Anatomy Team
433

King Saud University
College of medicine
Respiratory Block

Larynx Trachea and Bronchi

Done By:
Othman Abid

REVISED BY:
ZIYAD ALAJLAN

For Any comments
Please don't hesitate
to contact With us by:

anatomy433@live.com

Objectives

- ***By the end of the lecture, you should be able to:***
- Describe the Anatomy (extent, relations, structure and functions of the larynx.
- Describe the Anatomy (extent, relations, structure and functions of the trachea.
- Describe the bronchi and branching of the bronchial tree.
- Describe the functions of bronchi and their divisions.

Color Index

- Red : Important.
- Violet: Explanation.
- Gray: Additional Notes.

Other colors are for Coordination

Say " bsm Allah" then start

Larynx

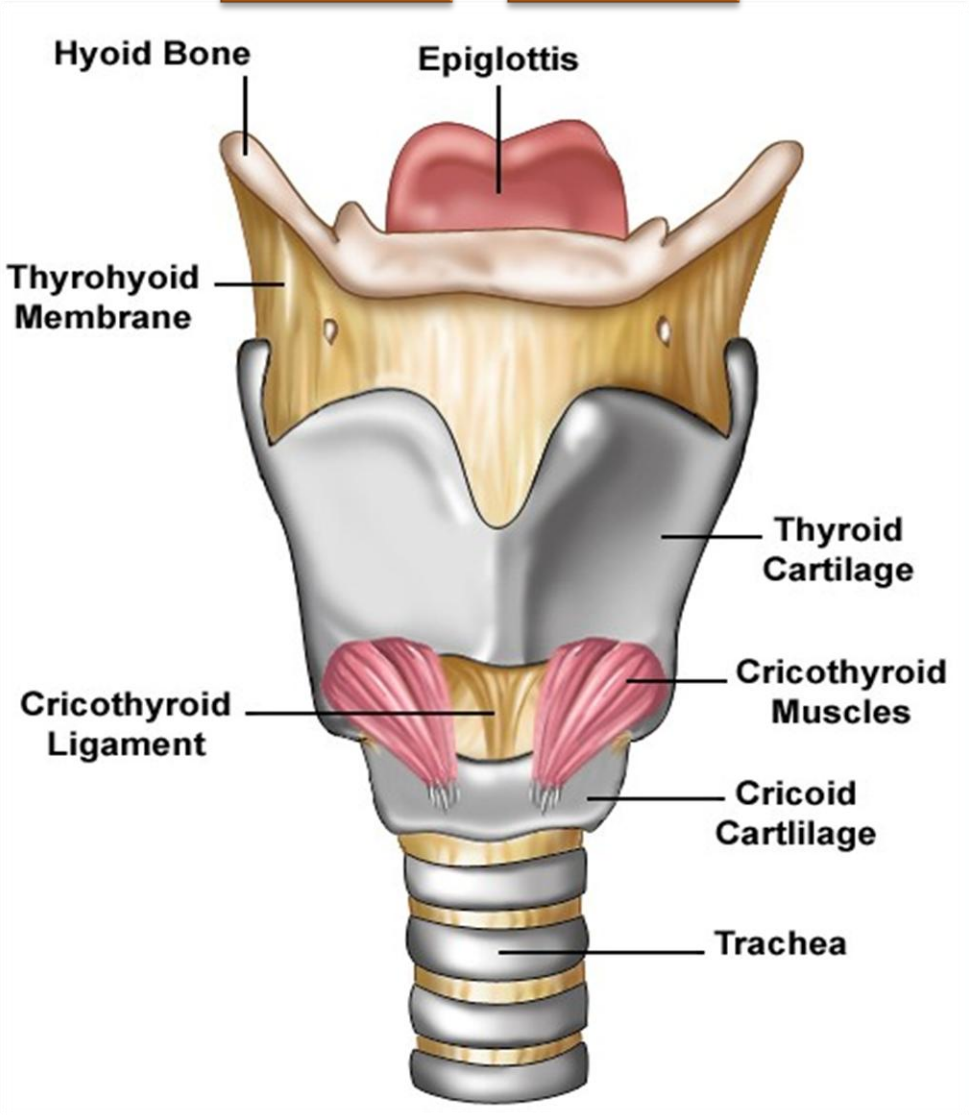
- Structure
- Cartilages
- Membranes
- Ligaments
- Laryngeal Inlet
- laryngeal Cavity
- Semon's Law

