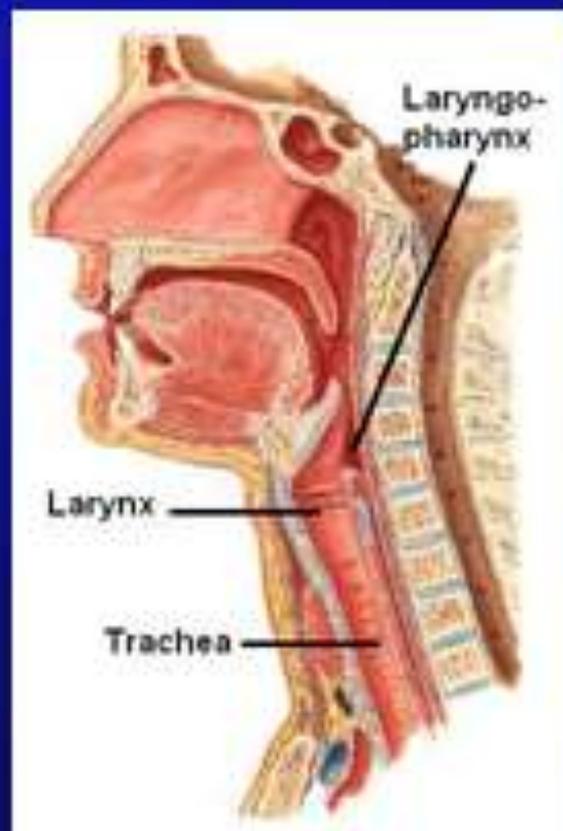


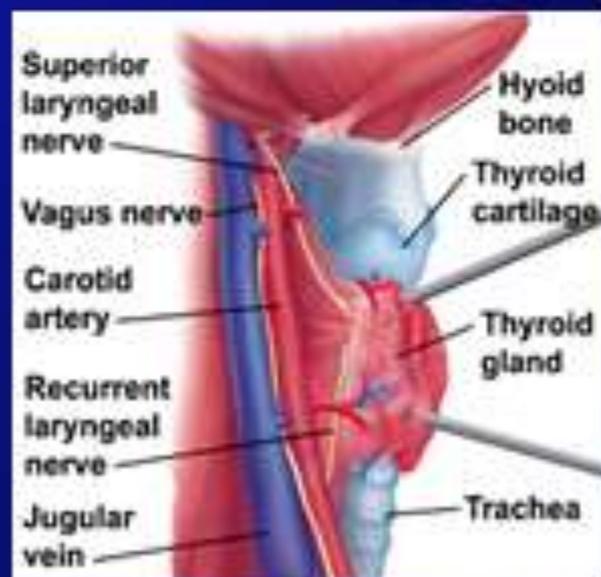
The Larynx

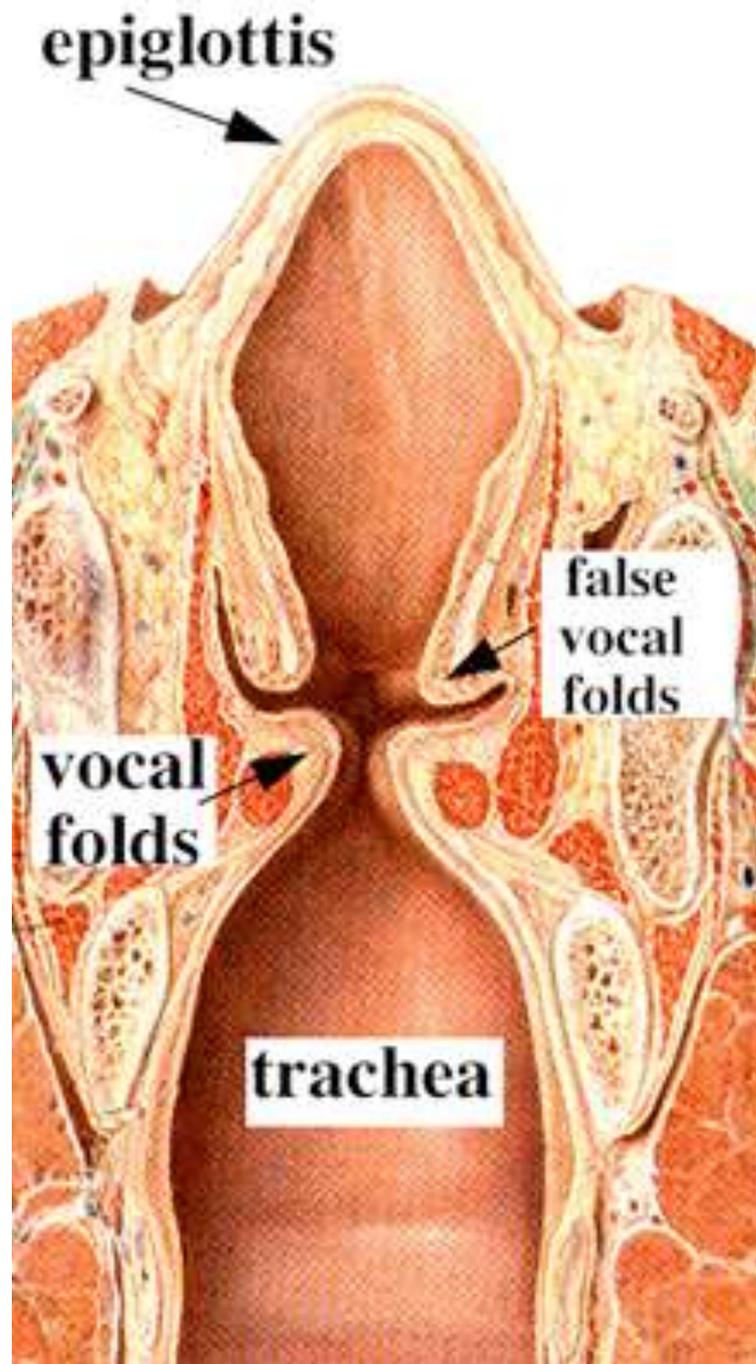
- The larynx is the **portion of the respiratory tract** containing the vocal cords
- A **2-inch-long**, tube-shaped organ, opens into the **laryngeal part of the pharynx** above and is continuous with the **trachea** below
- The larynx functions in:
 - **Deglutition** (swallowing)
 - **Respiration** (breathing)
 - **Phonation** (voice production)



The Larynx: Important Relations

- The larynx related to major critical structures:
 - Carotid arteries , jugular veins, and vagus nerve
 - Superior and inferior thyroid arteries
 - Superior and recurrent laryngeal nerves



