

Larynx: Anatomy & Physiology

Larynx

Lies in front of the laryngo- pharynx from the level of the third to the sixth cervical vertebrae.

Consists of a framework of *cartilages*, connected by *ligaments* and *membranes*, lined by a *mucous membrane* and moved by *muscles*.

Infantile larynx

- Absolutely and relatively smaller.
- Funnel-shaped.
- Much softer therefore collapse more easily in forced inspiration.
- Lies high up under the tongue.
- The plane of its inlet is less oblique.

Laryngeal cartilages

Unpaired cartilages

Thyroid cartilage:

The largest, each half consists of:

1. *Ala (lamina)*

The two alae meet in the midline, forming an angle of about 90° in men, about 120° in women.

2. *Superior cornu.*

3. *Inferior cornu.*

Cricoid cartilage:

Thicker and stronger, a signet ring, narrow in front, broad behind.

Cartilage of epiglottis:

Rises up behind the tongue. It is a thin leaf-like sheet of elastic fibrocartilage.

Paired cartilages

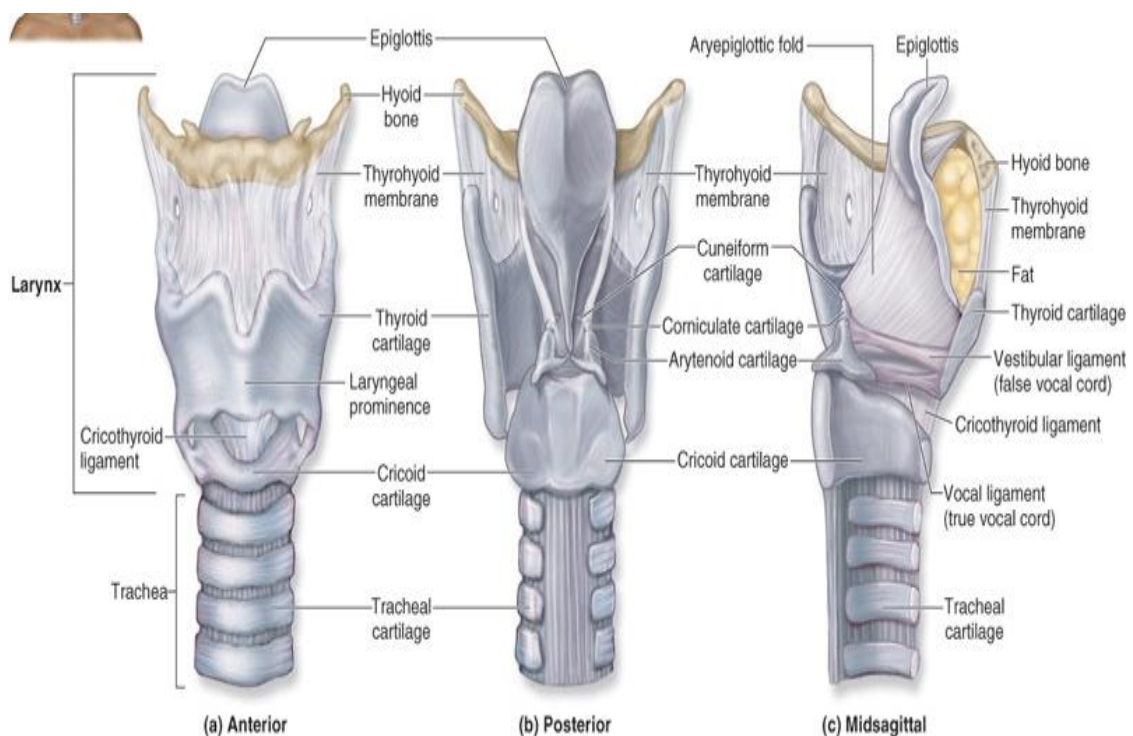
1. Arytenoid cartilages

Largest. pyramidal in shape.

- *Posterior surface* is triangular and concave. It extends laterally into a *muscular process*.
- *Anterolateral surface* is convex. It extends forward into a *vocal process*.
- *Medial surface* is narrow, smooth
- *Inferior surface* or base, is concave. It articulates with the cricoid cartilage.
- *Apex* curves backwards to articulate with the corniculate cartilage

2. Corniculate cartilages

3. Cuneiform cartilages



Laryngeal joints

The two important joints

1. *Crico-thyroid joint*
2. *Crico-arytenoid joint*

synovial joints, with two movements: *Rotation & Gliding*.