Trachea

- Structure
- Relations

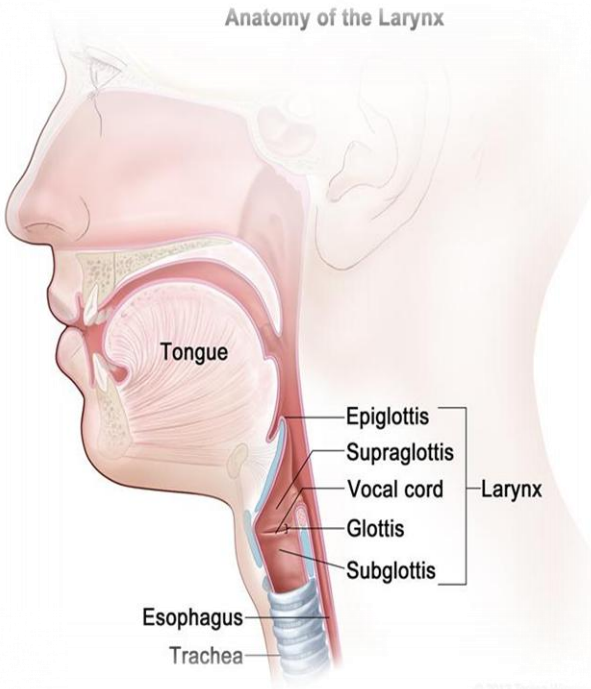
Bronchi

- Structure
- Divisions

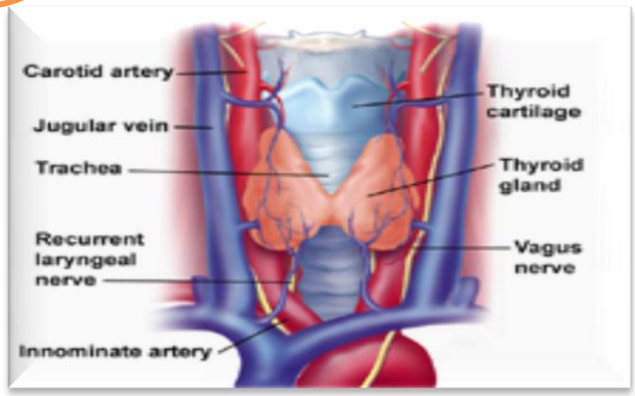


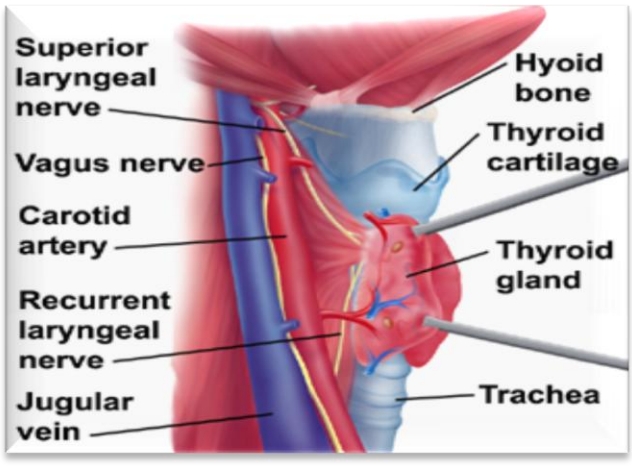
Larynx

- The larynx is the ***part of the respiratory tract which contains the vocal cords***.
- In **adult** it is 2-inch-long tube. It opens **above** into the laryngeal part of the pharynx.
- Below it is continuous with the trachea
- The larynx has functions in:
  - Respiration (breathing).
  - Phonation (voice production).
  - Deglutition (swallowing).



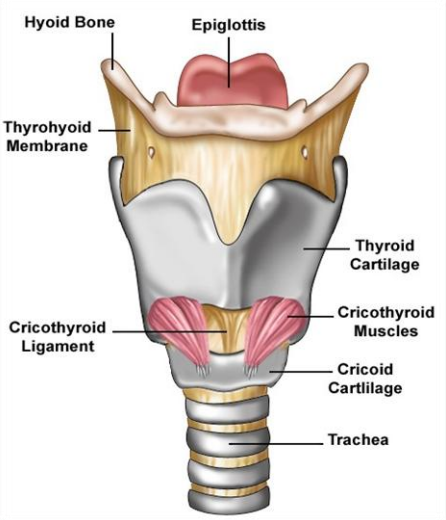
- **The larynx is related to major critical structures in the neck.**
- **Arteries**: Carotid arteries: (common, external and internal). Thyroid arteries: (superior & inferior thyroid arteries).
- Veins: Jugular veins, (external & internal)
- Nerves: Laryngeal nerves: (Superior laryngeal & recurrent laryngeal). Vagus nerve.





