

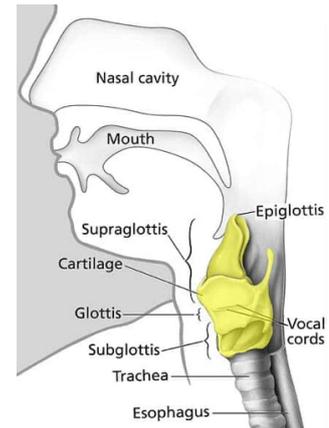
THE LARYNX

لَا حَوْلَ وَلَا قُوَّةَ إِلَّا بِاللَّهِ

"من كنوز الجنة"

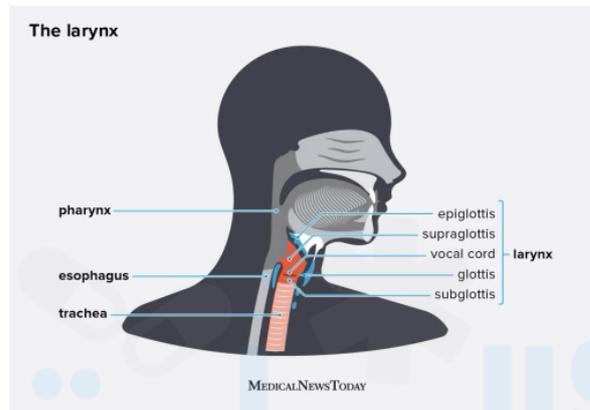
Definition and Function

- The larynx is an organ that:
- Acts as a protective sphincter at the inlet of the air passages.
- Is responsible for voice production (phonation).



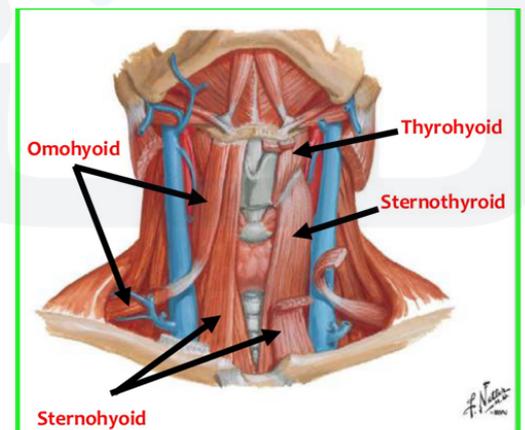
Location

- Situated below the tongue and hyoid bone.
- Lies between the great blood vessels of the neck.
- Located at the level of **C4, C5, and C6 vertebrae**.
- Opens above into the laryngeal part of the pharynx and is continuous below with the trachea.



Relations

- **Anteriorly:** Covered by the **infrahyoid (strap) muscles**:
- **Thyrohyoid**
- **Omohyoid**
- **Sternohyoid**
- **Sternohyoid**
- **Laterally:** Related to the **thyroid gland**.



Framework of the Larynx

Formed of:

- Cartilages (provide structure)
- Ligaments and membranes (connect the cartilages)
- Muscles (move the cartilages)
- Mucous membrane (lines the interior)

Cartilages of the Larynx

Mnemonic 🌀 "Three Single, Three Paired"

Description	Cartilage	Type
Largest; 2 laminae meet in midline → <i>Adam's apple (laryngeal prominence)</i> . Posterior border → Superior cornu (up) and Inferior cornu (down) . Outer surface → Oblique line for muscle attachment.	1. Thyroid	Single
Signet-ring shaped (broad plate behind, narrow arch in front). Lies below thyroid cartilage. Upper border (posteriorly) : facet for arytenoid articulation.	2. Cricoid	
Leaf-shaped elastic cartilage behind tongue root. Stalk attaches to thyroid cartilage. Sides attached to arytenoid by aryepiglottic folds . Upper edge is free.	3. Epiglottis	
Small, pyramidal , articulate with cricoid lamina . Each has: <ul style="list-style-type: none"> ■ Apex → articulates with corniculate cartilage. ■ Base → articulates with cricoid. ■ Vocal process → attachment for vocal ligament. ■ Muscular process → attachment for posterior & lateral cricoarytenoid muscles. 	4. Arytenoid	Paired
Small conical cartilages on top of arytenoids. Give attachment to aryepiglottic folds .	5. Corniculate	
Small rod-shaped cartilages within aryepiglottic folds , strengthen them.	6. Cuneiform	

