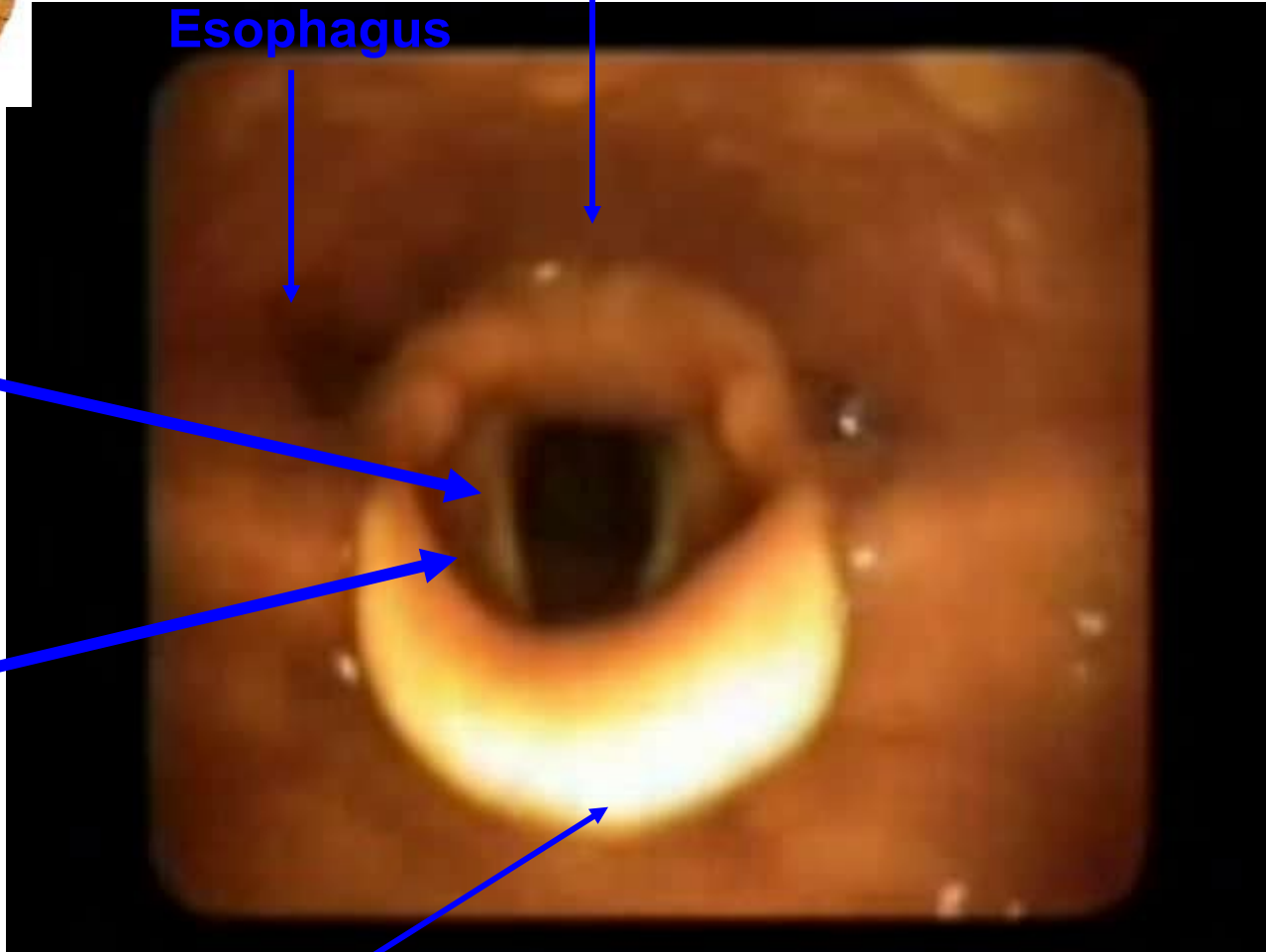
Leads to
Esophagus

**BREATHING
(INHALATION)**

**Vocal
Folds
(True,
white)**

**Vestib-
ular
Folds
(False,
Reddish)**

Epiglottis

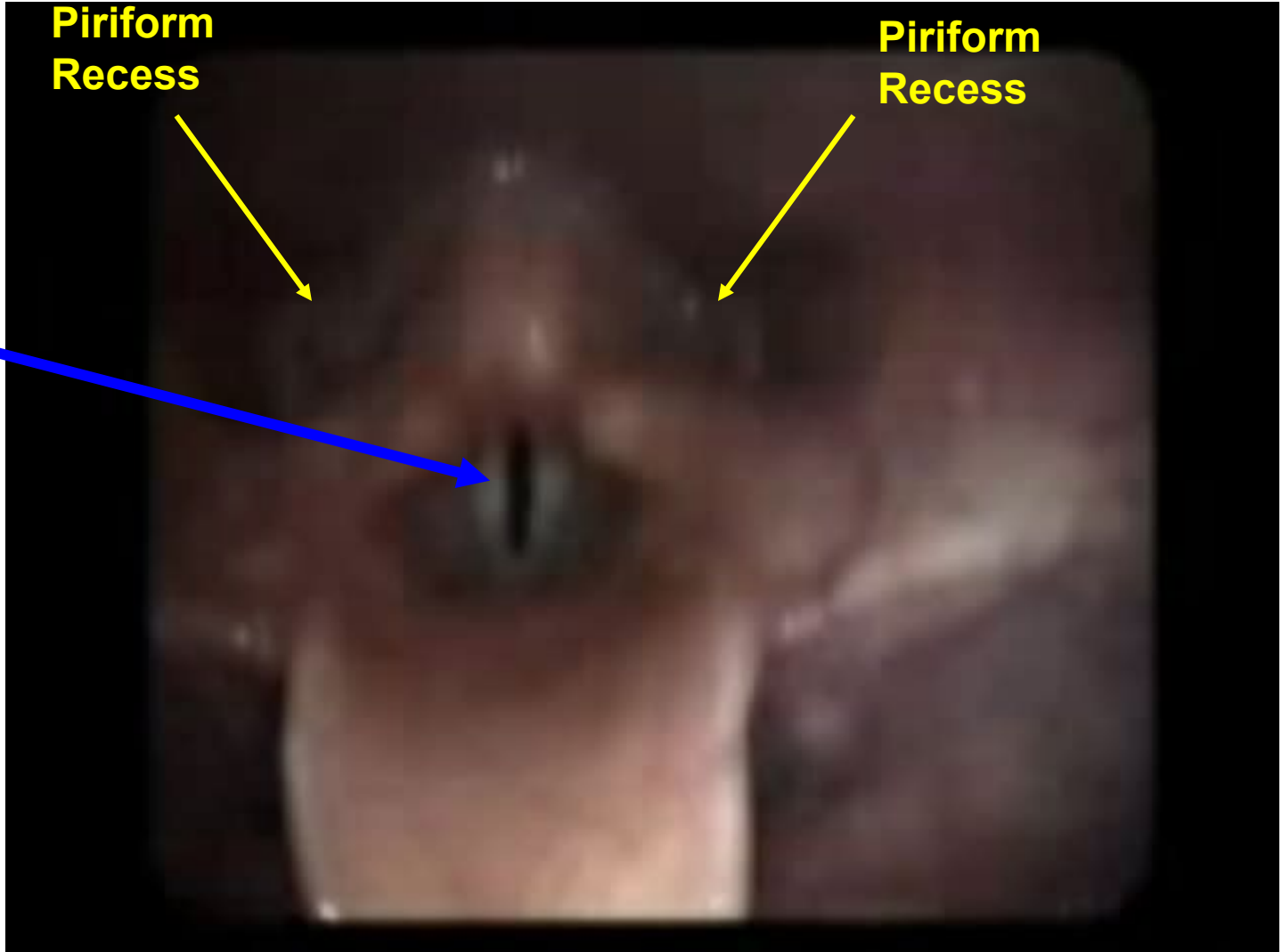


LARYNX PRODUCING SOUND

Piriform
Recess