Structures of the Larynx

1. Cartilgenious frame work.
2. Membranes and ligaments.
3. Muscles (Interensic and exterensic).
4. Mucosal lining.

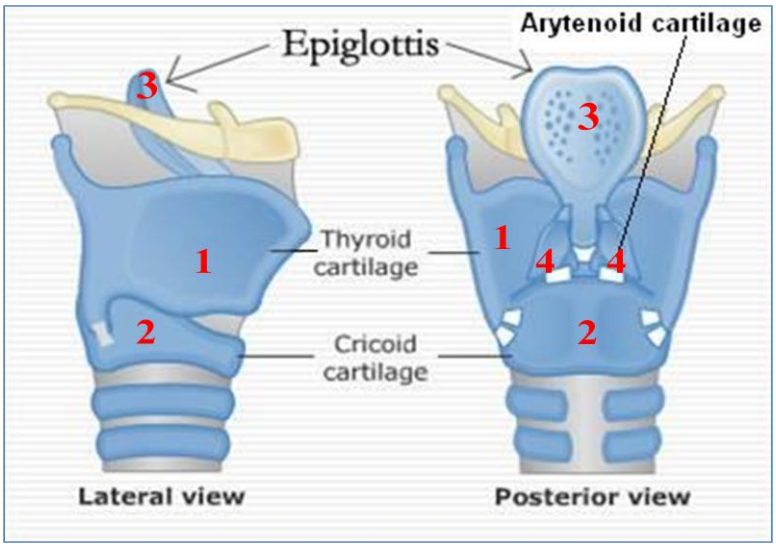


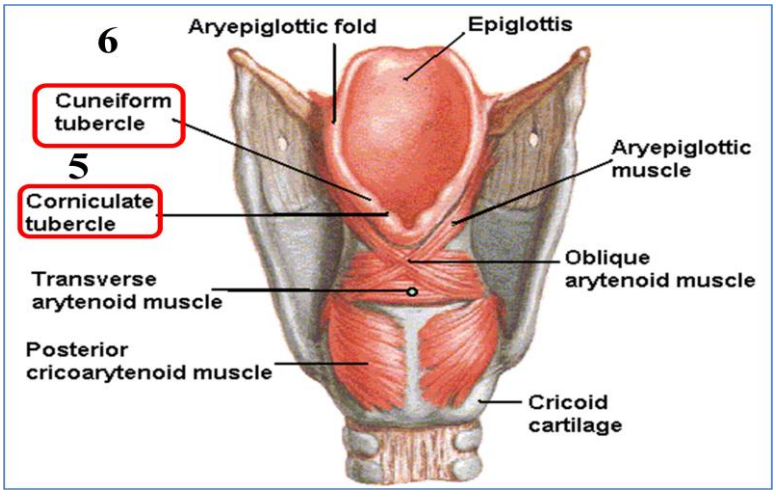
Cartilages of the Larynx

- The cartilaginous skeleton is composed of:
  1. Thyroid
  2. Cricoid — Three single
  3. Epiglottis

  4. Arytenoid
  5. Corniculate — Three paired
  6. Cuneiform
- All the cartilages, are Hyaline *except the Epiglottis* which is *Elastic* cartilage.

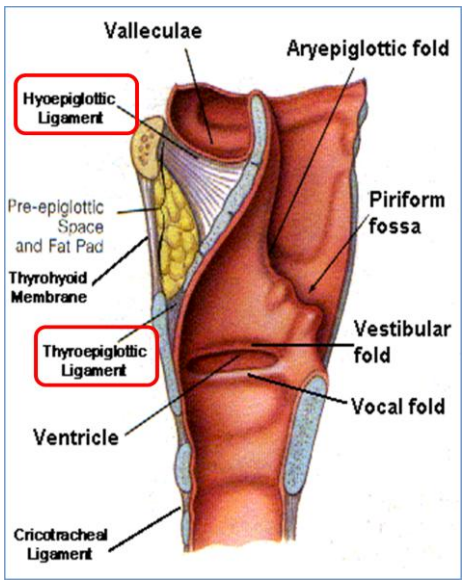
- The cartilages are:
  - Connected by joints, membranes & ligaments.
  - Moved by muscles.