Membranes and Ligaments

Special Notes	Connection / Description	Structure
Midline thickening → Median thyrohyoid ligament . Pierced by superior laryngeal vessels & internal laryngeal nerve .	Connects upper border of thyroid cartilage → hyoid bone .	Thyrohyoid membrane
Inferior margin → Vestibular ligament , which forms vestibular folds .	Between epiglottis & arytenoid cartilage .	Quadrangular membrane
—	Connects cricoid cartilage → first tracheal ring .	Cricotracheal ligament
Upper free margin → Vocal ligament (forms core of vocal folds). Anterior attachment: thyroid cartilage. Posterior attachment: vocal process of arytenoid.	Lower border attached to cricoid , upper border ascends on thyroid .	Cricothyroid ligament (conus elasticus)

Cartilages of the Larynx

There are **three single** and **three paired** cartilages.

🧠 Mnemonic: "TEC - ACC"

(Thyroid, Epiglottis, Cricoid – Arytenoid, Corniculate, Cuneiform)

1. Thyroid Cartilage

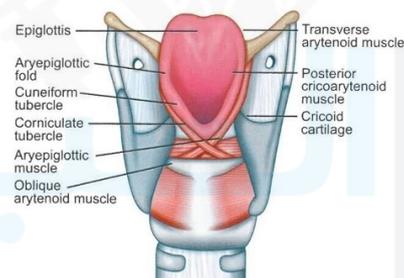
- The **largest** cartilage of the larynx.
- Formed of two laminae of **hyaline cartilage** that meet in the midline, forming a **prominent V angle (Adam's apple)**.
- The **posterior** border extends **upward as the superior cornu** and **downward as the inferior cornu**.
- On the **outer surface** of each lamina is an **oblique line for muscle attachment**.

2. Cricoid Cartilage

- Made of **hyaline cartilage** and shaped like a **signet ring** — **broad plate behind** and **shallow arch in front**.
- Lies **below the thyroid cartilage**.
- On the **upper border of its lamina (posteriorly)** is a facet for articulation with the **arytenoid cartilage**.

3. Arytenoid Cartilages

- **Two small pyramid-shaped** cartilages located **at the back of the larynx**.
- **Each articulates with the upper border of the cricoid lamina**.
- Each arytenoid has:
 - **An apex** that articulates with the **corniculate cartilage**.
 - **A base** that articulates with the **cricoid**.
 - **A vocal process** projecting **forward** for **vocal ligament attachment**.
 - **A muscular process** projecting **laterally** for **posterior and lateral cricoarytenoid muscle attachment**.



