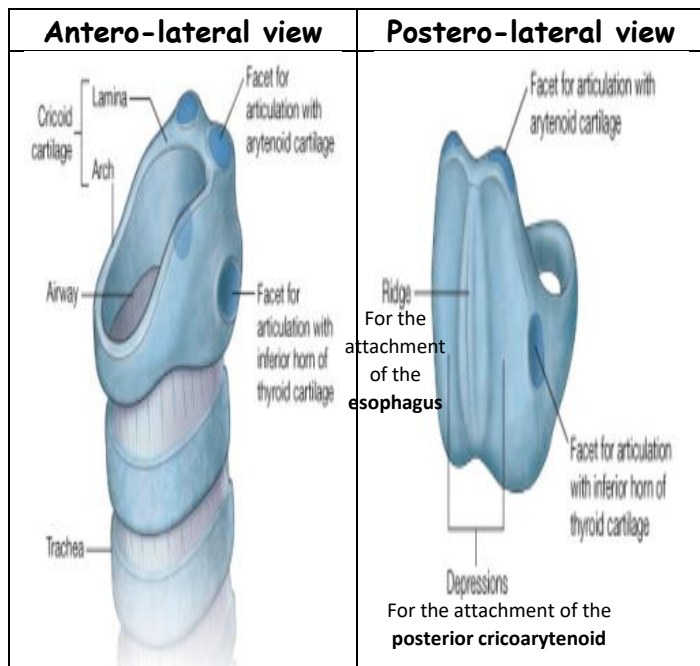


❖ **Functions of the Larynx:**

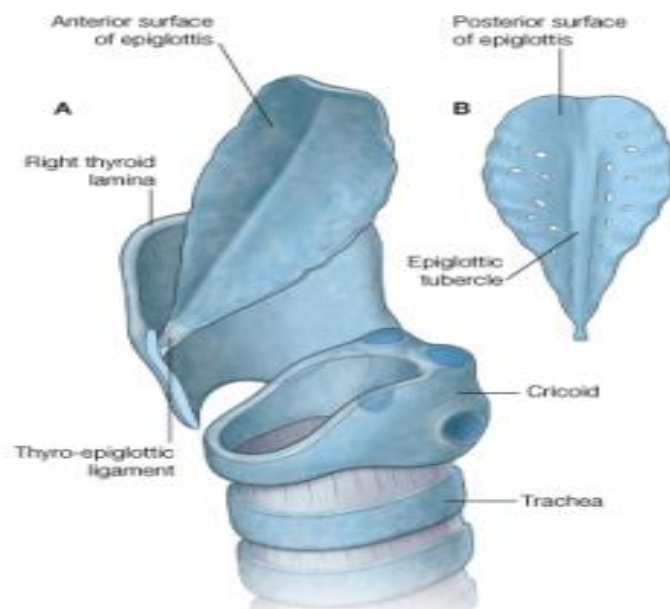
- ✓ Acts as an open valve in respiration
- ✓ Acts as a closed valve in deglutition
- ✓ Acts as a partially closed valve in the production of voice (speech)
- ✓ During cough, it is first closed and then opens suddenly to release compressed air