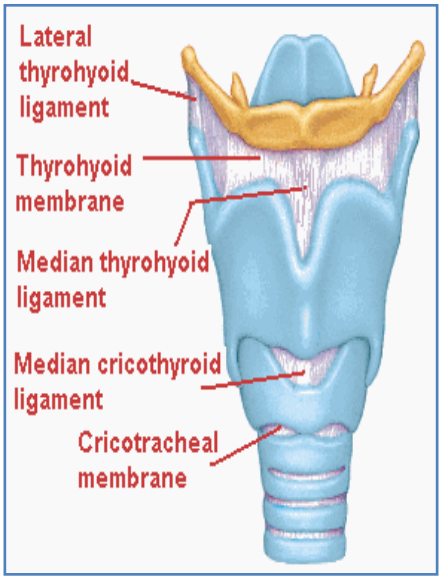




Membranes & Ligaments of the Larynx

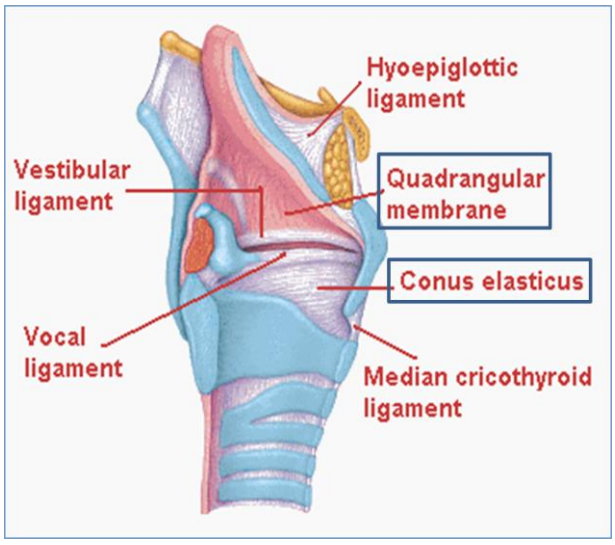
1. Thyrohyoid membrane.
2. Cricothyroid membrane.
3. Cricotracheal membrane
4. Hyoepiglottic ligament.
5. Thyroepiglottic ligament





The thyrohyoid membrane is thickened in the median plane to form median thyrohyoid ligament and on both sides to form lateral thyrohyoid ligaments.

- **Quadrangular membrane** (Aryepiglottic membrane)
  - ❖ It extends between the arytenoid and epiglottis.
  - ❖ Its lower free margin forms the **Vestibular ligament** **which forms** the **vestibular fold**.
- **Cricothyroid membrane** (**Conus Elasticus**):
  - ❖ Its lower margin is attached to the upper border of cricoid cartilage.
  - ❖ Upper free margin forms the **Vocal ligament**



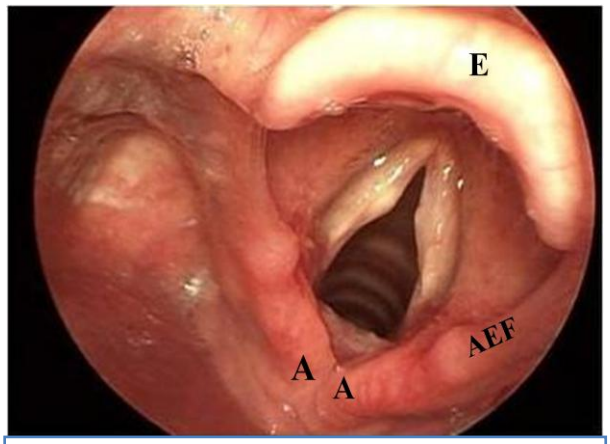
Laryngeal Inlet

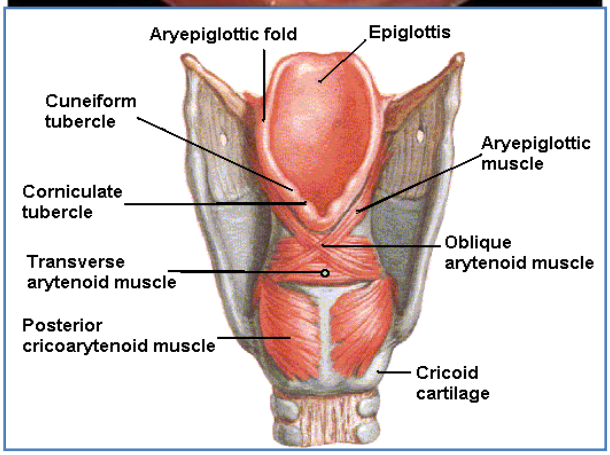
- It is the upper opening of the larynx. It faces upward and backward and opens into the laryngeal part of the pharynx, (laryngopharynx).
- Bounded by:

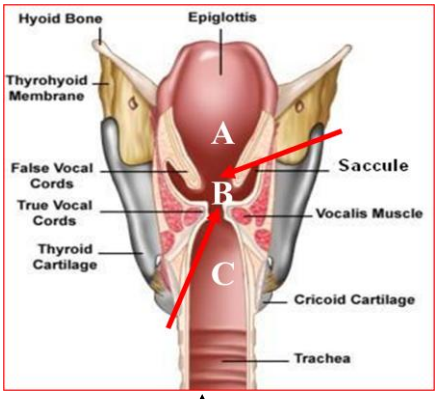
❖ Anteriorly by the upper margin of epiglottis (E)

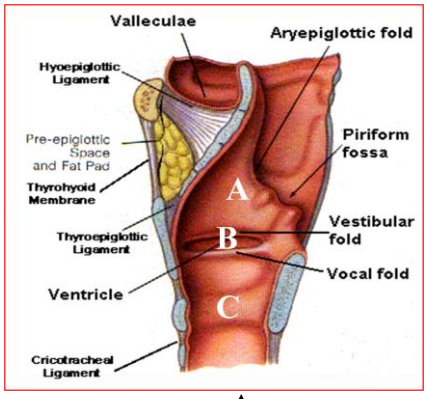
❖ Posteriorly & below by arytenoid cartilages (A)