Piriform
Recess

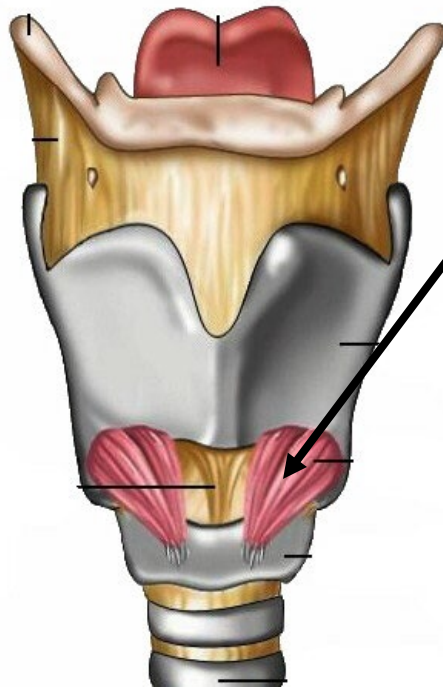
Vocal
Folds
(True,
white)
brought
together



III. MUSCLES OF LARYNX - well named

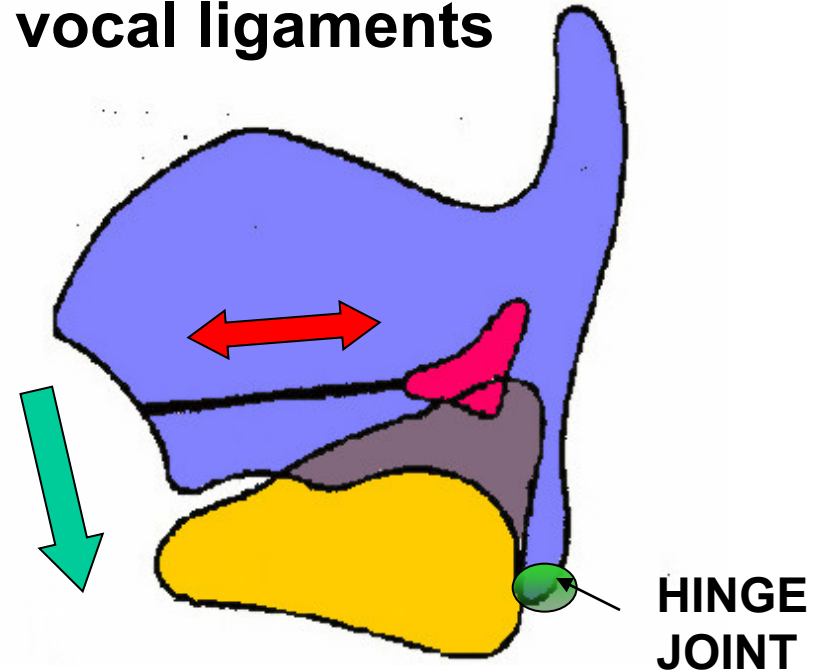
A. Extrinsic muscles (ex. hyoid muscles) - Move whole larynx as in swallowing