4. Corniculate Cartilages

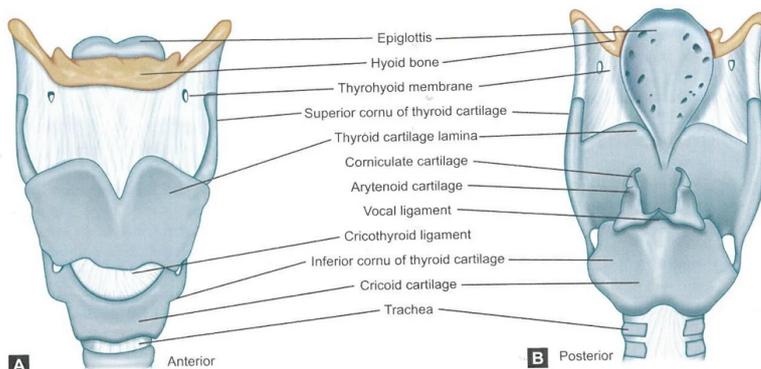
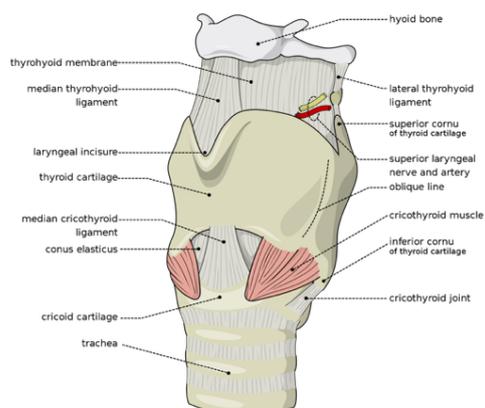
- **Two small conical cartilages** that **sit on top of the arytenoids**.
- They give attachment to the **aryepiglottic folds**.

5. Cuneiform Cartilages

- **Two small rod-shaped** cartilages found **within the aryepiglottic folds**, strengthening them.

6. Epiglottis

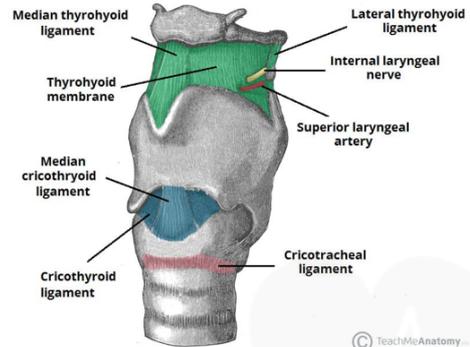
- A **leaf-shaped plate of elastic cartilage** located behind the root of the tongue.
- Its **stalk attaches to the back of the thyroid cartilage**.
- The **sides** are attached to the arytenoid cartilages by the **aryepiglottic folds**.
- The **upper edge is free**.
- **The mucous membrane covering it forms:**
 - **Median glossoepiglottic fold** on the tongue's posterior surface.
 - **Vallecula**: a depression on each side of this fold.
 - **Lateral glossoepiglottic folds** on the sides toward the pharynx.



Membranes and Ligaments

Thyrohyoid Membrane

- Connects the upper border of the thyroid cartilage to the hyoid bone.
- **Thickened in the midline** to form the **median thyrohyoid ligament**.
- Pierced on each side by the **superior laryngeal vessels** and **the internal laryngeal nerve** (branch of the **superior laryngeal nerve**).



Quadrangular Membrane

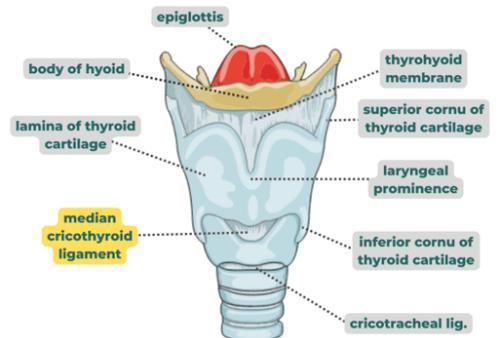
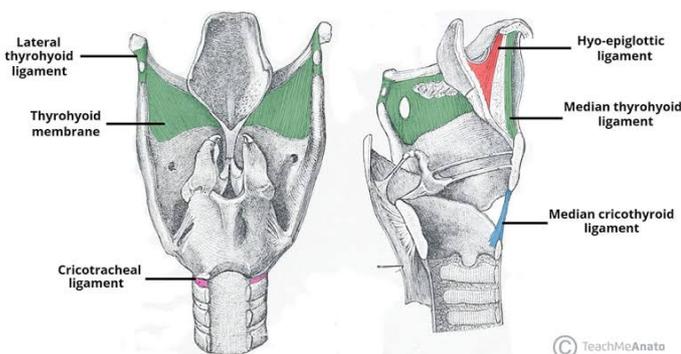
- Extends between the epiglottis and the arytenoid cartilage.
- Its **inferior margin** forms the **vestibular ligament**, which forms the core of the vestibular folds.