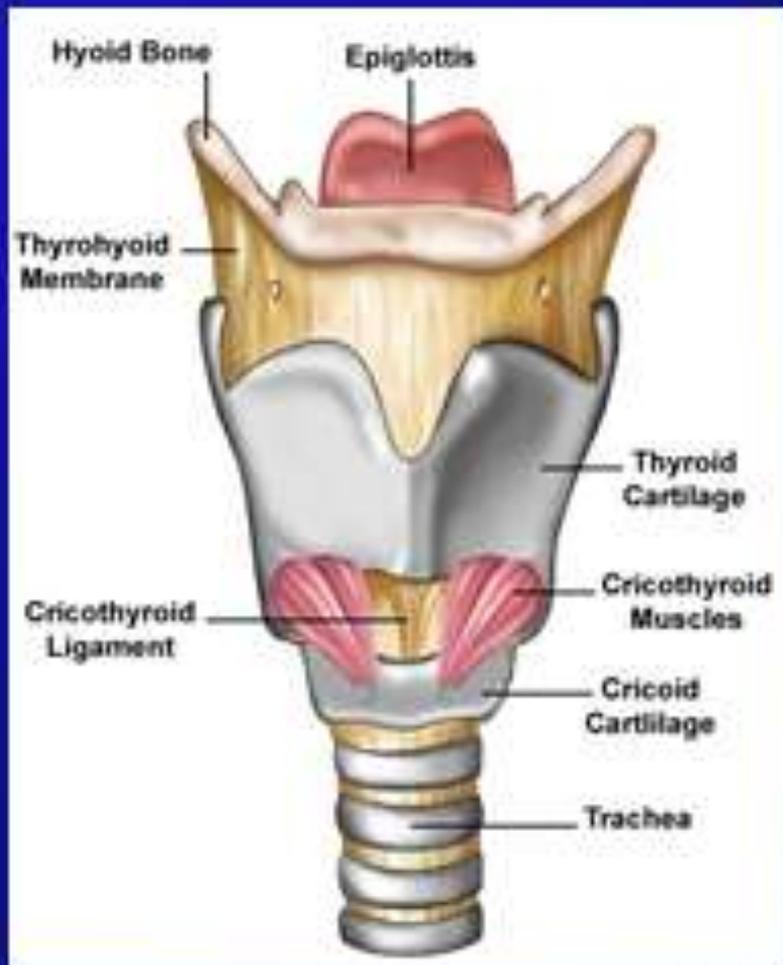


Subdivisions

- Vertically, the larynx is divided into 3 regions:
 - 1. Supraglottis – Includes the epiglottis, aryepiglottic folds, false vocal folds, arytenoids, and ventricle
 - 2. Glottis – true vocal folds
 - 3. Subglottis – below the true vocal folds to the inferior border of the cricoid cartilage

Structure

- The larynx consists of four basic components:
 - A cartilaginous skeleton
 - Membranes and ligaments
 - Intrinsic and extrinsic muscles
 - Mucosal lining



The Cartilages

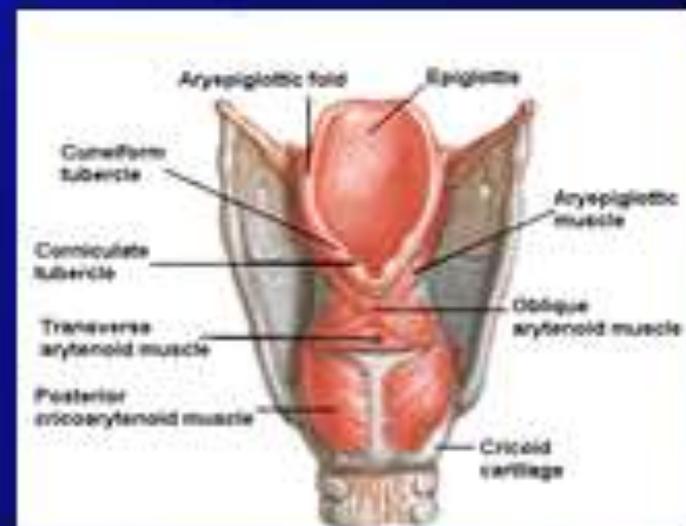
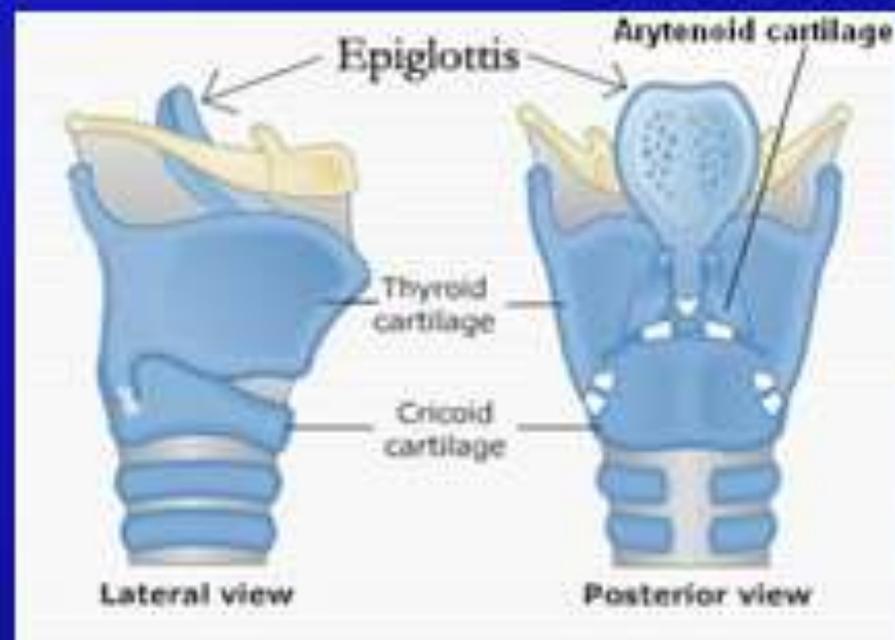
- The cartilaginous skeleton is comprised of :

- **Single Cartilages:**

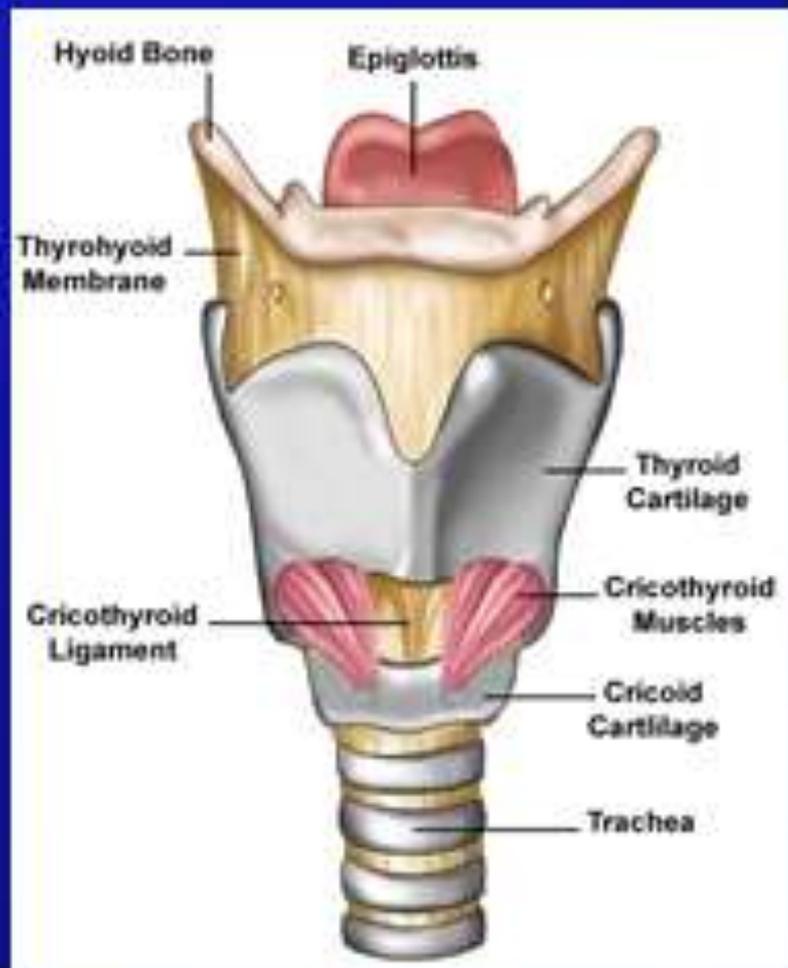
- Thyroid
- Cricoid
- Epiglottis

- **Paired Cartilages:**

- Arytenoid
- Corniculate
- Cuneiform



- All the cartilages, except the epiglottis, are of **hyaline** type.
- Epiglottis is formed of **elastic** cartilage
- The cartilages are:
 - Connected by **joints, membranes & ligaments**
 - Moved by **muscles**