❖ **Cartilaginous Skeleton of the Larynx:**

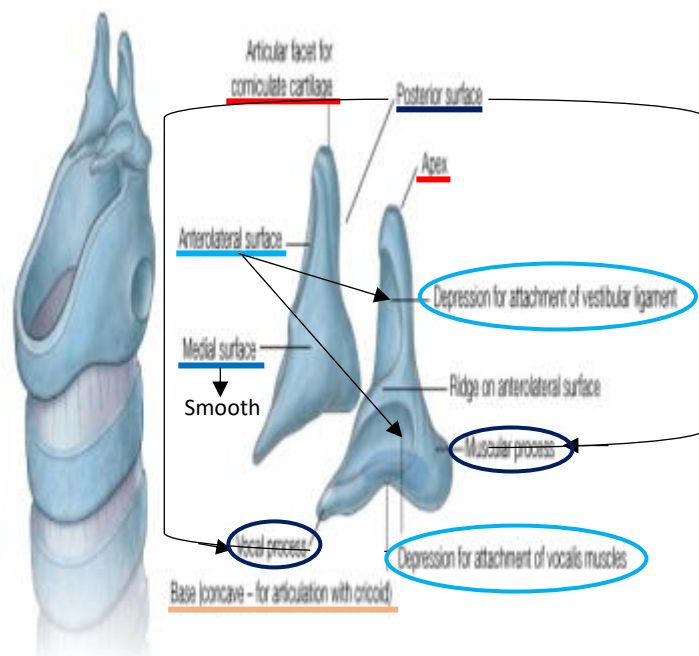
↳ **Cricoid Cartilage (single):**



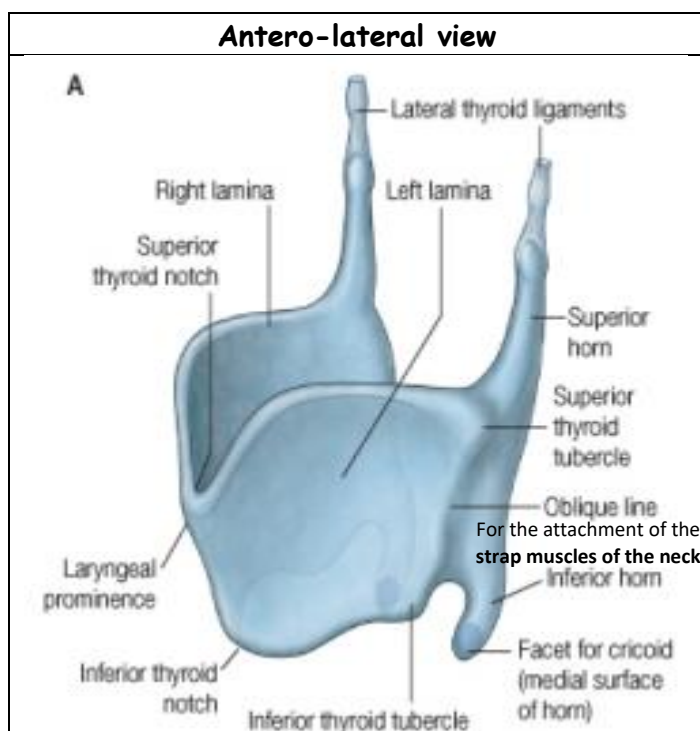
↳ **Epiglottis (single):**



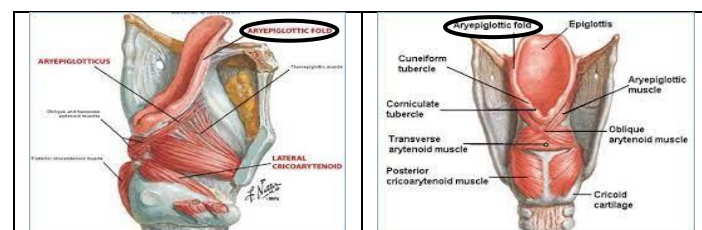
↳ **Arytenoid Cartilages (paired):**



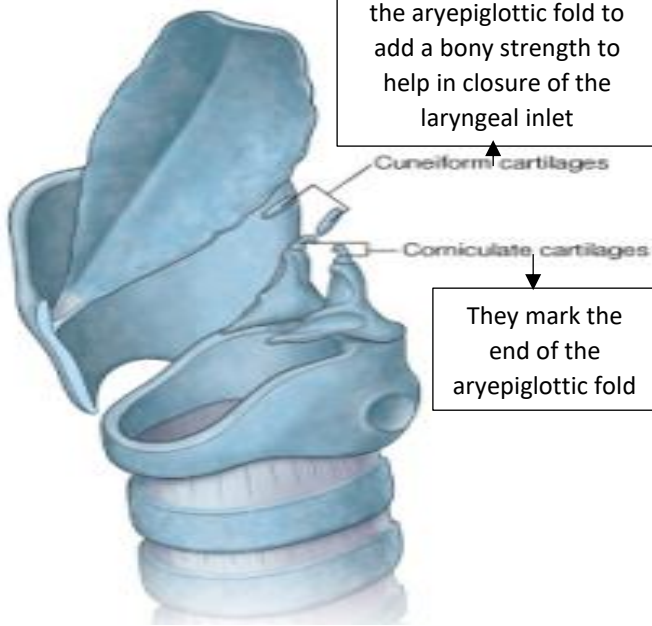
↳ **Thyroid Cartilage (single):**



- ↳ Posterior and lateral cricoarytenoid muscles are attached to the **muscular process** (posterolaterally on the posterior surface)
- ↳ Vocal ligament of true vocal cord is attached to the **vocal process** (anteriorly on the posterior surface)
- ↳ Vocal ligament of false vocal cord is attached to the **upper depression** (on the anterolateral surface)
- ↳ **Aryepiglottic Fold** (contains the aryepiglotticus muscle, and the pair of cuneiform cartilages):



➤ **Corniculate Cartilages (paired) and Cuneiform Cartilages (paired):**



They are suspended in the aryepiglottic fold to add a bony strength to help in closure of the laryngeal inlet

They mark the end of the aryepiglottic fold

➤ **Cricothyroid ligament (intrinsic):**

➤ Also named the cricovocal membrane, cricothyroid membrane or conus elasticus