Laryngeal ligaments and membranes

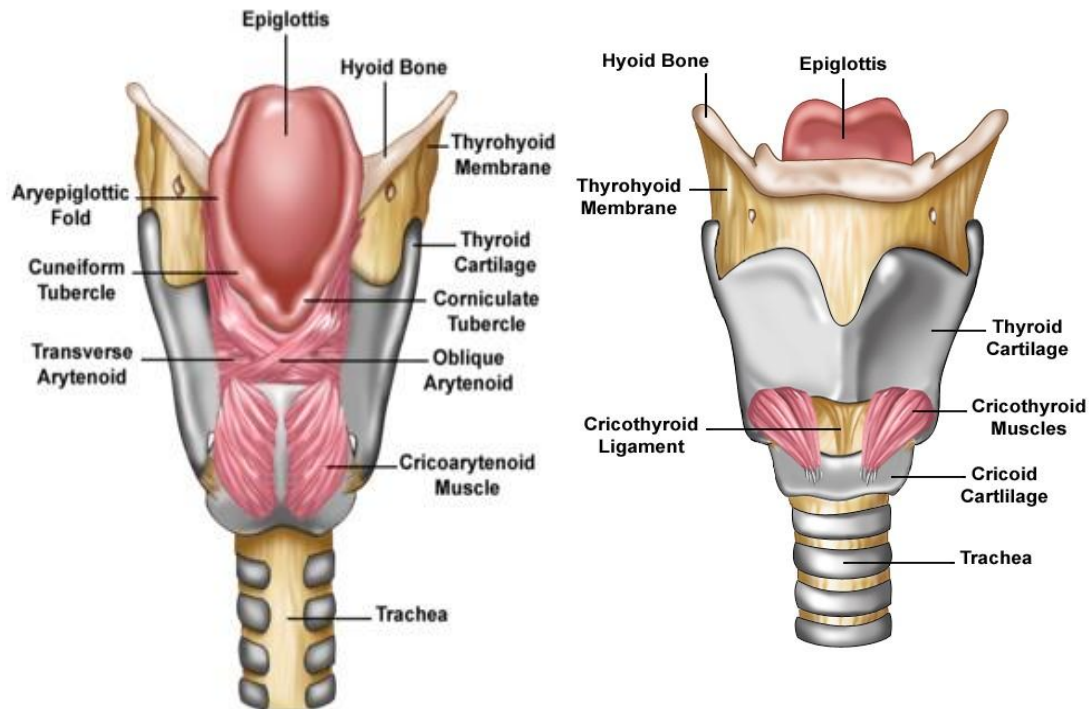
1. Intrinsic

2. Extrinsic

Thyrohyoid membrane.

Cricotracheal membrane.

Hyo-epiglottic ligament.



Laryngeal muscles

1. Intrinsic

A. Abductors of the vocal cords

Posterior crico-arytenoid muscle. Opens the glottis.

Origin - from the depression on the posterior surface of the cricoid lamina.

Direction - upwards and outwards.

Insertion - into the

back of the muscular process of the arytenoid cartilage.

B. Adductors of the vocal

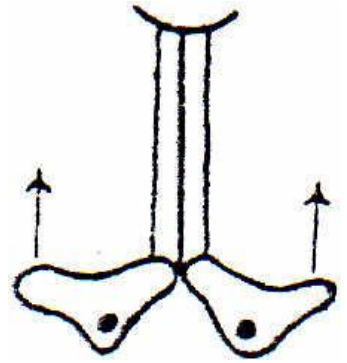
Lateral crico-arytenoid muscle:

Origin - from the upper border of the arch of the cricoid cartilage.

Direction - upwards and backwards.

Insertion into the front of the muscular process of the arytenoid cartilage.