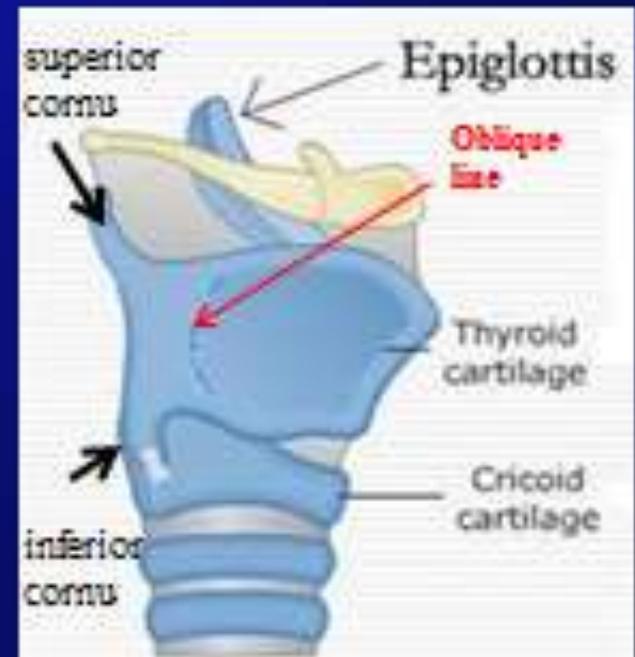
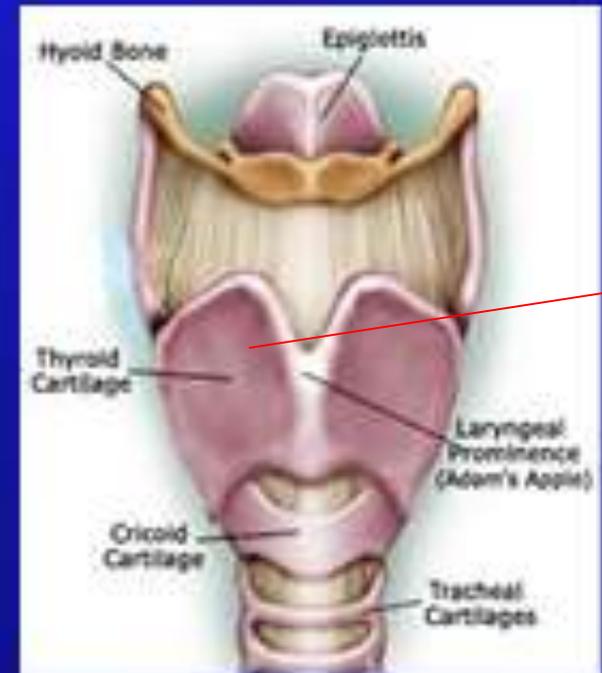
Thyroid Cartilage

Has two laminae, which meet in the midline and form a prominent angle, called **laryngeal prominence (Adam's apple)** and the **superior thyroid notch** at the rostral margin of the

The **posterior border** of each lamina forms **superior & inferior cornu (horns)**

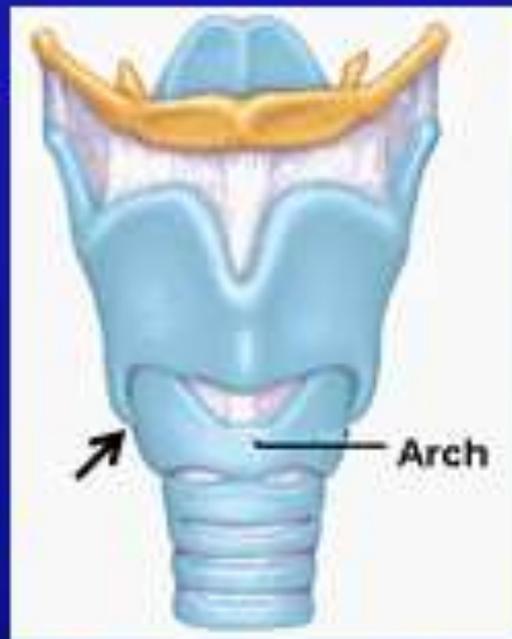
Outer surface of each lamina shows an **oblique line** which gives attachment to **thyrohyoid, sternothyroid & inferior constrictor of the pharynx**

The **superior border** gives attachment to the **thyrohyoid membrane**



Cricoid Cartilage

- Lies below the thyroid cartilage
- Forms a complete ring
- Has a **narrow anterior arch** & a **broad posterior lamina**
- Has an articular facet on its:
 - **Lateral surface** for articulation with **inferior cornu of the thyroid cartilage** (a synovial joint)
 - **Upper border** for articulation with base of **arytenoid cartilage** (a synovial joint)

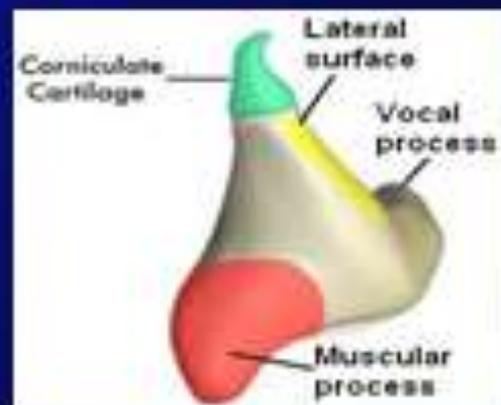


Arytenoid Cartilages

- Small, **pyramidal** in shape
- Situated at the back of the larynx

Has:

- A **base** articulating with the upper border of the cricoid cartilage
- An **apex** supporting the corniculate cartilage
- A **vocal process** projecting forward, gives attachment to the vocal ligament
- A **muscular process** projecting laterally, gives attachment to muscles