➤ The upper free margin thickens and attaches to the vocal process of the arytenoid cartilage posteriorly, and the angle of thyroid cartilage anteriorly, forming the **vocal ligament**, which is under the vocal fold (**true vocal cord**) of the larynx

➤ The cricothyroid ligament is also thickened anteriorly in the midline to form the **median cricothyroid ligament**



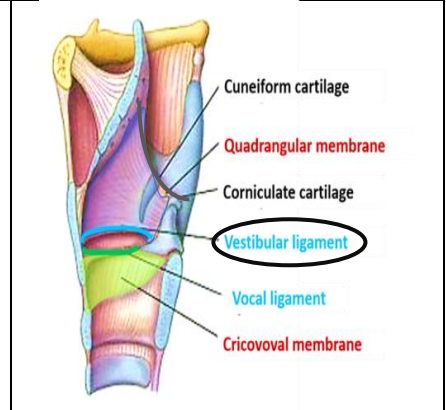
❖ **Membranes and Ligaments of the Larynx:**

Extrinsic	Intrinsic
	Lateral view (with left part of the thyroid cartilage being cut)
	Superior view

➤ **Quadrangular ligament (intrinsic):**

➤ The free upper margin extends from the aryepiglottic fold

➤ The free lower margin thickens and forms the **vestibular ligament** under the vestibular fold (**false vocal cord**)



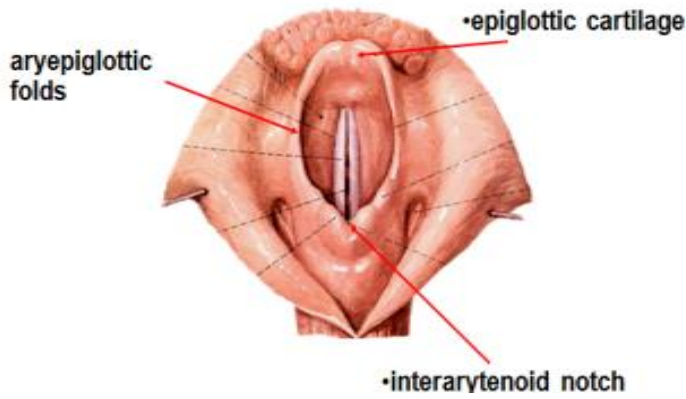
❖ **Joints of the Larynx:**

Cricothyroid	Cricoarytenoid
	<p>True Vocal Cords (= "Folds" or "Ligaments")</p> <p>(A) Vocal folds in closed position: closed glottis (B) Vocal folds in open position: open glottis</p>
<p>It enables the thyroid cartilage to move forward and tilt downwards on the cricoid cartilage. This movement effectively lengthens and puts tension on the vocal ligaments.</p>	<p>If the joint moves internally (toward the midline) the vocal cord (lateral cricoarytenoid muscle) adducts, whereas if it moves externally the vocal cord (posterior cricoarytenoid muscle) abducts</p>