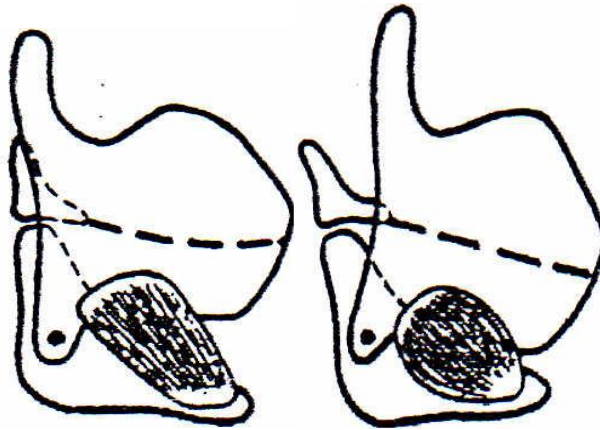
- *Transverse portion of interarytenoid muscle.*
- *External portion of thyro-arytenoid muscle.*



C. Tensors of the vocal cords

There are two on each side:

1. *Cricothyroid muscle.*
2. *Internal portion of thyro-arytenoid (vocalis) muscle .*



D. Opener of the laryngeal inlet

Thyro-epiglottic muscle is a part of the thyro-arytenoid muscles

E. Closers of the laryngeal inlet

- *Oblique portion of interarytenoid muscle*
- *Aryepiglottic muscle*

2. Extrinsic

'Strap' muscles of the neck

1. *Sternothyroid muscle*
2. *Thyrohyoid muscle*

Cavity of the Larynx

Extends from the inlet into the laryngopharynx, to the lower border of the cricoid cartilage. It is divided into three parts by two folds of mucous membrane:

1. *False vocal cords*
2. *True vocal cords*

The mucosal folds divide the cavity into the following parts:

a. **Vestibule**

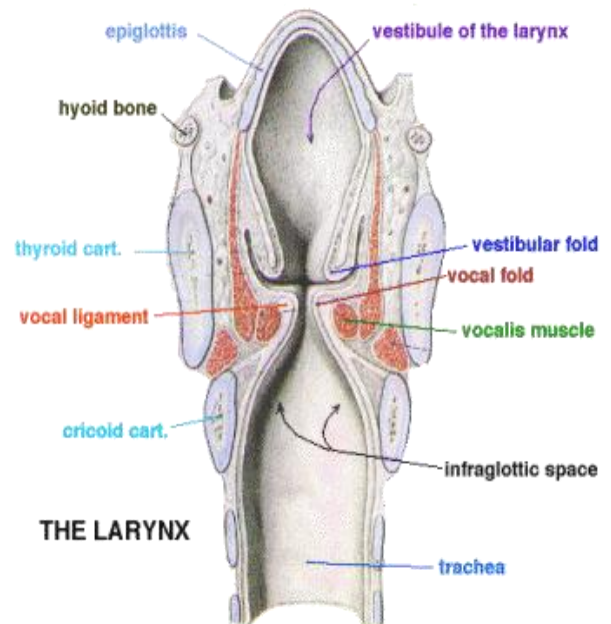
Lies between the inlet and the edges of the false cords

b. **Ventricle of larynx**

A recess between the false and true vocal cords.

c. **Subglottic space**

Lies between the true vocal cords and the lower border of the cricoid cartilage .



Mucous membrane of the larynx

All is *Ciliated columnar epithelium* except that covers vocal cords & upper part of vestibule of larynx is *Stratified squamous epithelium*

Reinke's layer of connective tissue lies immediately under the epithelium of the larynx and superficial to the elastic layer. There are no glands beneath it and no lymph vessels in it.

Blood supply of the larynx

The larynx is supplied by:

1. *Laryngeal branches of superior thyroid artery.*
2. *Laryngeal branches of inferior thyroid artery.*
3. *Cricothyroid branches of superior thyroid artery.*

Anastomose freely with one another. Veins accompany the arteries.

Nerve supply of the larynx

The larynx is supplied by branches of the vagus nerve.

Superior laryngeal nerve has two, laryngeal branches:

1. *Internal branch*. Entirely *sensory* supplies the cavity of the larynx as far down as the level of the vocal cords.
2. *External branch* supplies the cricothyroid muscle

Recurrent (inferior) laryngeal nerve divides into:

1. *An anterolateral (motor) branch* which supplies all the intrinsic muscles of the larynx except the cricothyroid muscle
2. *Posteromedial (sensory) branch* which supplies the cavity of the larynx below the level of the vocal cords.

Lymphatic drainage of the larynx

The edges of the vocal cords divide the lymphatic system of the larynx into two parts:

1. *Supraglottic* above the vocal cords. The vessels drain into:

- *Pre-epiglottic nodes.*
- *Upper deep cervical nodes*

2. *Subglottic* below the vocal cords. The vessels drain to:

- *Prelaryngeal and pretracheal nodes.*
- *Lower deep cervical nodes*

The vocal cords themselves have practically no lymphatic vessels, hence malignant tumours limited to them do not spread readily.