Corniculate & Cuneiform Cartilages

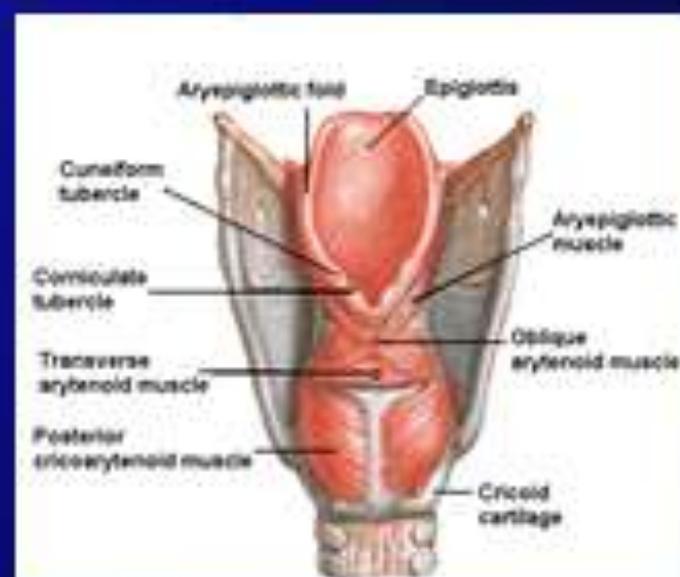
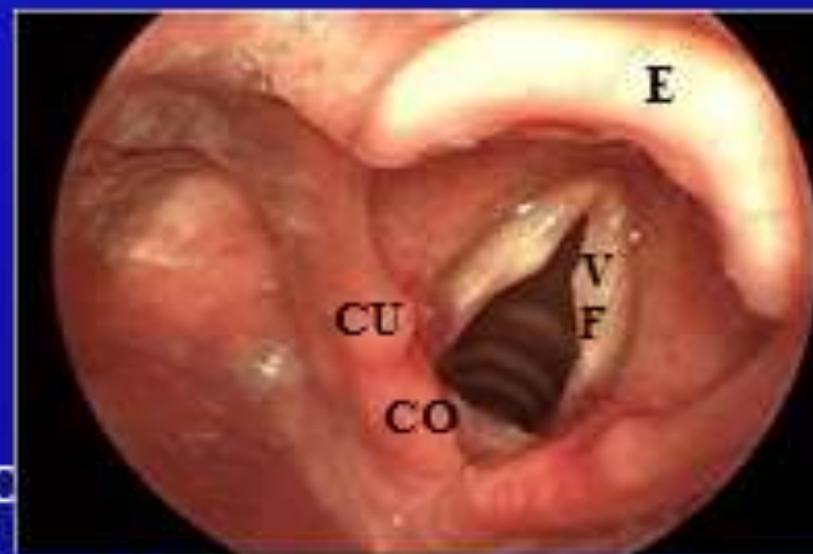
Corniculate Cartilages

- Small nodules
- Articulate with the apices of arytenoid cartilages

Cuneiform Cartilages

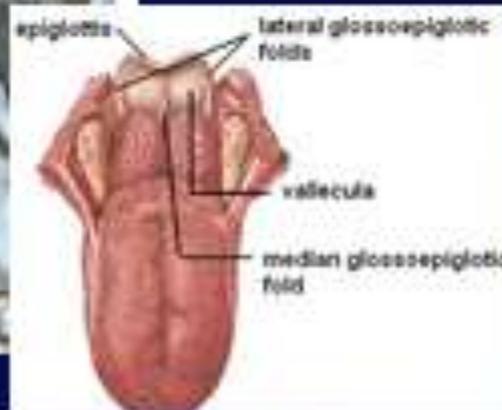
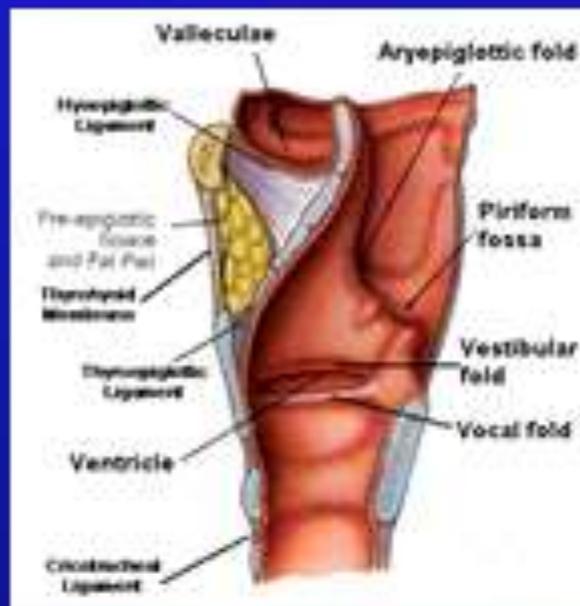
- Small rod shaped, placed in each aryepiglottic fold, producing a small elevation
- Do not articulate with any other cartilage

Serve as support for the aryepiglottic fold



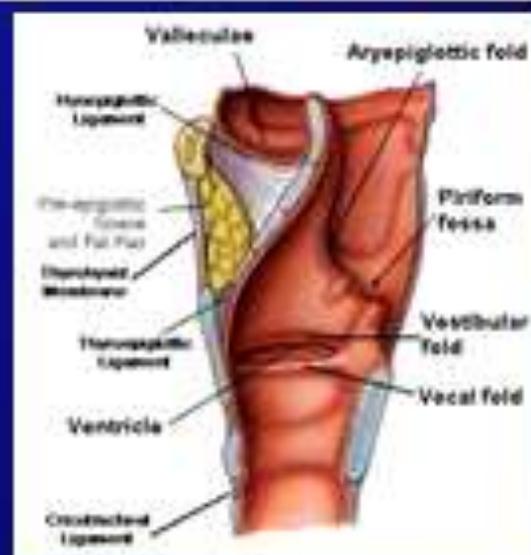
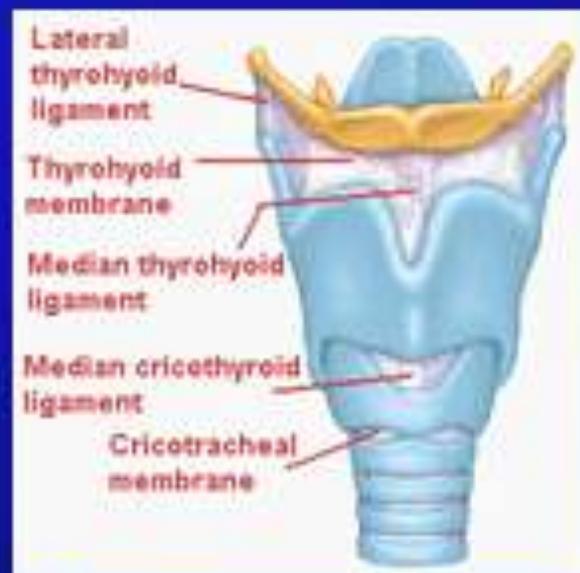
Epiglottis

- Leaf shaped, situated behind the root of the tongue
- Connected:
 - In front to the body of hyoid bone by the **hyoepiglottic ligament**
 - By its stalk to the back of thyroid cartilage by the **thyroepiglottic ligament**
- Upper edge is free.
- Laterally gives attachment to **aryepiglottic fold**
- Anteriorly mucosa is reflected onto the tongue forming three **glossoepiglottic folds & valleculae**



Membranes & Ligaments

- Thyrohyoid membrane, median & lateral thyrohyoid ligaments
- Median cricothyroid ligament
- Cricotracheal membrane
- Hyoepiglottic ligament
- Thyroepiglottic ligament



Laryngeal Inlet

- Faces backward and upward and opens into the laryngeal part of the pharynx
- The opening is bounded:
 - Anteriorly: by the upper margin of epiglottis
 - Posteriorly & below by arytenoid cartilages
 - Laterally by aryepiglottic folds



Mucous Membrane

- The cavity is lined with **ciliated columnar epithelium**
- The surface of **vocal folds**, because of exposure to continuous trauma during phonation, is covered with **stratified squamous epithelium**
- Contains many **mucous glands**, more numerous in the saccule (for lubrication of vocal folds)

Muscles:

Divided into two groups:

- **Extrinsic muscles:** divided into two groups
 - Elevators of the larynx
 - Depressors of the larynx
- **Intrinsic muscles:** divided into two groups
 - Muscles controlling the laryngeal inlet
 - Muscles controlling the movements of the vocal cords

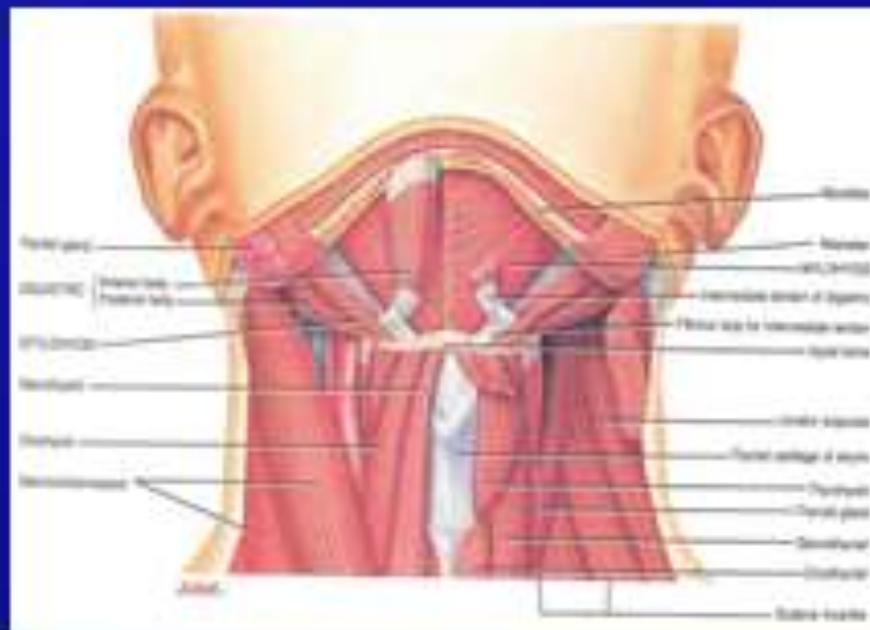
Elevators of the Pharynx

- The Suprahyoid Muscles
 - Digastric
 - Stylohyoid
 - Mylohyoid
 - Geniohyoid
- The Longitudinal Muscles of the Pharynx

- Stylopharyngeus
- Salpingopharyngeus
- Palatopharyngeus

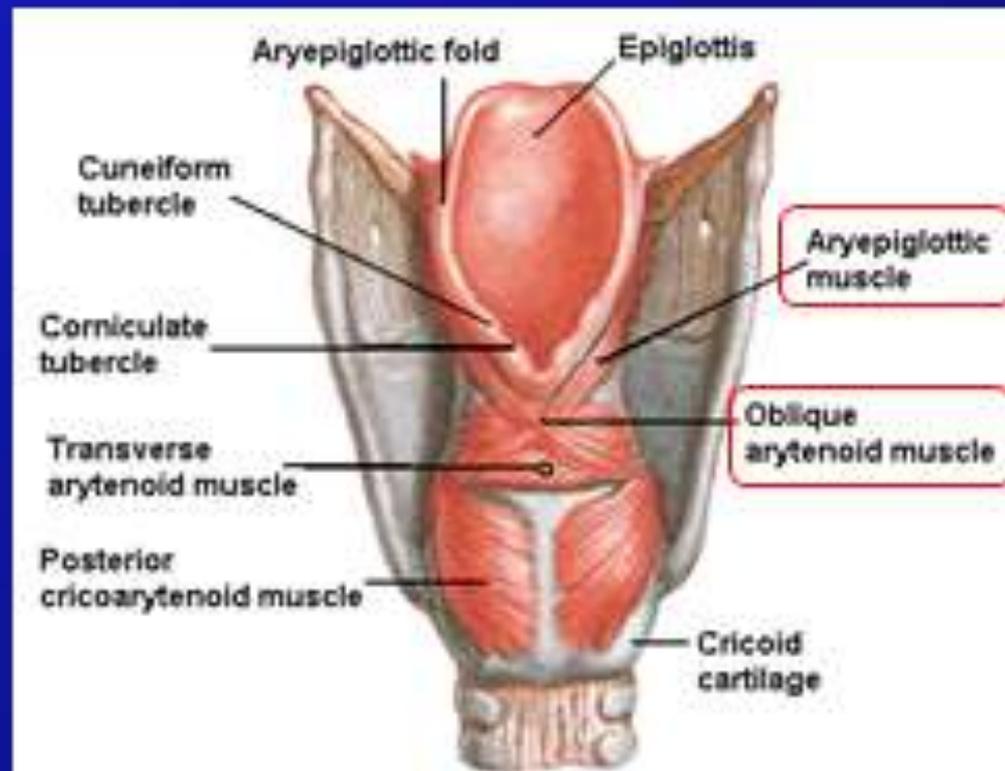
Depressors of the Pharynx:

- The Infrahyoid Muscles
 - Sternohyoid
 - Sternothyroid
 - Omohyoid



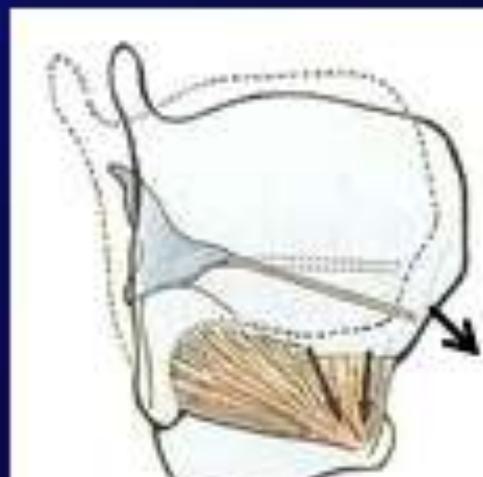
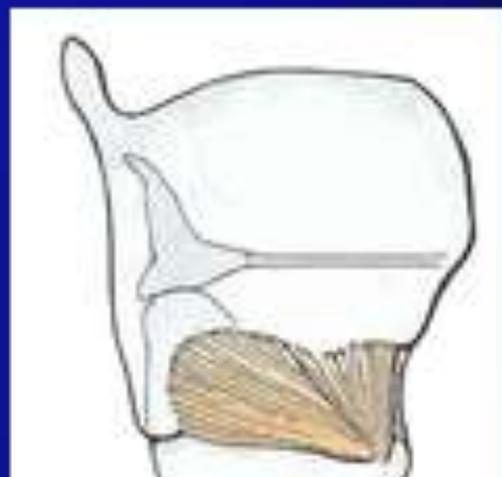
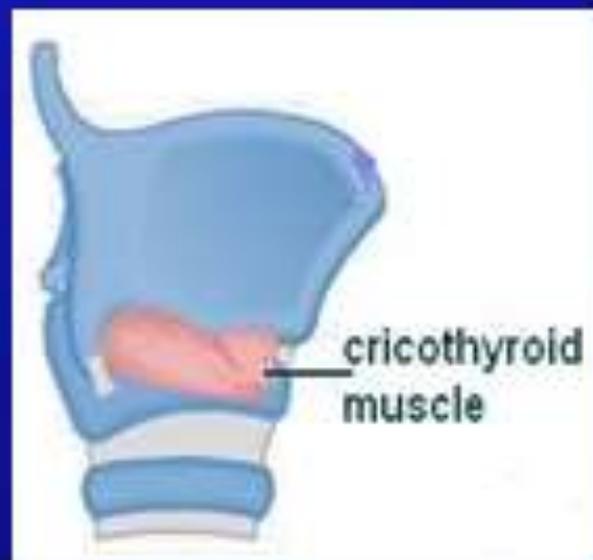
Muscles Controlling the Laryngeal Inlet