❖ **Laryngeal Cavity:**

➤ **Laryngeal Inlet:**

inlet of larynx — bounded by upper border epiglottic cartilage, aryepiglottic folds and interarytenoid notch



**NOTE:** The inter-arytenoid notch is between the two corniculate tubercles

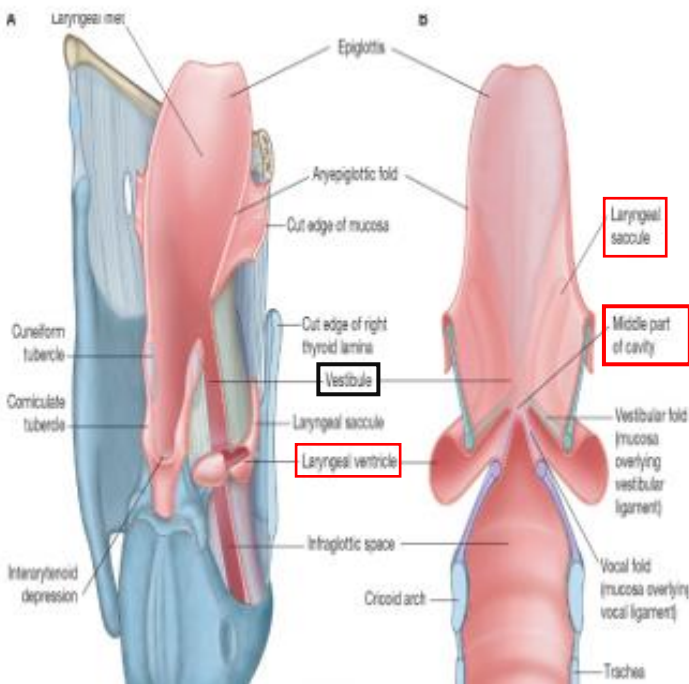
➤ **Inferior Opening:**

It is completely encircled by the cricoid cartilage, and continuous with the lumen of the trachea

➔ **Laryngeal Inlet vs. Inferior Opening:**

Laryngeal Inlet	Inferior Opening
Oblique	Horizontal in position
Can be closed by downward movement of the epiglottis	Continuously open