Applied physiology of the larynx

FUNCTIONS OF THE LARYNX

1. Protection of the lower air passages

1. *Closure of the laryngeal inlet*

The aryepiglottic folds move towards one another and close the inlet

2. *Closure of the glottis*

Accompanies closure of the inlet. This normal reflex is present from the time of birth.

3. *Cessation of respiration*

Automatic, IXth cranial nerve, is initiated by the contact of food with the posterior pharyngeal wall and base of tongue

4. Cough reflex

Should any particles enter the trachea and bronchi the act of coughing will usually dislodge them ...'watchdog of the lungs'

2. Phonation

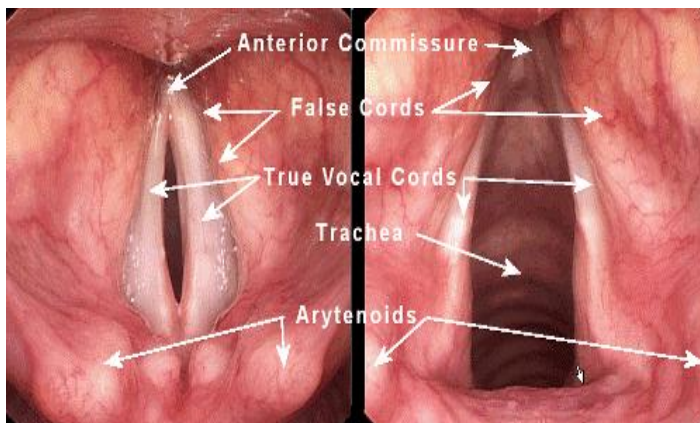
Voice is produced by vibration of the vocal cords

1. Pitch

The vibrations of the cords cut the air column into puffs and the frequency of the puffs determines the pitch produced. The larynx is therefore a wind instrument. The average individual human voice can produce a frequency range of two octaves in singing.

2. 'Volume'

The intensity of sound produced by the larynx depends on the air pressure generated in the lungs by contraction of the abdominal and thoracic muscles.