- Oblique arytenoid
- Aryepiglottic muscle



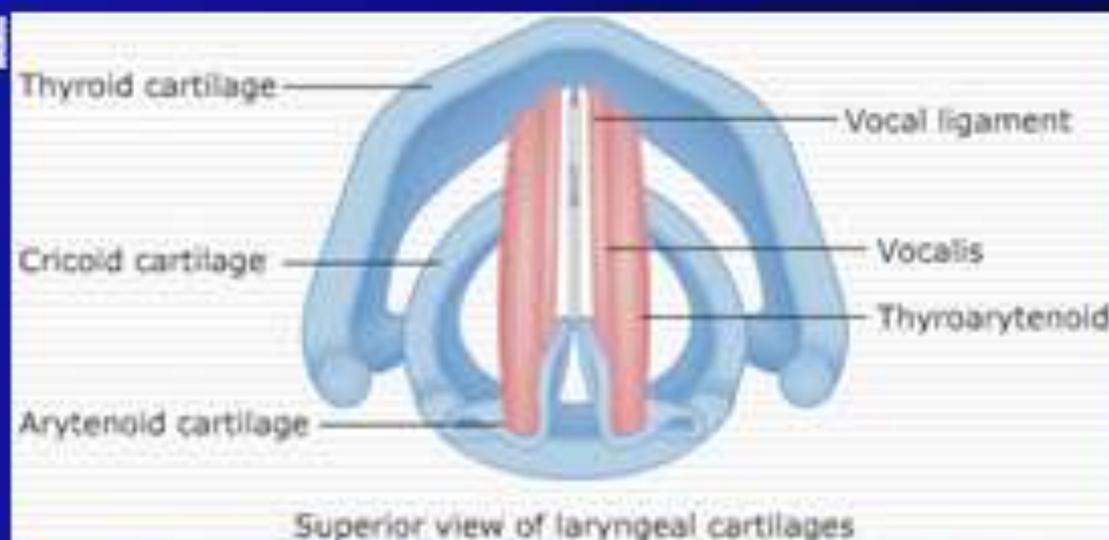
Muscle Increasing the Length & Tension of the Vocal Cords

- **Cricothyroid**: increases the distance between the **angle of the thyroid cartilage** & the **vocal processes of the arytenoid cartilages**, and results in **increase in the length & tension of the vocal cords**



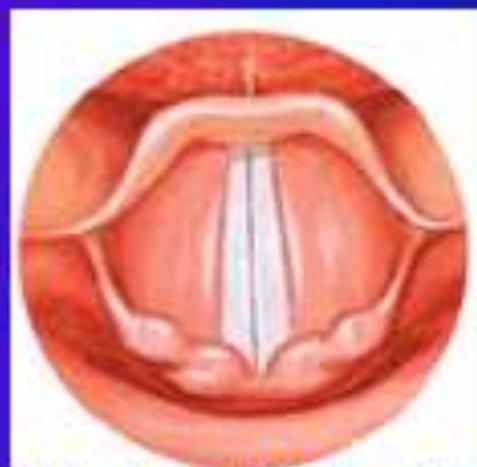
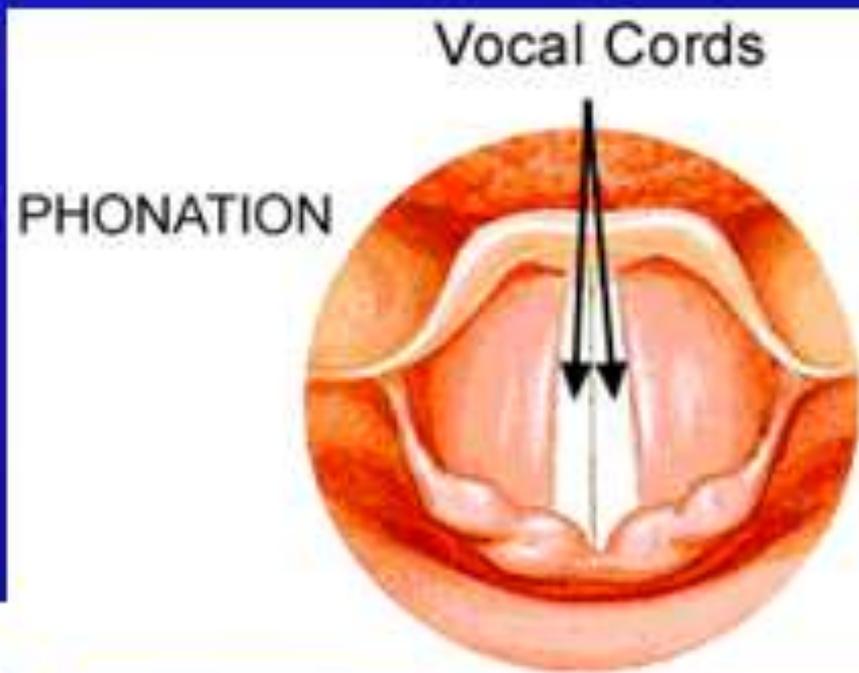
Muscle decreasing the Length & Tension of Vocal Cords

- **Thyroarytenoid (vocalis):** pulls the arytenoid cartilage forward toward the thyroid cartilage and thus **shortens** and **relaxes** the vocal cord

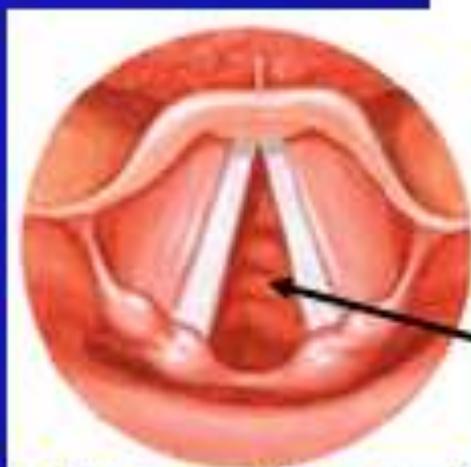


Movements of the Vocal Cords

- Adduction
- Abduction



Folds closed (adducted)