Cricotracheal Ligament

- Connects the **cricoid cartilage** to the **first tracheal ring**.

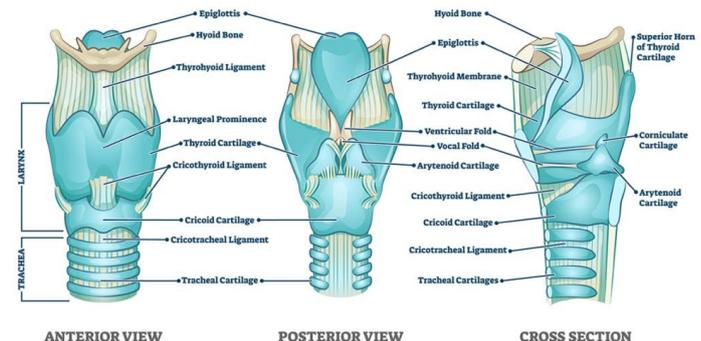
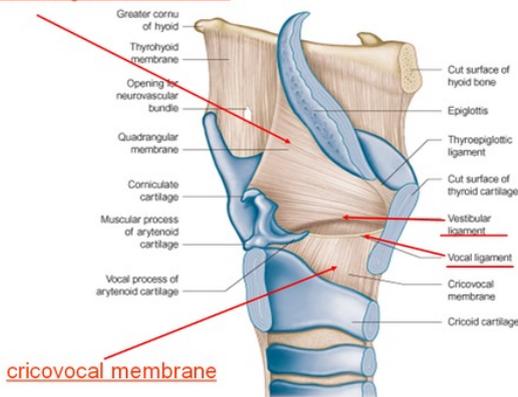
Cricothyroid Ligament (Conus Elasticus)

- Its **lower border** is attached to the **cricoid cartilage**, and the **upper border** ascends on the **thyroid cartilage**.
- **The upper free margin** forms the vocal ligament on each side.
- **The vocal ligament** forms the core of the vocal fold (true vocal cord).
- **The anterior end** attaches to the **thyroid cartilage**, and the **posterior end** attaches to the **vocal process of the arytenoid cartilage**.



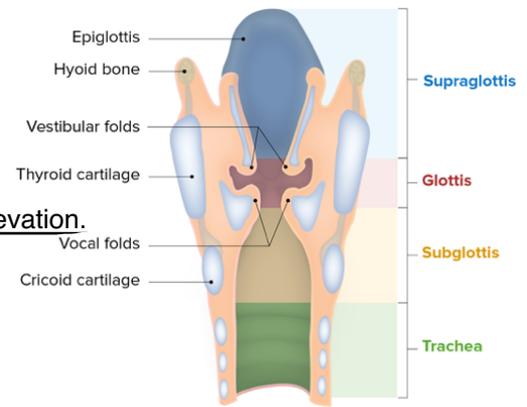
Larynx

Quadrangular membrane



Inlet of the Larynx

- Faces backward and upward into the laryngeal part of the pharynx.
- Boundaries:
- **Anteriorly:** Epiglottis
- **Laterally:** Aryepiglottic folds
- **Posteriorly:** Arytenoid and Corniculate cartilages
- The Cuneiform cartilage lies within the aryepiglottic fold and forms a small elevation.



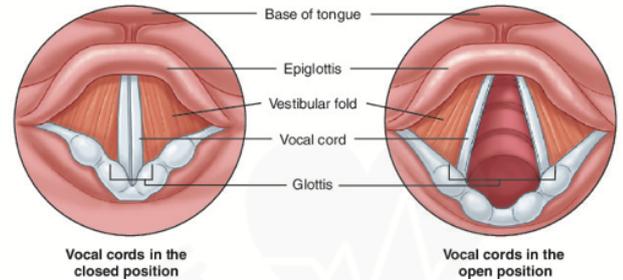
Laryngeal Folds

Vestibular Fold (False Vocal Cord)

- A **fixed** fold on each side of the larynx.
- Formed by mucous membrane **covering the vestibular ligament.**
- **Vascular** and **pink in color.**

Vocal Fold (True Vocal Cord)

- A **mobile** fold on each side, responsible for voice production.
- Formed by mucous membrane **covering the vocal ligament.**
- **Avascular** and **white in color.**
- Moves with respiration and is visible during laryngoscopy.