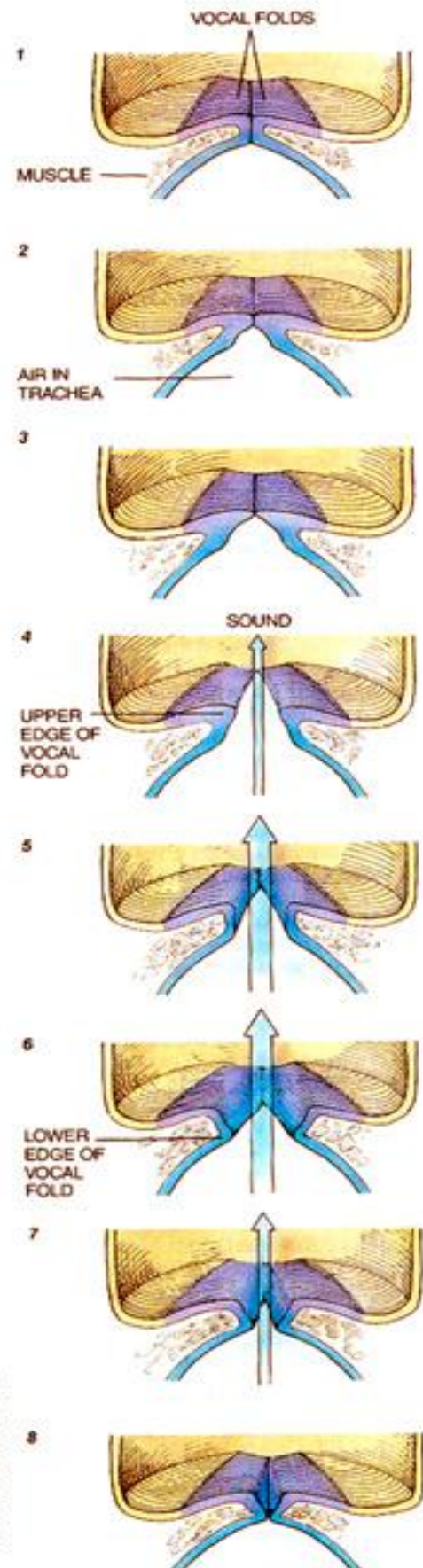


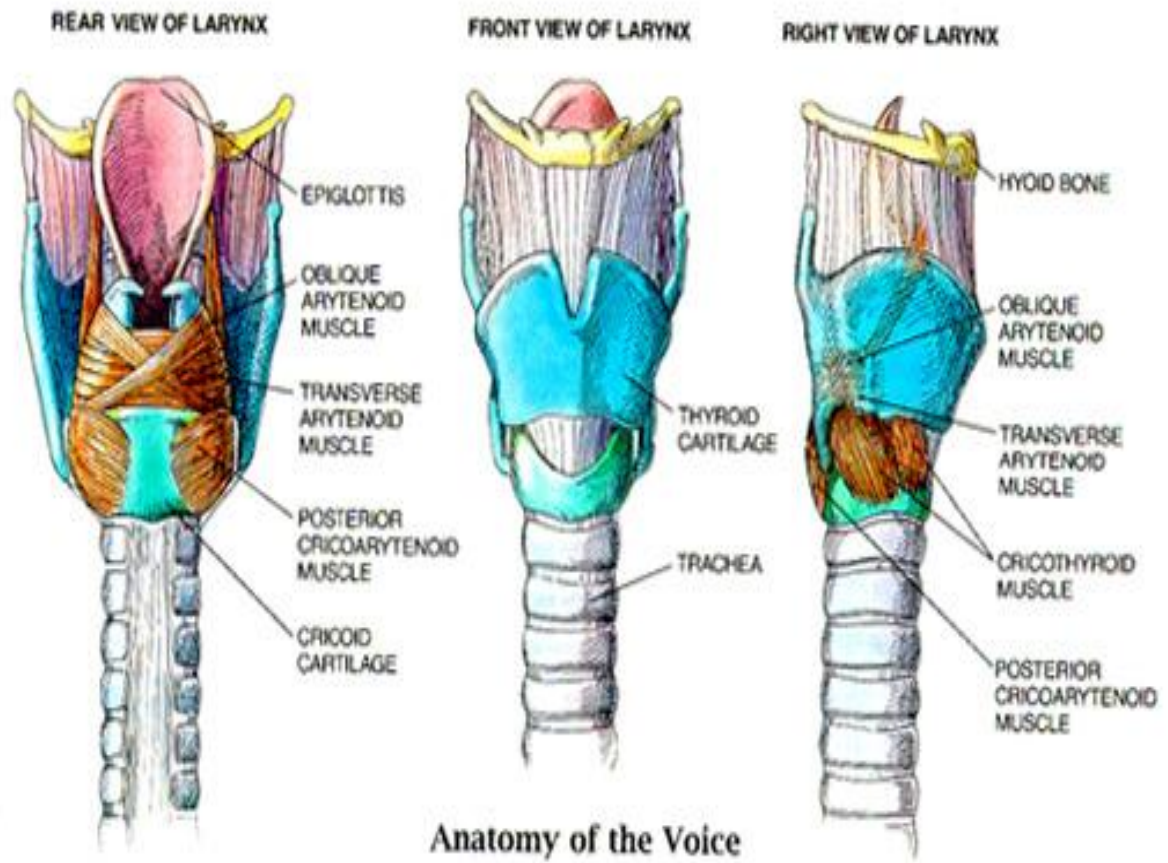
3. Respiration

The larynx plays a part in the mechanism of respiration by reflex adjustments of the glottic aperture.

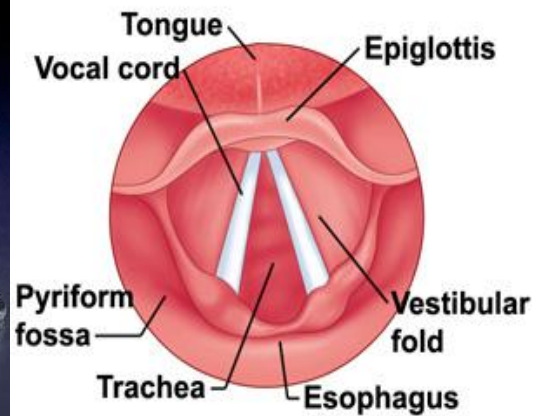
4. Fixation of the chest

When the larynx is closed the thoracic cage becomes fixed permitting climbing or digging. Since the ribs cannot rise freely, a fixed support is given to the pectoral muscles.





Anatomy of the Voice



Thank you,,,