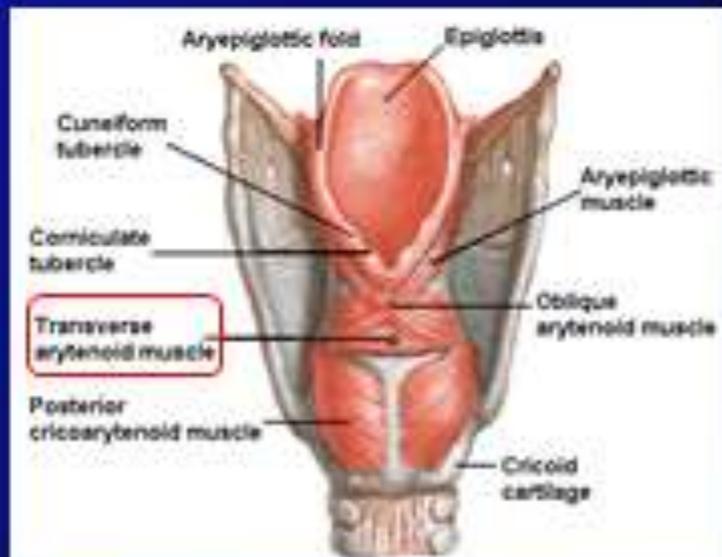
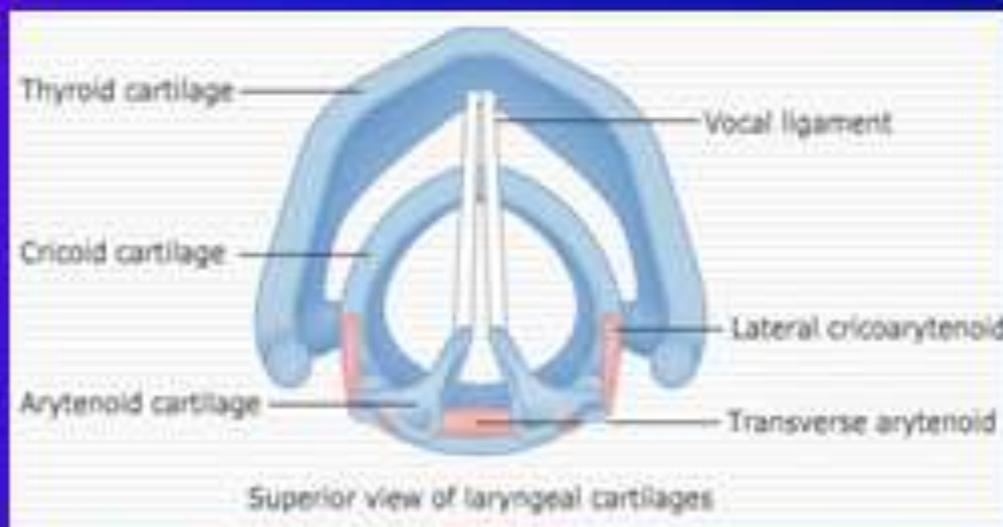
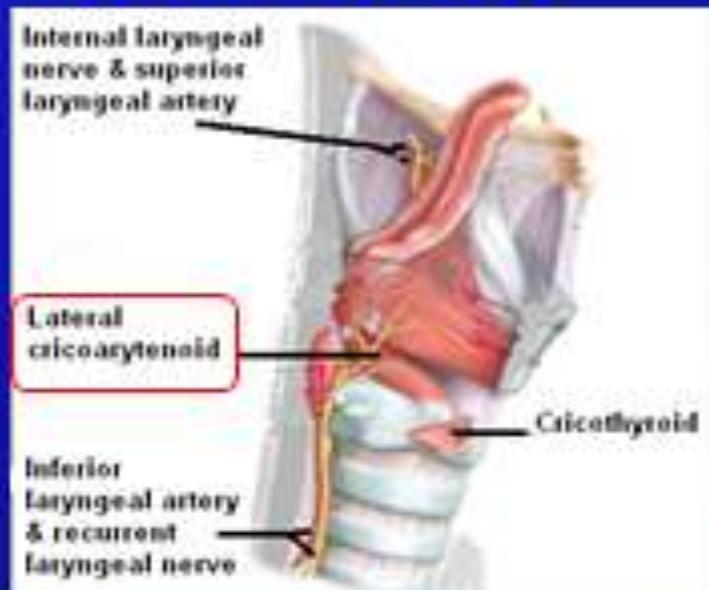
Folds open (abducted)

(View from above)

Glottis (space between folds)

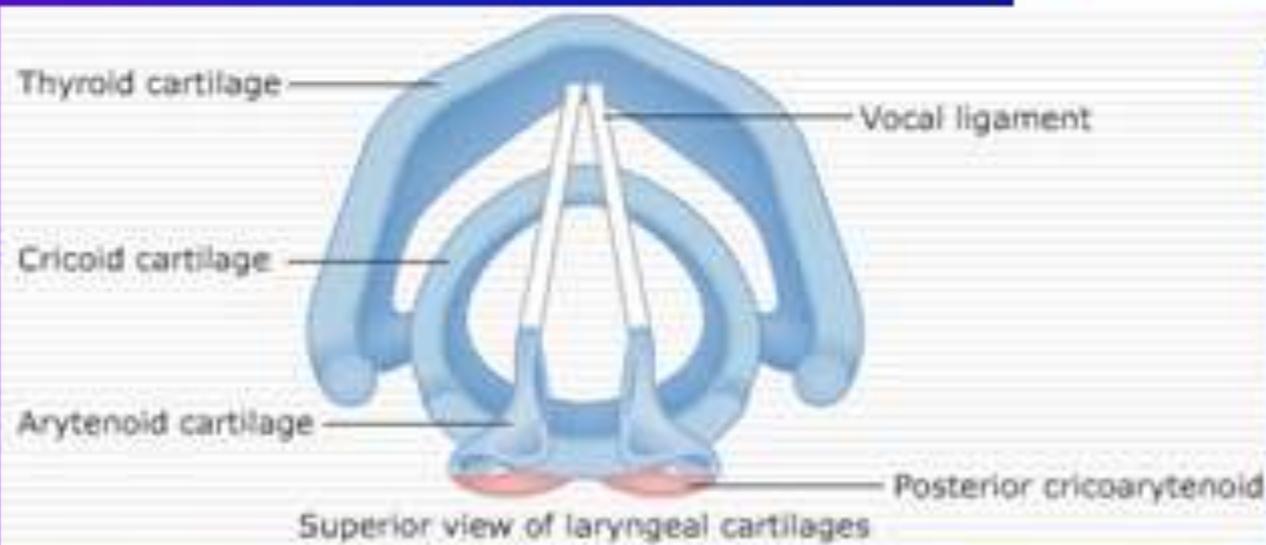
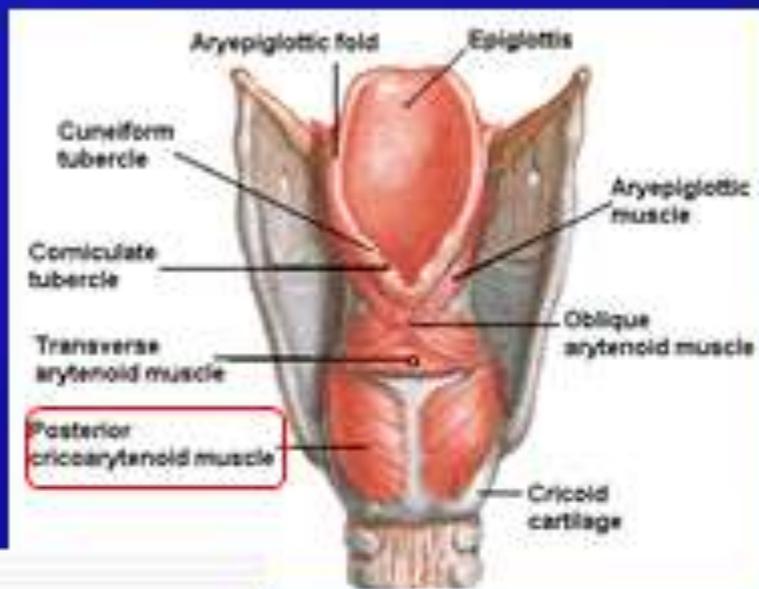
Adductors of the Vocal Cords