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

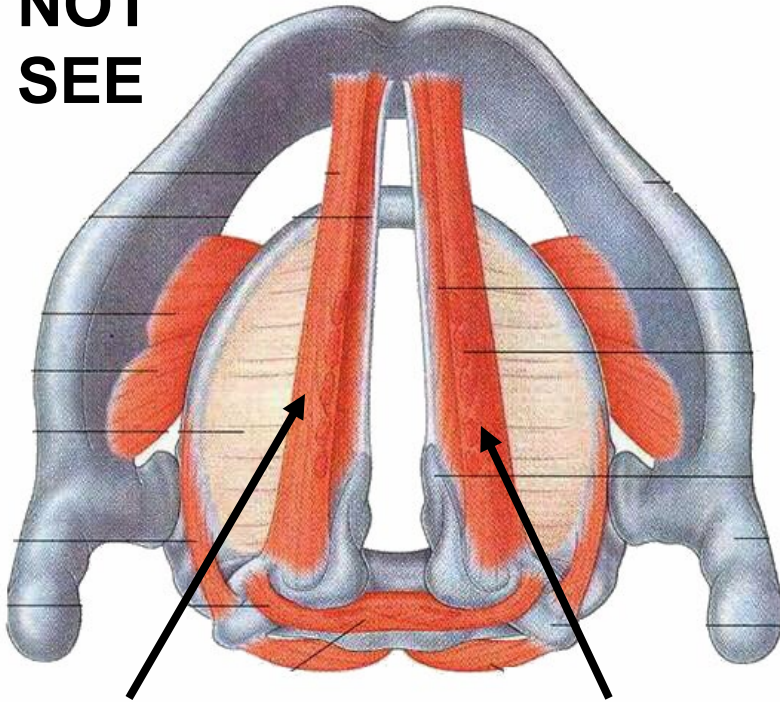
Tilting - **STRETCHES** vocal ligaments



STRETCH vocal ligament
INCREASE PITCH -
CRICOTHYROID

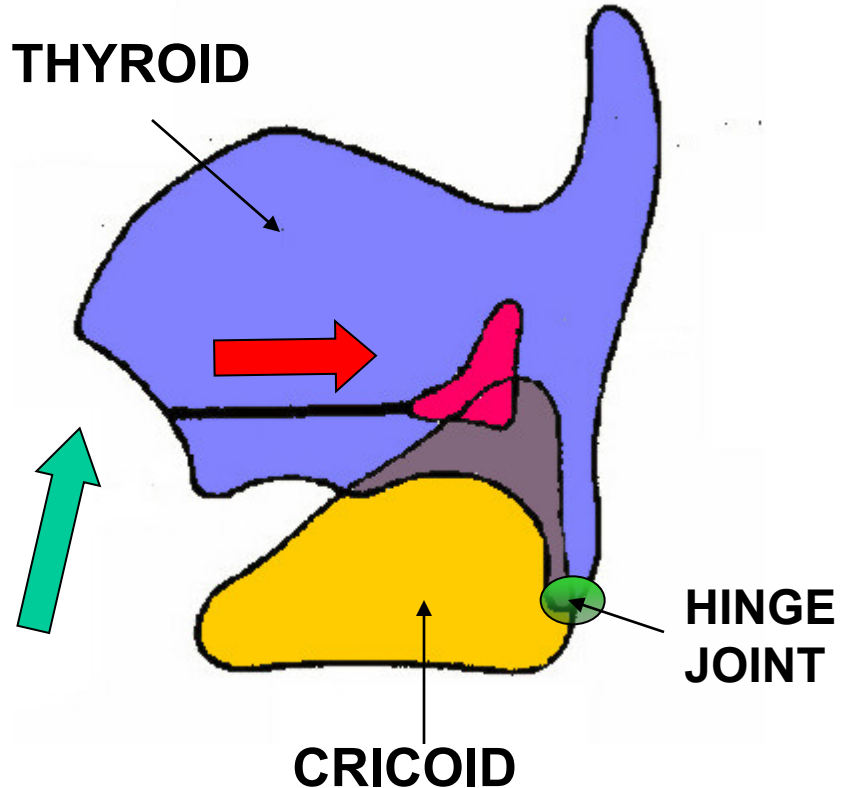
MUSCLES OF LARYNX

NOT
SEE



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

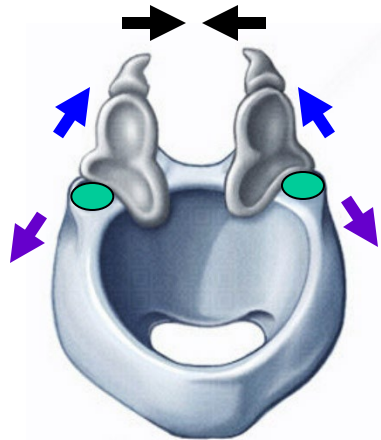
THYROID



RELAX vocal ligament
DECREASE PITCH -
THYROARYTENOID

OPEN AND CLOSE RIMA GLOTTIDIS BY ROTATING/SLIDING ARYTENOIDS -

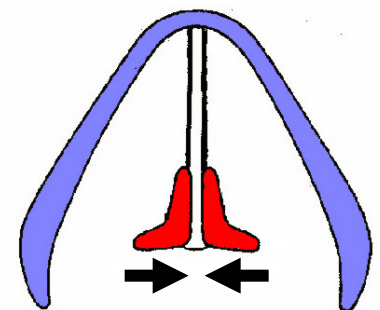
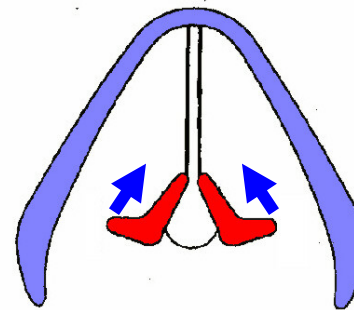
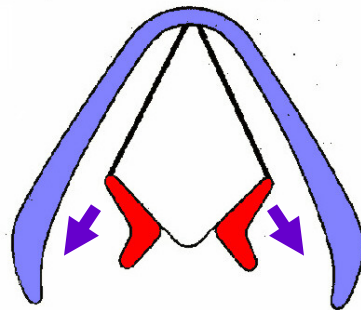
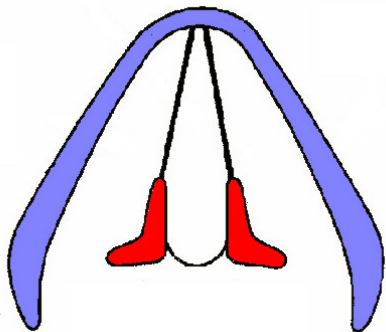
Rotate laterally opens; Rotate medially or slide closes
 more close than open