Rima Glottidis (Glottis)

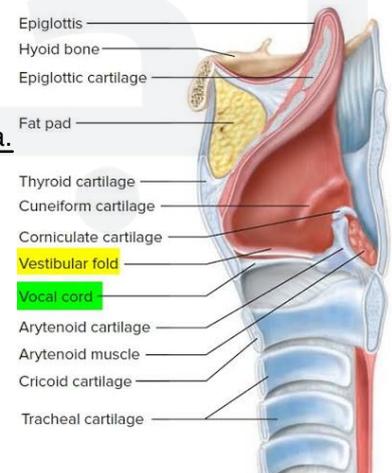
- The gap between the vocal folds.
- Boundaries:
- **Anteriorly:** Vocal folds
- **Posteriorly:** Medial surfaces of arytenoid cartilages.
- It is the narrowest part of the larynx (≈ 2.5 cm front to back).

Cavity of the Larynx

Extends from the inlet to the lower border of the cricoid cartilage, continuous with the trachea.

It is divided into three regions:

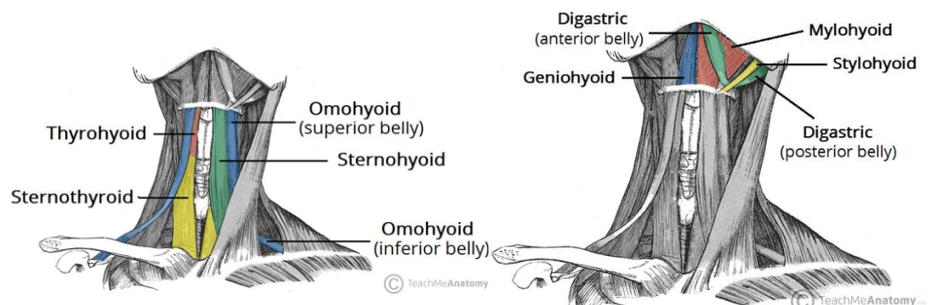
1. **Vestibule** – between the inlet and the vestibular folds.
2. **Middle region** – between the vestibular and vocal folds.
3. **Lower region** (infraglottic cavity) – between the vocal folds and the cricoid cartilage.



Muscles of the Larynx

Extrinsic Muscles

- Move the larynx as a whole.
- **Infrahyoid muscles** (sternohyoid, sternothyroid, omohyoid, thyrohyoid): **depress the larynx.**
- **Suprahyoid muscles** (mylohyoid, digastric, stylohyoid, geniohyoid): **elevate the larynx.**



Intrinsic Muscles

- Move the individual parts of the larynx, changing the **length** and **tension** of the **vocal cords** and the **size** of the **rima glottidis.**

Nerve Supply

- **Sensory Above Vocal Cords:** Internal laryngeal branch of the superior laryngeal nerve (from vagus).
- **Sensory Below Vocal Cords:** Recurrent laryngeal nerve (from vagus).
- **Motor Supply:**
- **All intrinsic muscles** except cricothyroid → **Recurrent laryngeal nerve.**
- **Cricothyroid** → **External laryngeal branch of the superior laryngeal nerve**

“All by Recurrent, except Cricothyroid by External.”