❖ **Parts (Divisions) of the Larynx:**



❖ **True Vocal Cords vs. False Vocal Cords:**

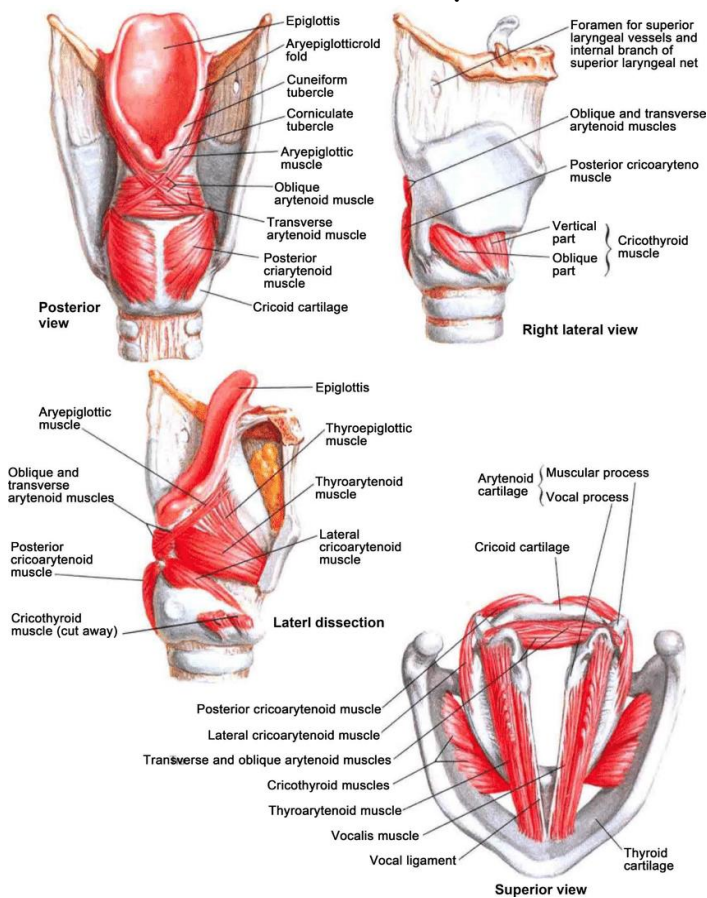
True Vocal Cords (Vocal Cords)	False Vocal Cords (Vestibular Cords)
Extends on each side of the larynx, between the vocal process of the arytenoid and the back of the anterior lamina of thyroid cartilage (It's the thickened, upper free edge of the cricothyroid membrane "vocal folds" + Vocalis muscle)	The lower free edge of quadrangular membrane
Inferior to the vestibular cords	Superior to the vocal cords
Non-vascularized (i.e., white in color)	Vascularized (i.e., red in color)
Movable	Fixed and not movable
Stratified squamous non-keratinized epithelium [+ No submucosa]	Respiratory mucosa (pseudostratified ciliated columnar epithelium with goblet cells)
<b>Laryngeal Cavity</b>	

## ❖ Muscles of the Larynx:

Intrinsic		Extrinsic
Internal	External	
-Posterior and lateral cricoarytenoid -Transverse arytenoid -Thyroarytenoid (vocalis) -Oblique arytenoid -Aryepiglotticus	Cricothyroid	Suprahyoid and infrahyoid

<b>Oblique arytenoid</b>	Muscular process of one arytenoid	Apex of the opposite arytenoid	Narrows the inlet by adducting aryepiglottic folds
<b>Ary-epiglotticus</b>	Between arytenoid and epiglottis, it lies within the aryepiglotticus fold		Narrows the inlet when acting with oblique arytenoid
<b>Thyro-arytenoid (vocalis)</b>			Relaxes the true vocal cords (low pitch)
<b>Cricothyroid</b>			
<b>Oblique part</b> (runs in a posterior direction)	Arch of cricoid	Inferior horn of thyroid	Tenses the true vocal cords (high pitch) by pulling the thyroid cartilage forward and rotate it down relative to the cricoid cartilage
<b>Straight part</b> (runs more vertically and upward)	Arch of cricoid	Postero-inferior margin of the thyroid lamina	

## ➤ Intrinsic Muscles of the Larynx:



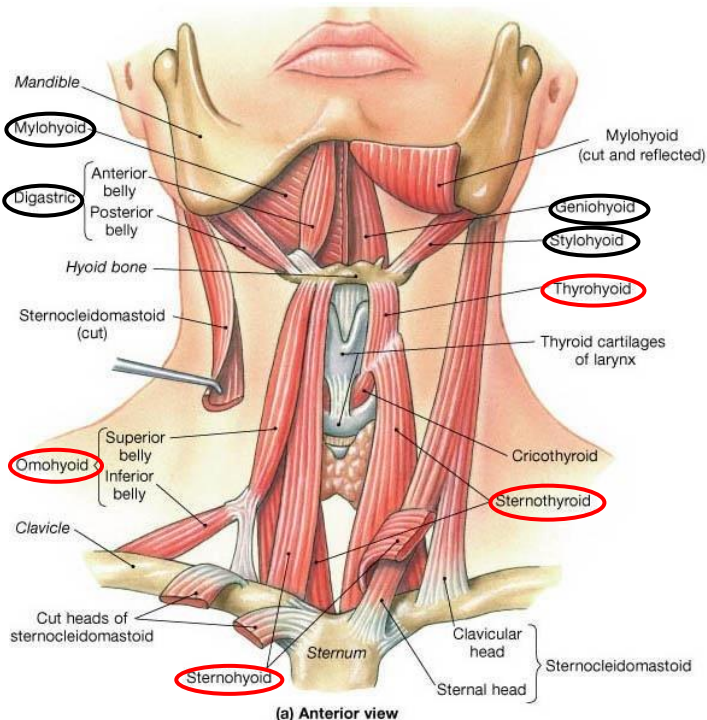
[All intrinsic muscles of the larynx are innervated by the recurrent laryngeal nerve, except for one lonely external muscle, the **cricothyroid muscle**, which is innervated by the external laryngeal nerve]