OPEN
 ROTATE
 Laterally

CLOSE
 ROTATE
 Medially

CLOSE
 SLIDE



**POSTERIOR
 CRICO-
 ARYTENOID**

**LATERAL
 CRICO-
 ARYTENOID**

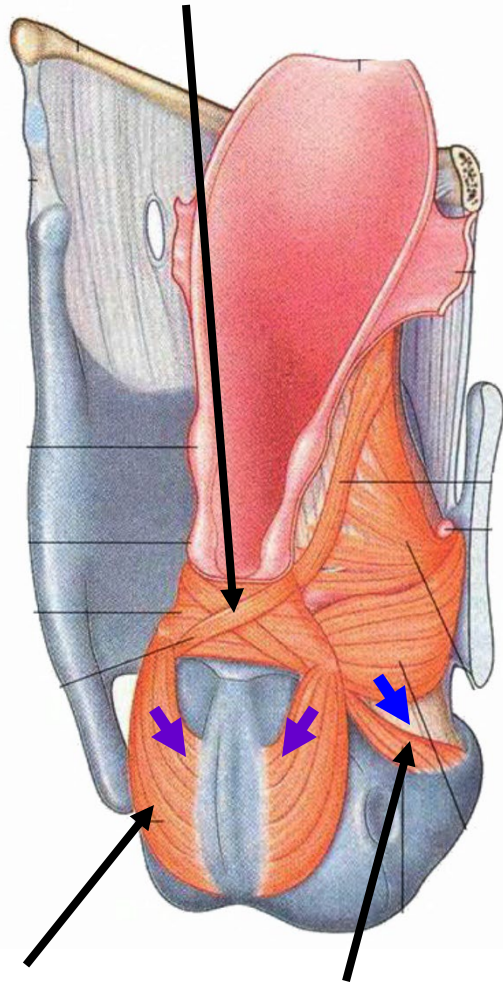
ARYTENOIDEUS

**REST
 POSITION**

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

MUSCLES OF LARYNX

ARYTENOIDEUS



POSTERIOR
CRICO-
ARYTENOID

LATERAL
CRICO-
ARYTENOID

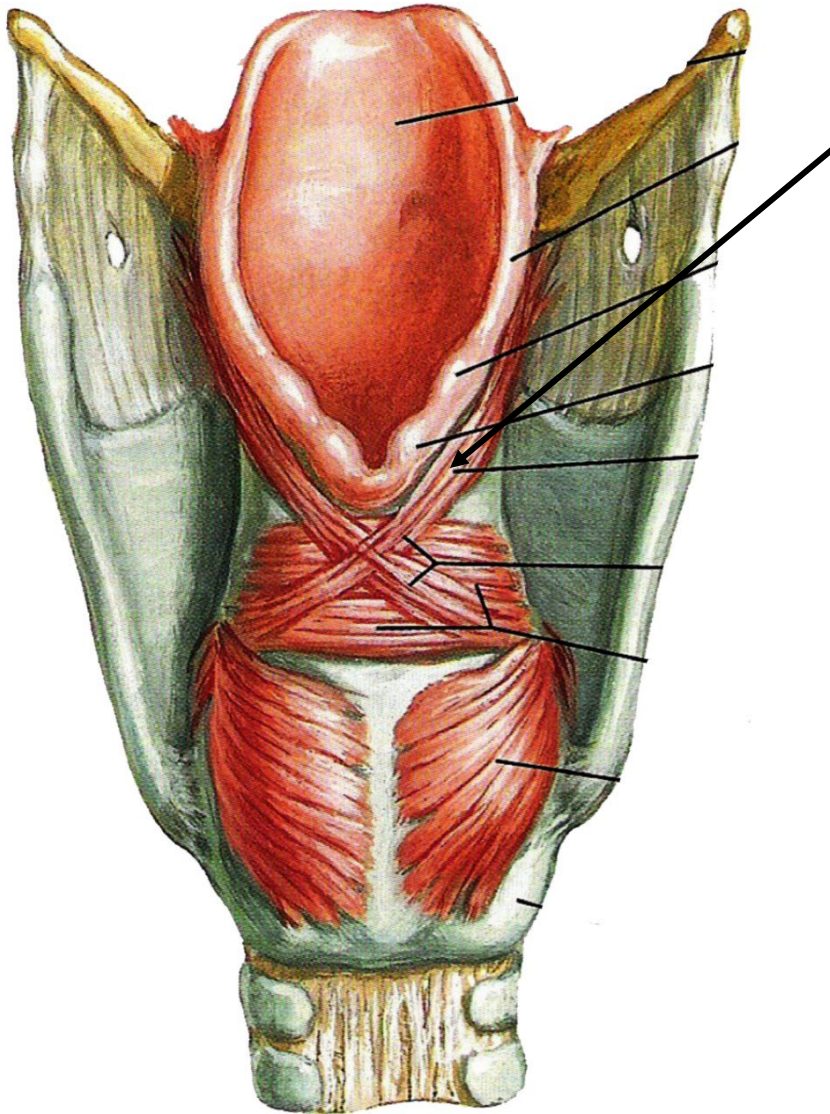
5) ARYTENOID (Transverse and oblique arytenoid) - Adduct vocal folds

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

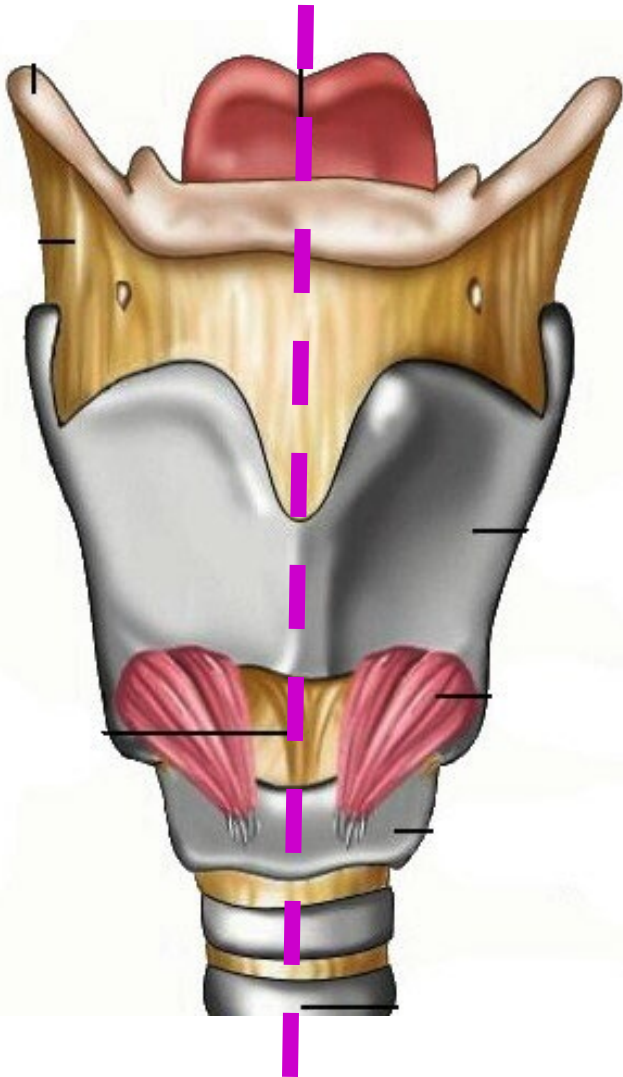
- Not necessary in adult humans

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



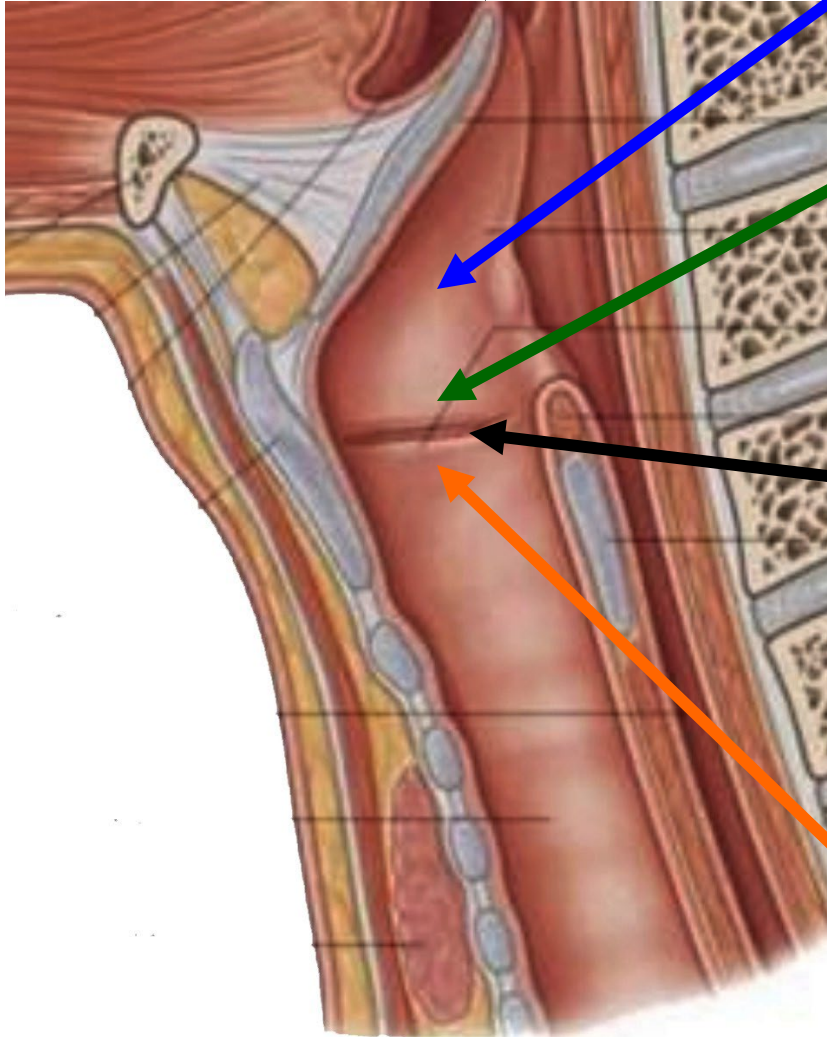
Bisect
Larynx to see
interior
structures