Nerve Supply of the Larynx

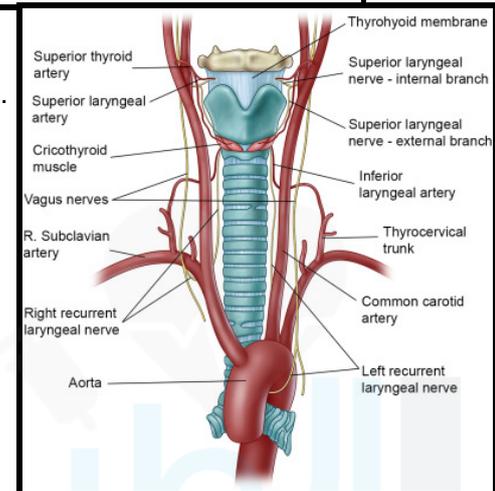
Origin	Nerve	Function
Branch of superior laryngeal nerve (vagus)	Internal laryngeal nerve	Sensory above vocal cords
From vagus	Recurrent laryngeal nerve	Sensory below vocal cords
Vagus	Recurrent laryngeal nerve	Motor (all intrinsic muscles except one)
Branch of superior laryngeal nerve (vagus)	External laryngeal nerve	Motor (cricothyroid only)

Blood Supply

- **Upper half of larynx:** **Superior laryngeal artery** (from **superior thyroid artery**).
- **Lower half of larynx:** **Inferior laryngeal artery** (from **inferior thyroid artery**).

Lymph Drainage

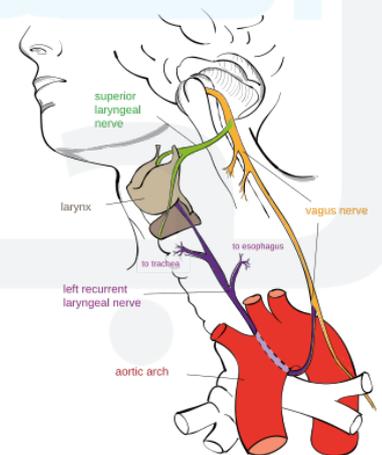
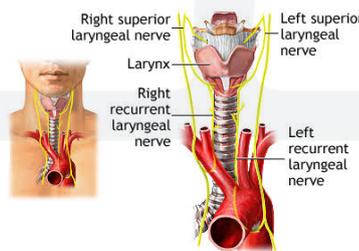
- Drains into the **deep cervical lymph nodes**.



Important Branches of the Vagus Nerve in the Neck

Recurrent Laryngeal Nerve

- **Right side:** Loops around the first part of the subclavian artery.
- **Left side:** Loops around the arch of the aorta.
- Closely related to the **inferior thyroid artery**.
- Supplies:
- **All intrinsic muscles except cricothyroid.**
- Mucosa below the vocal cords.
- Mucosa of the upper part of the trachea.