❖ Laterally by the Aryepiglottic folds (AEF)









Laryngeal Cavity

- Extends from laryngeal inlet to lower border of the cricoid cartilage
- Narrow in the region of the vestibular folds (rima vestibuli)
- Narrowest in the region of the vocal folds (rima glottides)
- **Divided into three parts**:

A. **Supraglottic part or vestibule**: it is the part above the vestibular folds.

B. **Ventricle: it is** the part between the vestibular folds & the vocal folds.

C. **Infraglottic part**, the part below the vocal folds.

- NB. The ventricle has an upward invagination called **saccule** which is rich in goblet cells.

Mucous Membrane

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

Laryngeal muscles

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

Elevators of the Larynx

- **The Suprahyoid Muscles:** (MSGD)

مسجد ^_^

1. Mylohyoid.
2. Stylohyoid.
3. Geniohyoid.
4. Digastric.

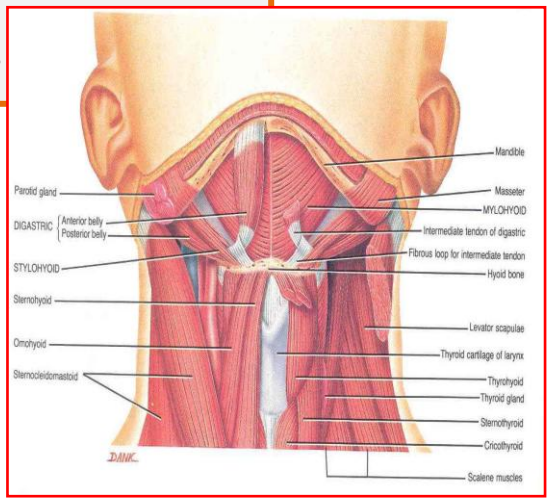
- **The Longitudinal Muscles of the Pharynx:**

1. Stylopharyngeus.
2. Salpingopharyngeus.
3. Palatopharyngeus.

Depressors of the Larynx

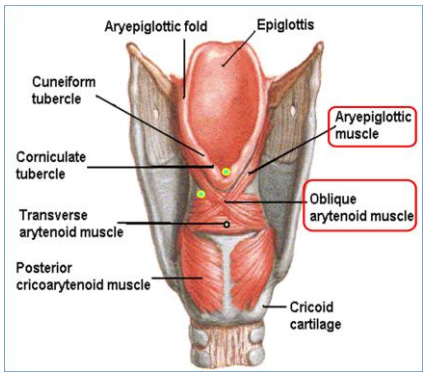
- **The Infrahyoid Muscles:**

1. Sternohyoid.
2. Sternothyroid.
3. Omohyoid.



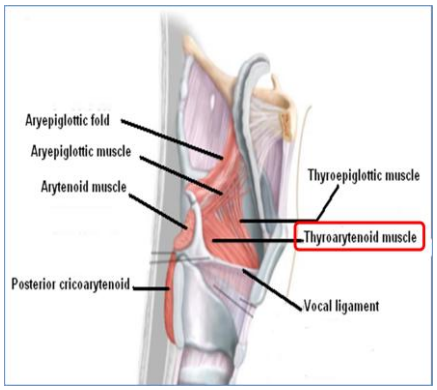
Muscles Controlling the Laryngeal Inlet

- Oblique arytenoid.
- Aryepiglottic muscle.



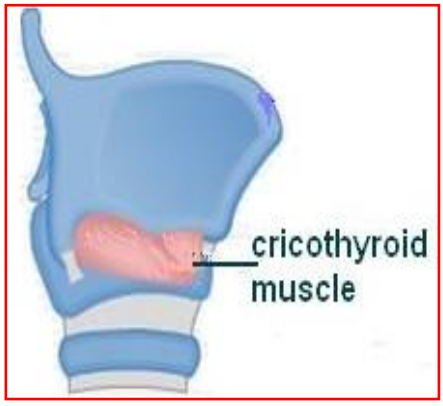
Muscle decreasing the Length & Tension of Vocal Cords

- Thyroarytenoid (vocalis)



Muscle increasing the Length & Tension of Vocal Cords.

- Cricothyroid.
- NB. It is the only intrinsic muscle which found outside the larynx.



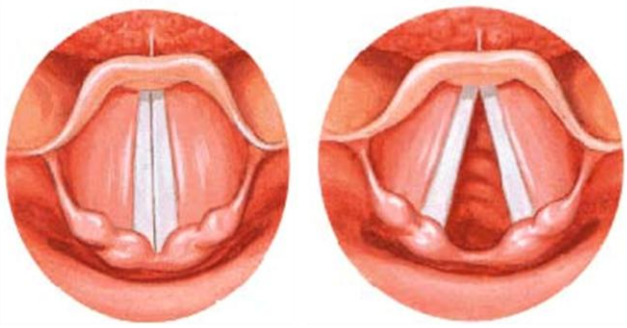
Adductors

- Lateral cricoarytenoid.
- Transverse arytenoid.