NOSE



TERMS ASSOCIATED WITH LARYNX

epiglottis



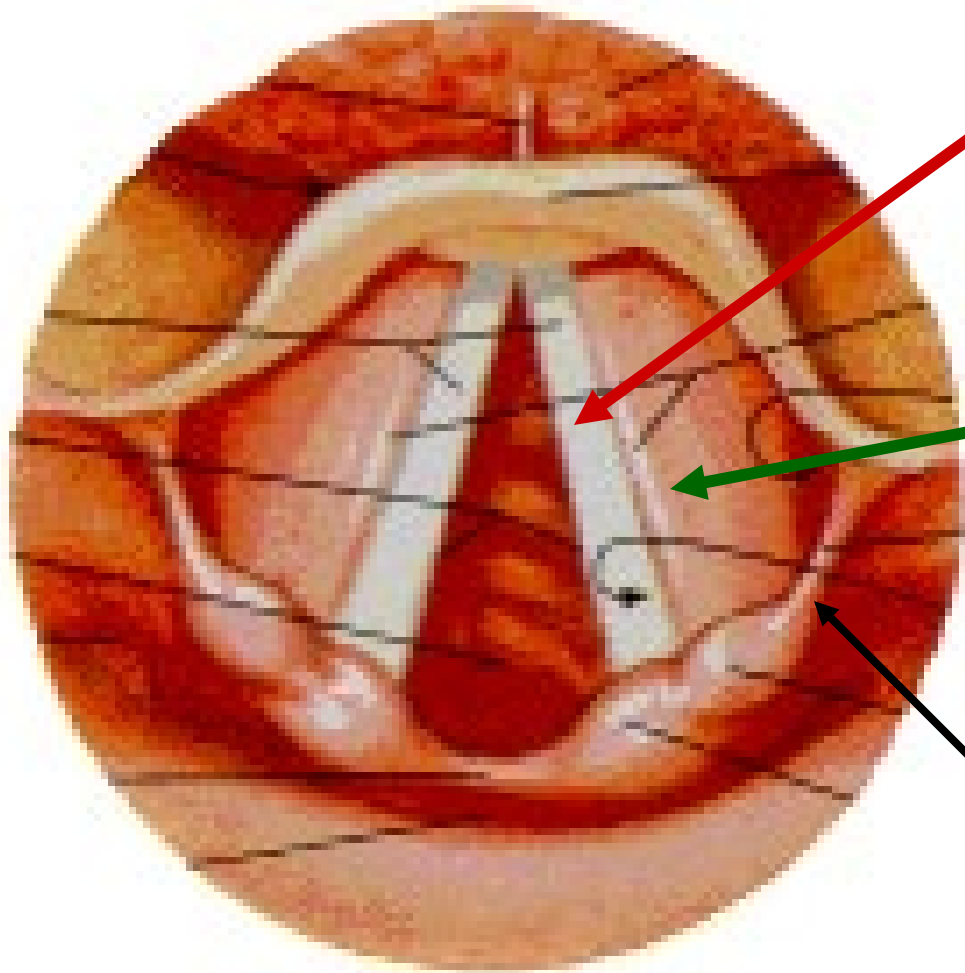
VESTIBULE - inlet above false vocal folds