## ➤ Extrinsic Muscles of the Larynx:

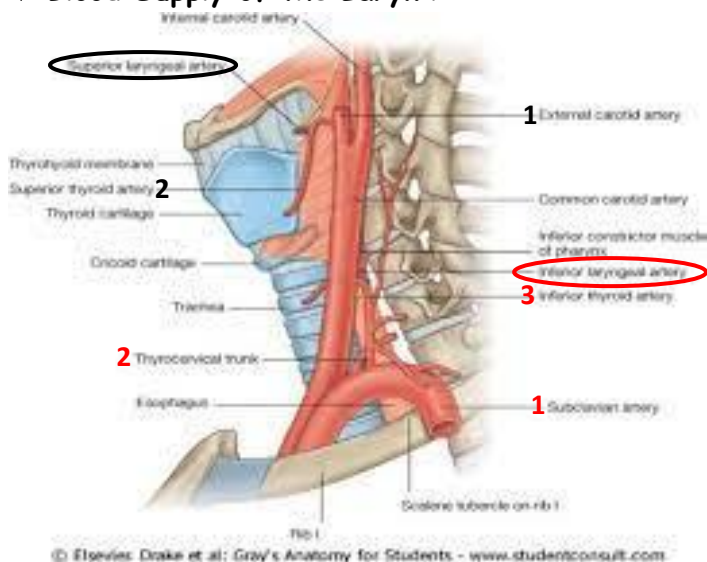
**Suprahyoid** [assisted by Stylopharyngeus, Salpingopharyngeus, and Palatopharyngeus] for pulling the larynx upward and aid in closure of inlet.

**Infrahyoid** (strap muscles of the neck) for depressing the larynx downward.

Muscle	Origin	Insertion	Action
<b>Posterior cricoarytenoid</b>	Posterior surface of cricoid lamina	Muscular process of arytenoid	Pulling them externally backwards and upwards abducts the vocal cords
<b>Lateral cricoarytenoid</b>	Lateral surface of cricoid lamina	=	Pulling them internally adducts the vocal cords
<b>Transverse arytenoid</b>	Back and medial surface of arytenoid cartilage	Back and medial surface of opposite arytenoid cartilage	Closes posterior part of rima glottidis by approximating arytenoid cartilages (inter-arytenoid area)



## ❖ Blood Supply of the Larynx:

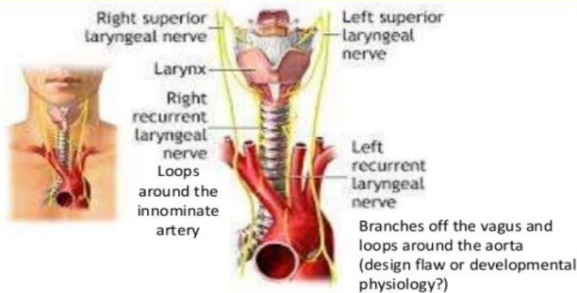


## ❖ Nerve Supply of the Larynx:

Airway A & P: the pharynx  
SLN & RLN

**Superior Laryngeal nerve:**  
Internal → sensory above cords  
External → motor to cricothyroid muscle

**Recurrent Laryngeal nerve:**  
Sensory → below glottis  
Motor → all other muscles of larynx



## 👉 NOTES:

👉 **Superior laryngeal artery pierces the thyrohyoid membrane with the internal laryngeal nerve**