Abductor

- Posterior cricoarytenoid.

• Movements of the Vocal Cords



Blood Supply

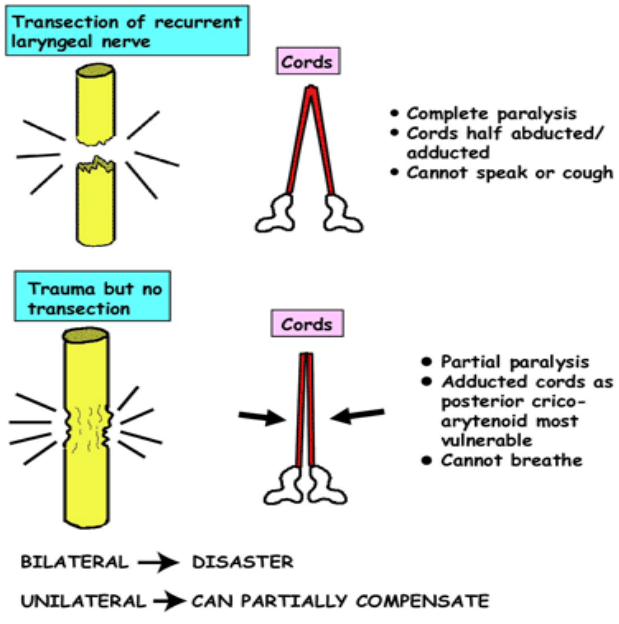
- **Arteries:**
  - ❖ Upper half: Superior laryngeal artery, branch of superior thyroid artery.
  - ❖ Lower half: Inferior laryngeal artery, branch of inferior thyroid artery.
- **Veins:**
  - ❖ Accompany the corresponding arteries.
- **Lymphatics:**
  - ❖ The lymph vessels drain into the deep cervical lymph nodes.

Nerve Supply (very important)

- **Sensory**
  - ❖ Above the vocal cords: Internal laryngeal nerve, branch of the superior laryngeal of the Vagus nerve.
  - ❖ Below the vocal cords: Recurrent laryngeal nerve, of the Vagus nerve.
- **Motor**
  - ❖ All intrinsic muscles are supplied by the recurrent laryngeal nerve **except** the Cricothyroid.
  - ❖ The Cricothyroid is supplied by the external laryngeal of superior laryngeal of Vagus.