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 –

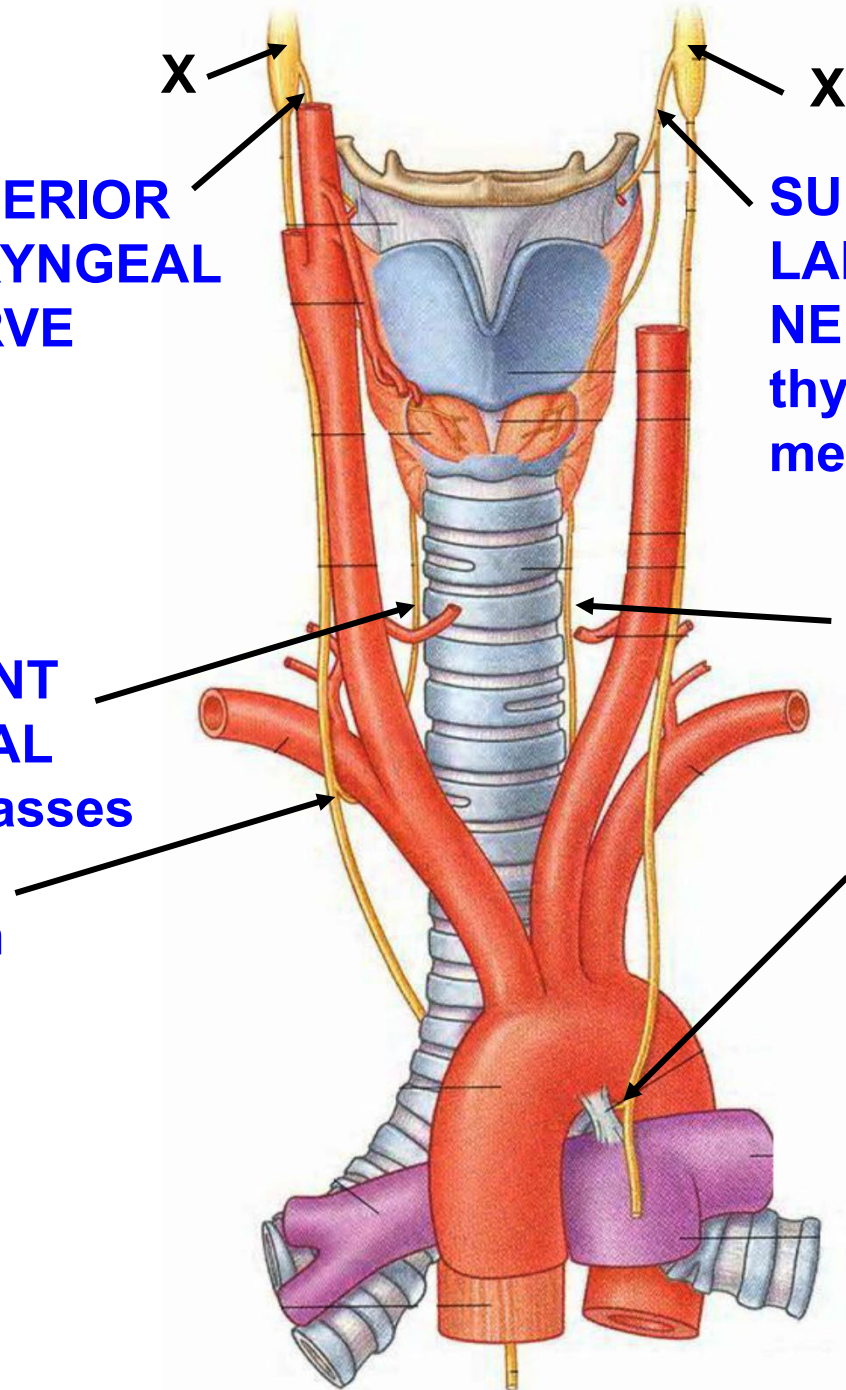
All are Branches of Vagus CN X

SUPERIOR LARYNGEAL NERVE

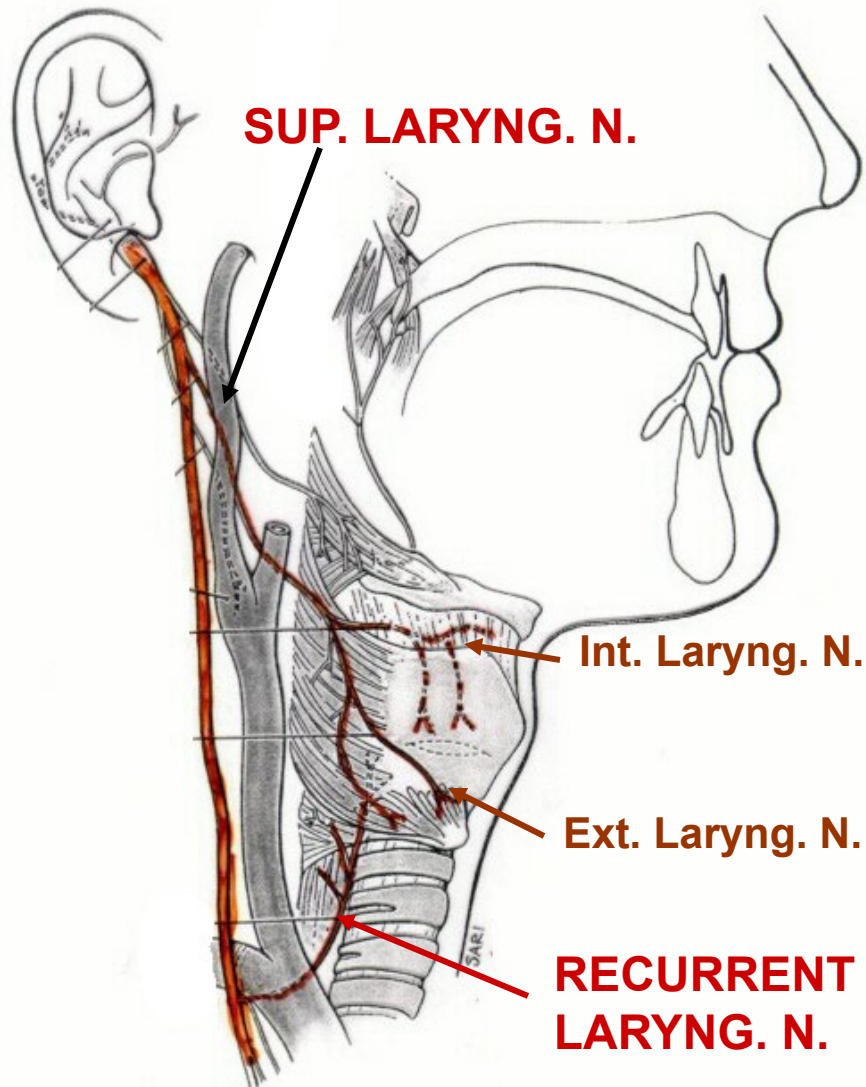
SUPERIOR LARYNGEAL NERVE - pierces thyrohyoid membrane