- Lateral cricoarytenoid
- Transverse arytenoid



Abductor of the Vocal Cords

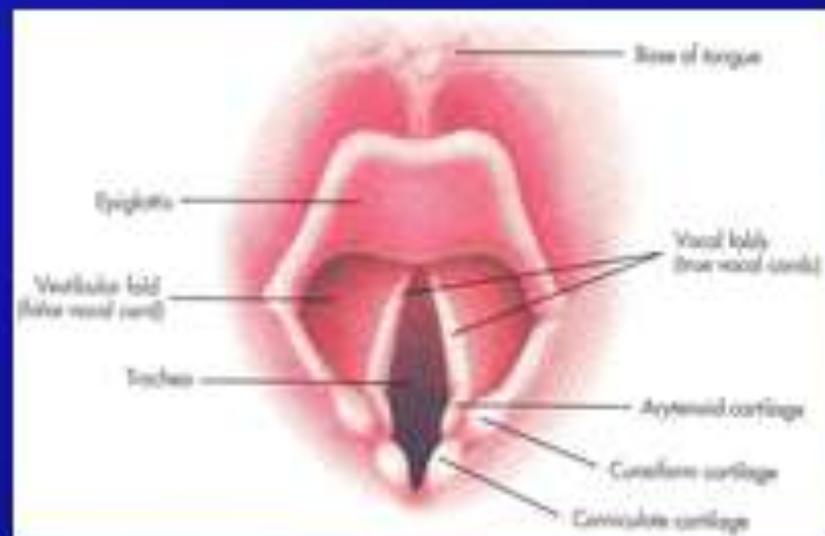
- Posterior cricoarytenoid



Sphincteric Function of the Larynx

There are two sphincters:

- **At the inlet:** used only during swallowing
- **At the rima glottis:** used in coughing and sneezing



Blood Supply & Lymph Drainage

- Arteries:

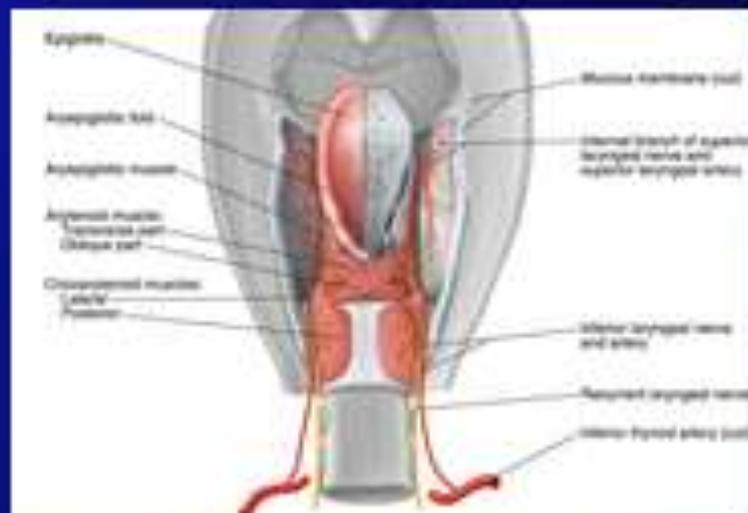
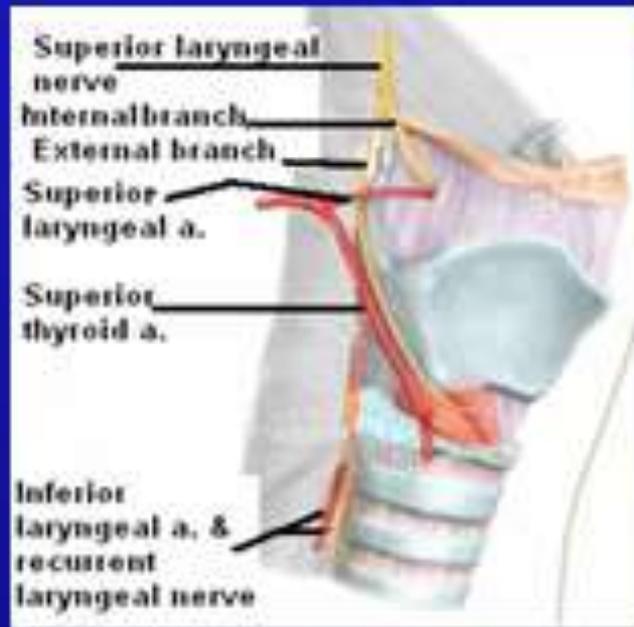
- Upper half: **Superior laryngeal artery**, branch of superior thyroid artery
- Lower half: **Inferior laryngeal artery**, branch of inferior thyroid artery

- Veins:

- Accompany the corresponding arteries

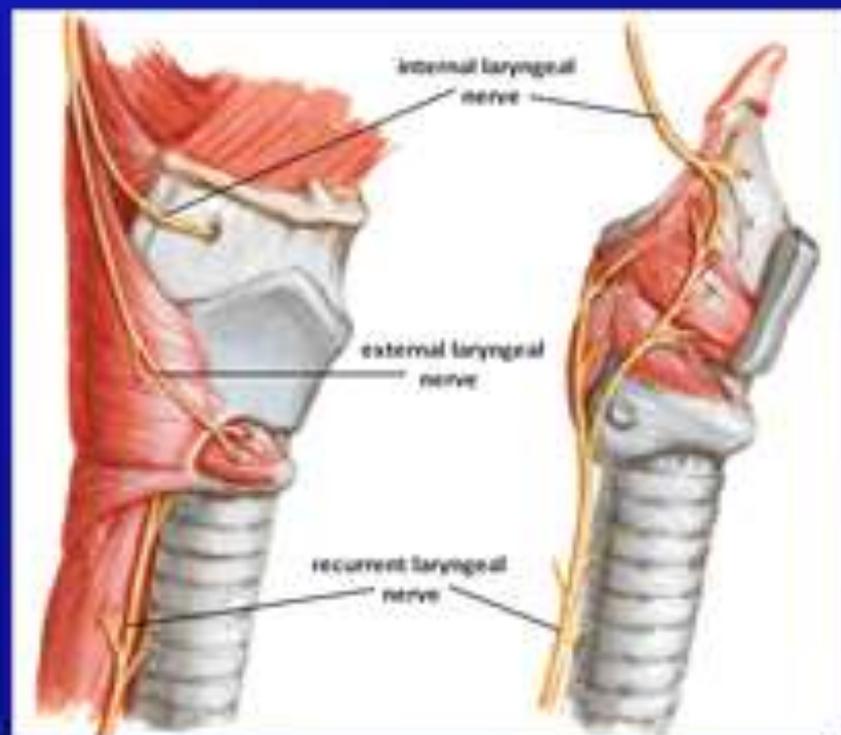
- Lymphatics:

- The lymph vessels drain into the **deep cervical lymph nodes**



Nerve Supply

- Sensory
 - Above the vocal cords: Internal laryngeal nerve, branch of the superior laryngeal branch of the vagus nerve
 - Below the vocal cords: Recurrent laryngeal nerve, branch of the vagus nerve
- Motor
 - All intrinsic muscles, except cricothyroid, supplied by the recurrent laryngeal nerve
 - The cricothyroid muscle is supplied by the external laryngeal nerve, a branch of the superior laryngeal branch of vagus nerve



Functions of larynx

- 1- protection of lower air passages
- 2- phonation
- 3- respiration
- 4- fixation of the chest wall during heavy weight lifting (closure of the laryngeal inlet aids in the increase of the intra-thoracic pressure which is mandatory during heavy weight lifting).