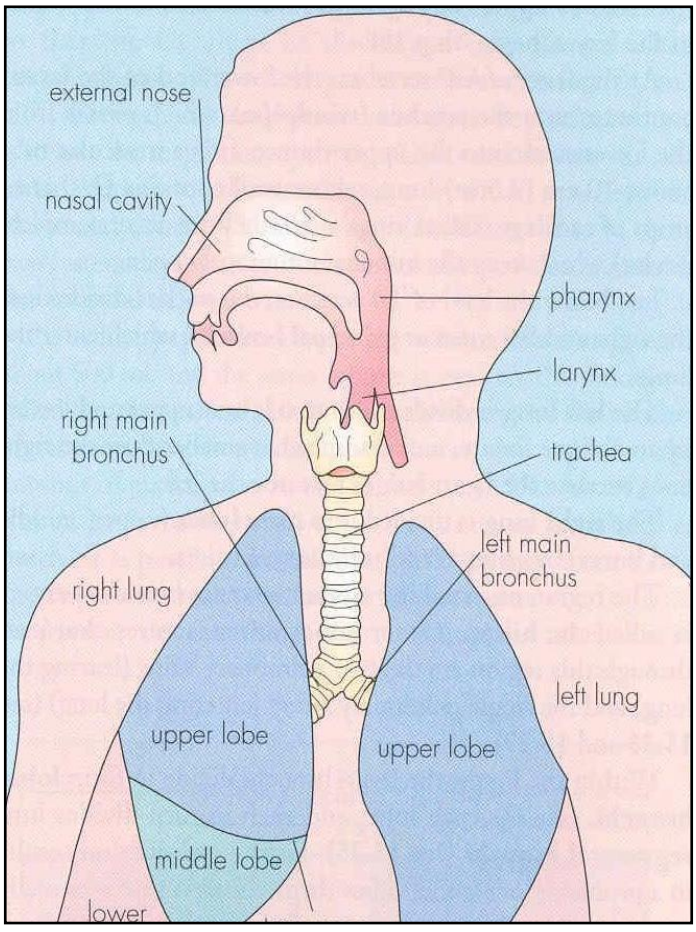
Semon's Law or Damage of the Laryngeal

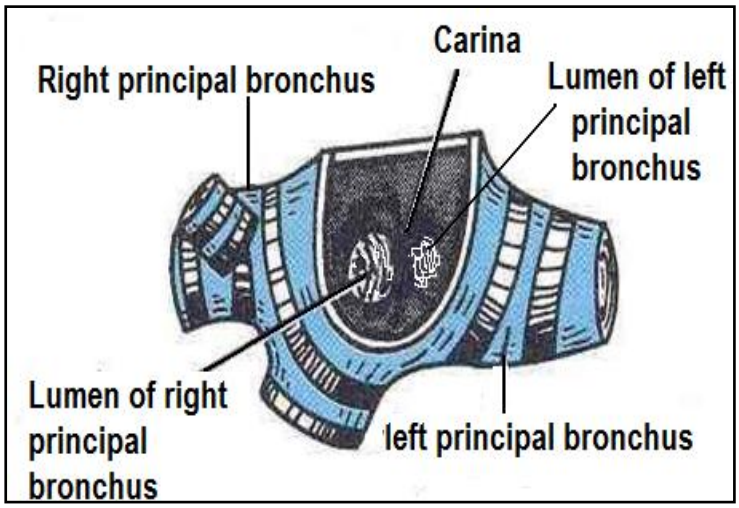
Semon's Law indicates the different effect between damage (surgical trauma) and transection of the recurrent laryngeal nerve due to surgery in region of the neck (e.g. thyroidectomy or parathyroidectomy).



Trachea (windpipe)

- Mobile, fibrocartilginous tube, 5 inches long, 1 inch in diameter.
- Begins: In the neck below the cricoid cartilage of the larynx (C6).
- Ends: In the thorax at the level of sternal angle (lower border of T4), by dividing into right and left principal (main, primary) bronchi.
- The ridge at the bifurcation from inside is called **carina**.
- It is the most sensitive part of the respiratory tract and is associated with the cough reflex.





Relations of the Superior Mediastinum

Anterior

1. Sternum.
2. Thymus, (remains of thymus gland).
3. Left brachiocephalic vein.
4. Arch of aorta.

Origin of:

1. Brachiocephalic artery.
2. left common carotid artery.

Posterior

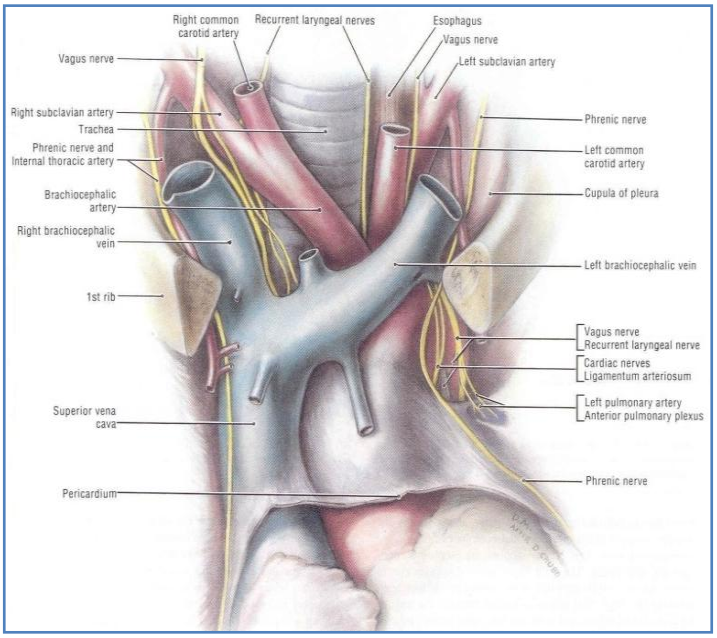
1. Esophagus.
2. Left recurrent laryngeal nerve.

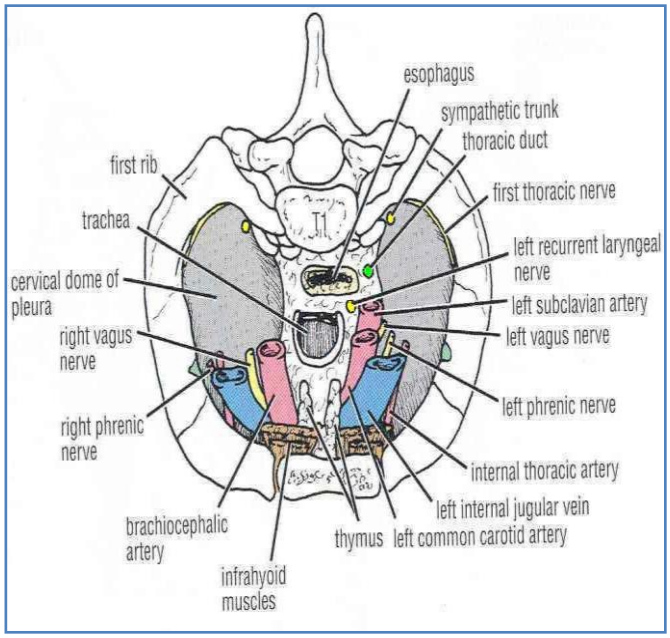
Left side

1. Arch of aorta.
2. Left common carotid artery.
3. left subclavian artery.
4. Left vagus nerve.
5. Left phrenic nerve.
6. Pleura.