RIGHT RECURRENT LARYNGEAL NERVE - passes under Subclavian Artery

LEFT RECURRENT LARYNGEAL NERVE - passes under Arch of Aorta



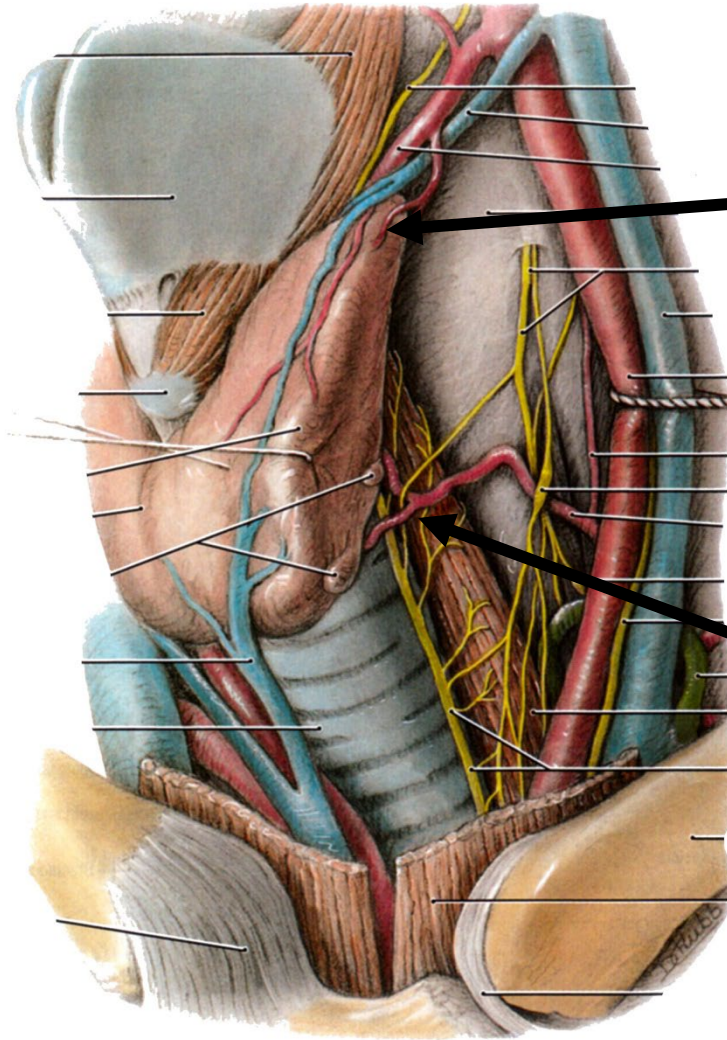
V. NERVES OF LARYNX – Branches of Vagus



- 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



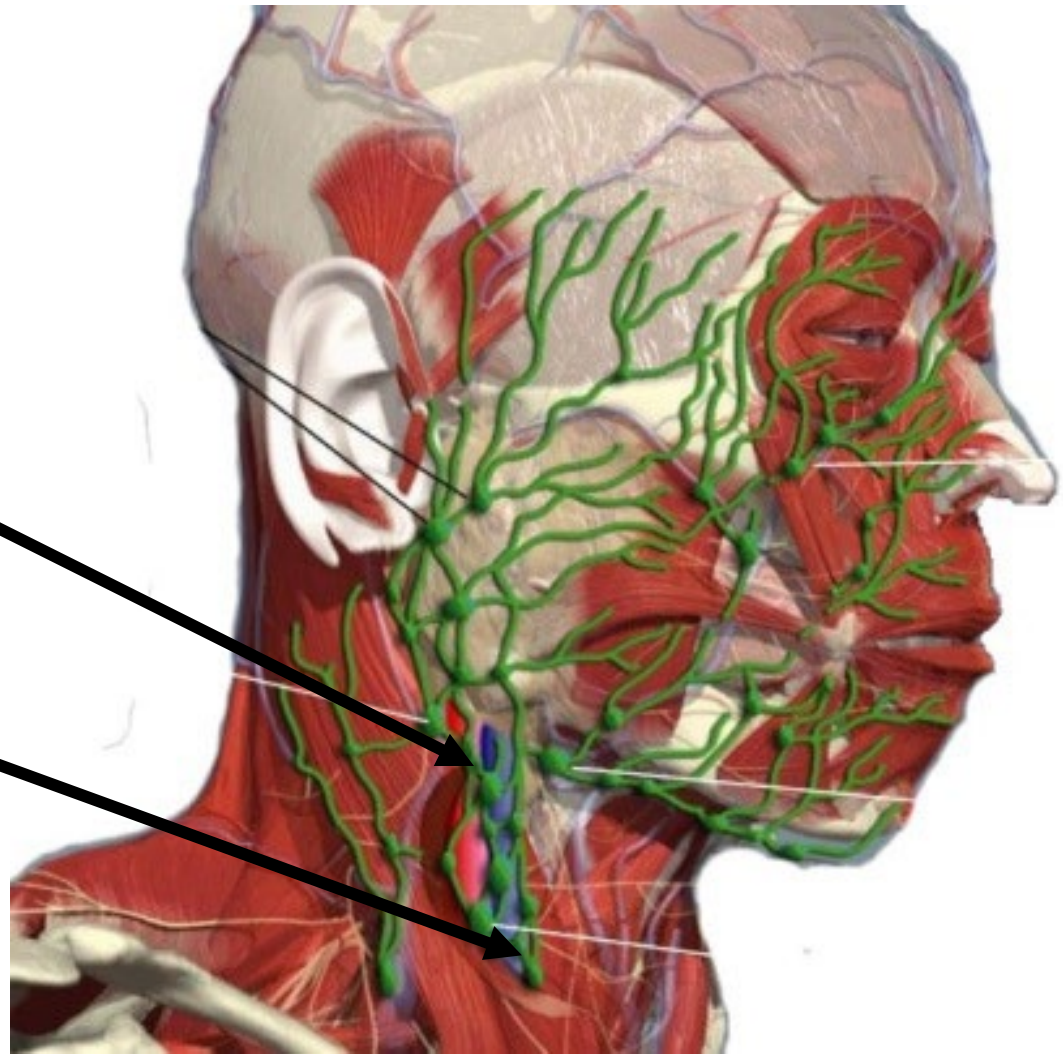
**Superior
Laryngeal Artery
from Superior
Thyroid artery**

**Inferior Laryngeal
Artery from
Inferior Thyroid
artery**

VII. LARYNX - LYMPHATICS

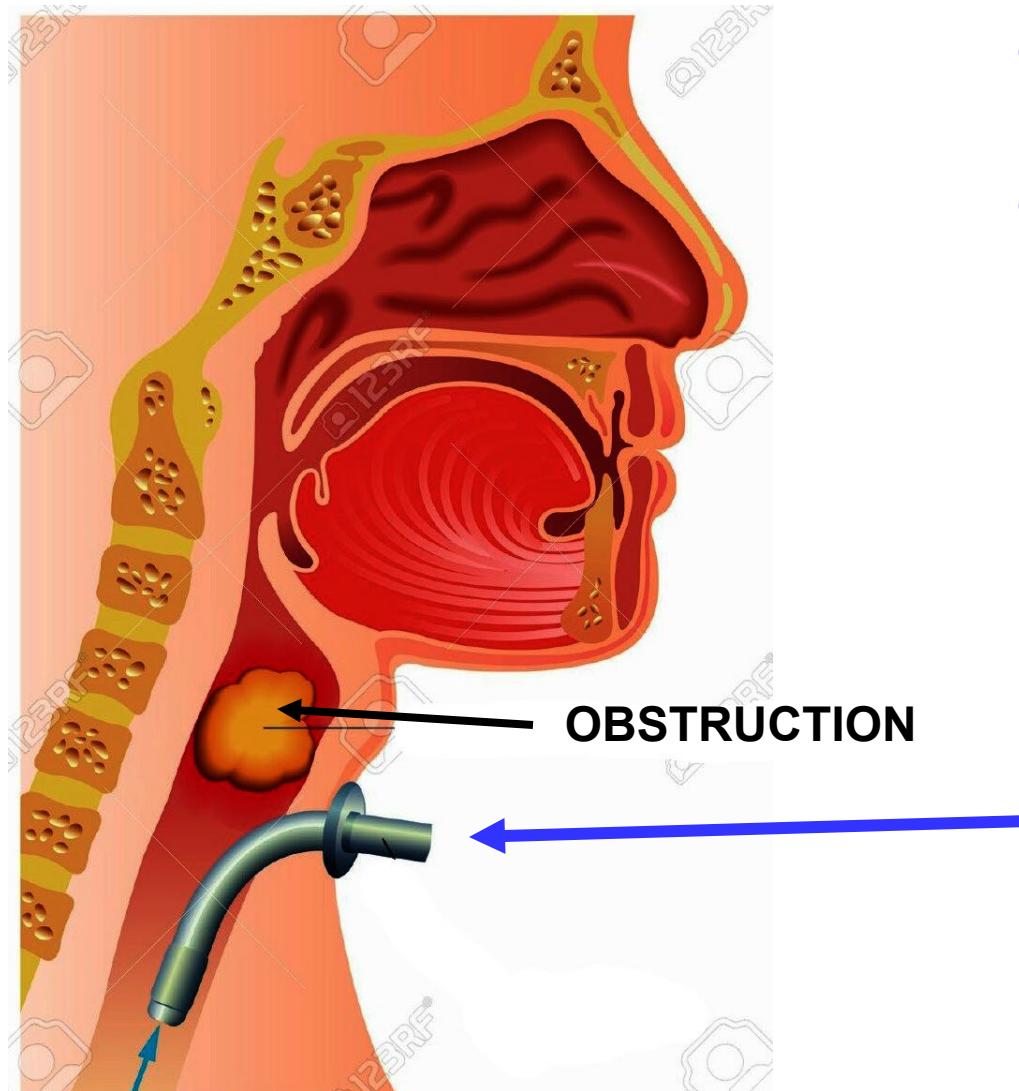
Superior Deep
Cervical Nodes -
drain Larynx above
true vocal folds

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)