👉 Recurrent laryngeal nerve passes between the branches of the inferior thyroid artery and then with the inferior laryngeal artery. Together, **inferior laryngeal artery and recurrent laryngeal nerve**, they ascend in the groove between the esophagus and trachea, entering the larynx by passing deep to the margin of the inferior constrictor muscle of the pharynx.

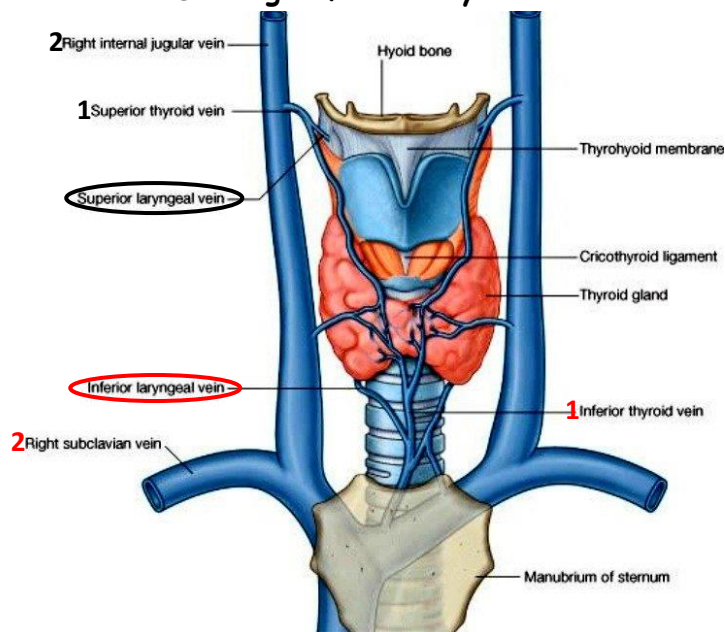
## ❖ Injuries to Recurrent Laryngeal Nerves:

Injury	Speech	Respiration
Unilateral Complete	-No change-	-No change-
Bilateral Complete	Loss	Difficulty
Unilateral Partial	Hoarseness	Difficulty
Bilateral Partial	Loss	Suffocation

## ❖ Injuries to External Laryngeal Nerves:

Injury	Speech	Respiration
Unilateral	Weakness	-No change-
Bilateral	Hoarseness	-No change-

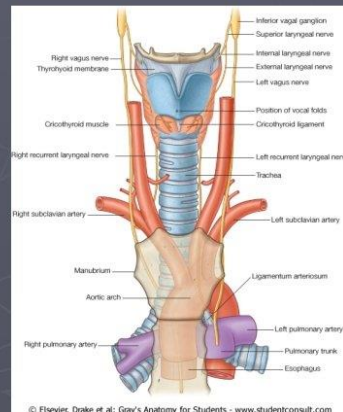
## ❖ Venous Drainage of the Larynx:



## ❖ Relations of the Larynx:

### Relations of the larynx

- ▶ On each side :  
▶ **Carotid sheath (contents), and lateral lobe of the thyroid gland**
- ▶ Posterior:  
▶ **Pharynx and the right recurrent laryngeal nerve**
- ▶ Anterior:  
▶ **Skin, fascia and its contents, 4 infra-hyoid muscles**



## ❖ Lymphatic Drainage of the Larynx:

👉 Above the true vocal cords, lymphatics end in the **deep cervical lymph nodes** through the lymph nodes associated with superior laryngeal artery

👉 Below the true vocal cord, lymphatics end in the **paratracheal lymph nodes** (on the cricothyroid ligament or upper trachea) through the lymph nodes associated with inferior thyroid artery