Right side

1- Azygos vein 2- Right vagus 3- nerve Pleura





Nerve Supply

- Branches of the vagus nerve and recurrent laryngeal nerve give sensory fibers to supply the mucous membrane.
- Branches from the sympathetic trunks supply the trachealis muscle and the blood vessels.

Blood Supply

- **Arteries:** Branches from the inferior thyroid and bronchial arteries
- **Veins:** Drain to inferior thyroid veins.

Lymphatic Drainage

- Into the pretracheal and paratracheal lymph nodes.

Right Principal Bronchus

- About 1 inch long.
- Wider, shorter and more vertical than the left.
- Gives superior lobar bronchus before entering the hilum of the right lung.
- On entering the hilum it divides into middle and inferior lobar bronchi.

Left Principal Bronchus

- About 2 inches long.
- Narrower, longer and more horizontal than the right.
- Passes to the left below the aortic arch and in front of esophagus.
- On entering the hilum of the left lung it divides into superior and inferior lobar bronchi.

Bronchial Divisions

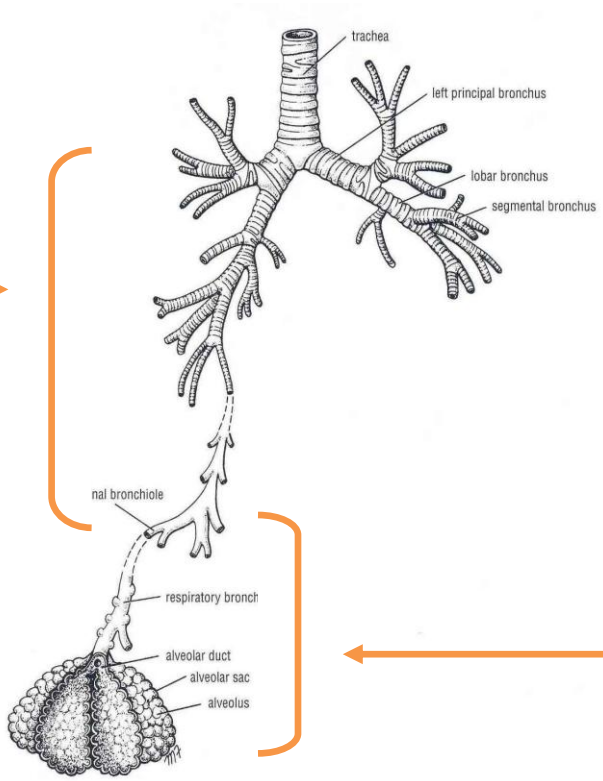
- Within the lung each bronchus divides and redivides into number of branches that can be divided into two groups:

Conduction zone branches

1. Primary (main) bronchi.
2. Secondary (lobar) bronchi.
3. Tertiary (segmental) bronchi. (supply the bronchopulmonary segment).
4. Smaller bronchi.
5. Bronchioles.
6. Terminal bronchioles.

Respiratory zone branches

1. Respiratory bronchioles.
2. Alveolar ducts.
3. Alveolar sacs.
4. Alveoli.



Larynx: Anterior View (3:03) & Posterior View (2:53) & Intro to the muscle action of the larynx (2:59) & Muscles of the larynx 1(8:29) & Muscles of the larynx 2 (10:45)

Trachea : A (3:15)

Bronchi: Bronchial Tree (3:15)

Click Here You will fined **several 3D Vedioes** For Respiratory system

Multiple Choice Questions

Q1:WHICH OF THE FOLLOWING IS A SNIGLE CRTILAGE OF LARYNX?

a-THYROID b-ARYTENOID c-CUNEIFORM

Q2:WHICH ONE OF THESE MEMBERANS CAN FORM THE VESTIBULAR FOLD ?

a-QUADRANGULAR b-CRICOTAHYROID c-THYROHYOID

Q3:WHAT IS THE NERVE THAT SUPPLIES THE CRICOTHYROID MUSCLE ?

a-RECURRENT LARYNFEAL b-EXTERNAL LARYNGEAL c-INTERNAL LARYNGEAL

Q4:ONE OF THESE STRUCTURE IS PART OF THE RESPIRATORY ZOEN ?

a-PRIMARY BRONCHI b- SEGMENTAL BRONCHI c- ALVEOLI

Q Ans.

1-a 2-a 3-b 4-c