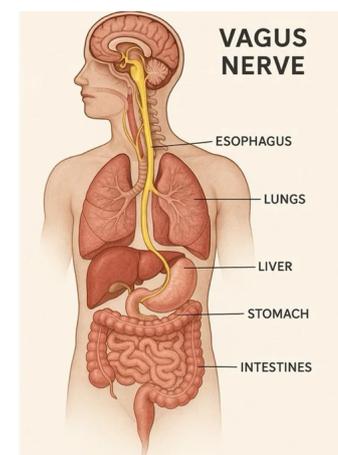


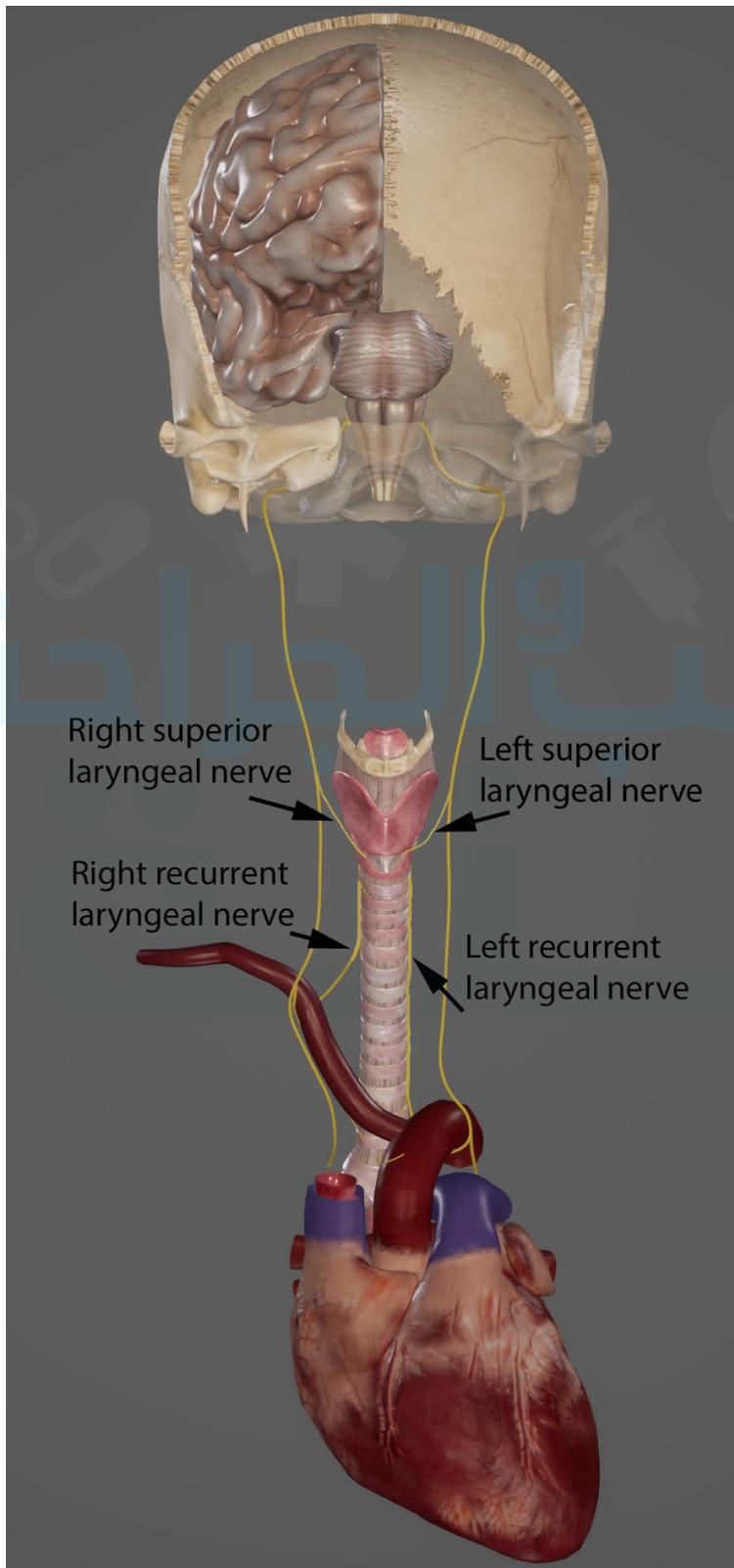
Vagus Nerve Injury

- **Injury to pharyngeal branches** → Dysphagia (difficulty swallowing).
- **Injury to recurrent laryngeal nerve** → Hoarseness and dysphonia (due to vocal fold paralysis).
- **Injury to both recurrent nerves** → Aphonia (loss of voice) and inspiratory stridor (harsh, high-pitched breathing sound).
- Causes include cancer of the larynx or thyroid gland or injury during thyroid or neck surgery.

Vagus Nerve Injury

Result	Site of Injury
Dysphagia (difficulty swallowing)	Pharyngeal branches
Hoarseness, Dysphonia (paralysis of vocal folds)	Recurrent laryngeal nerve
Aphonia (loss of voice) + Inspiratory stridor (harsh, high-pitched sound)	Both recurrent nerves
Cancer of larynx or thyroid, or surgical injury (thyroidectomy, neck surgery).	Causes





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