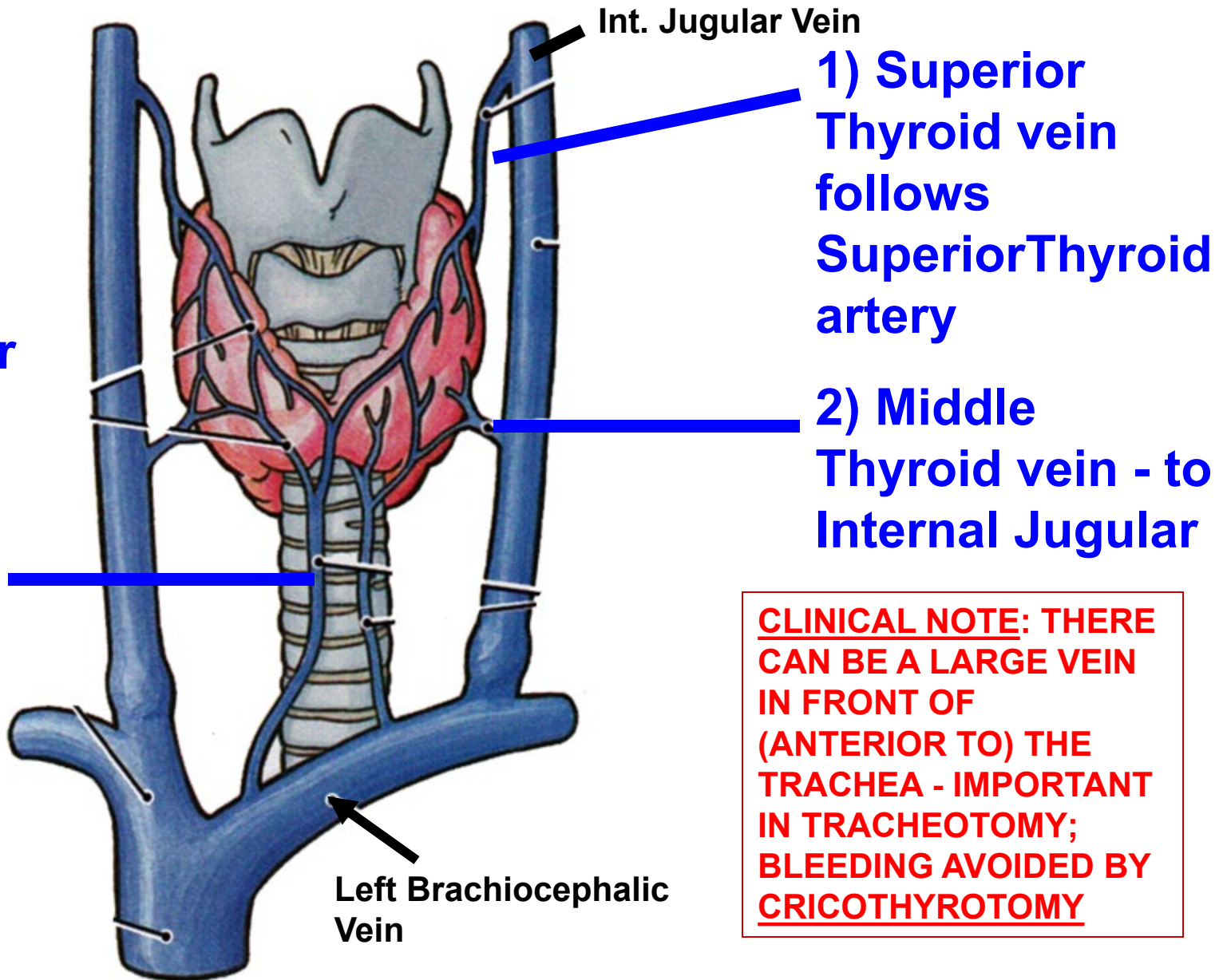
VIII. OBSTRUCTION OF LARYNX: TRACHEOTOMY



open airway to
lungs below
obstructed
larynx

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

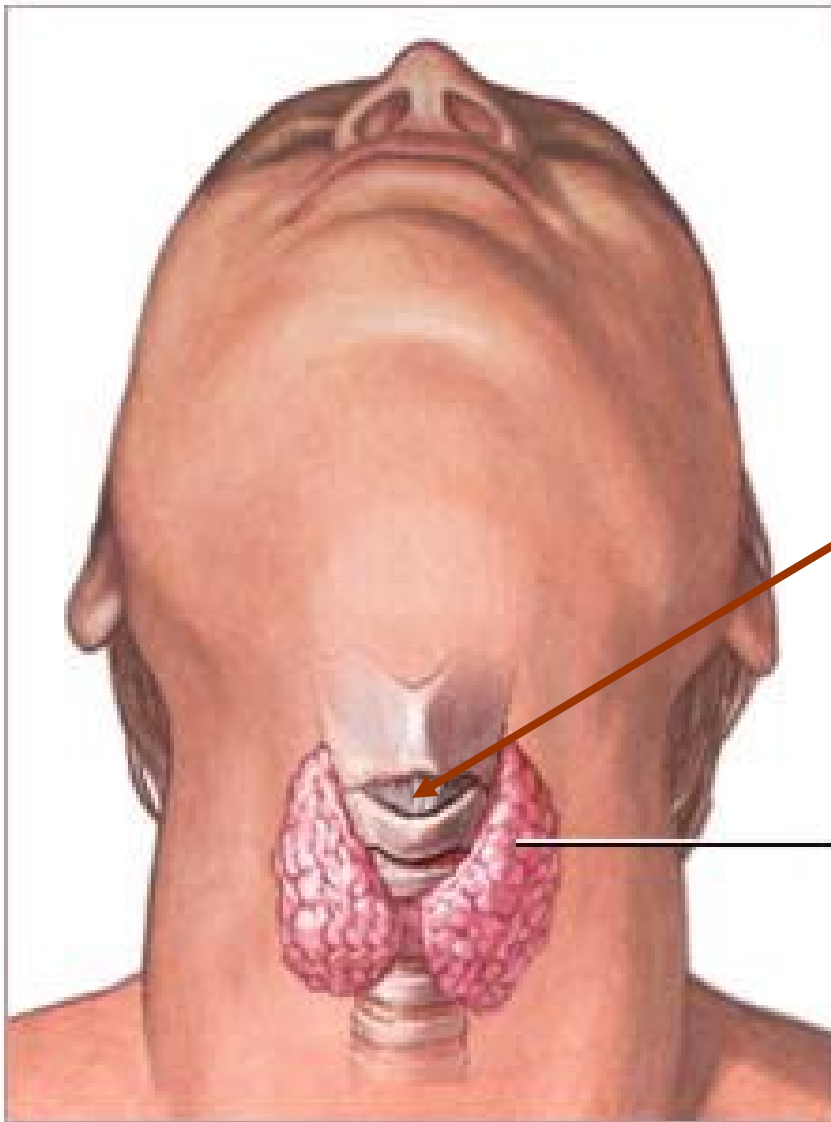
THYROID GLAND - LOTS OF VEINS



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**

