

## **Laryngeal Joints:**

### **Cricothyroid Joints:**

Cricothyroid: between cricoid and thyroid.

It's a synovial joint (movement: forwards, downwards, and rotation).

This movement affects the length and tension of vocal cords.

### **CricoArytenoid Joint:**

Between the arytenoid and cricoid cartilage.

Articulation: 2 facets at the upper border of cricoid cartilage.

It's a synovial joint (arytenoid moves medial or lateral rotation).

The movement causes adduction and abduction of the vocal cords.

### **Cavity of the Larynx:**

Starts from the inlet of the larynx and ends below the true vocal cords.

Cavity is divided into 3 parts:

Vestibule: after the inlet.

Glottic part (middle compartment): between the folds and true vocal cords.

Infra-glottic: below the true vocal cords. The compressed air column is present here during expiration.

### **Laryngeal Inlet:**

Anteriorly: free edge of epiglottis.

Laterally: aryepiglottic folds.

Posteriorly: interarytenoid space that contains posterior/inter- arytenoid muscle.

True vocal cords are white because they're avascular.

### **During Anesthesia:**

An endotracheal tube is inserted into the trachea, through the larynx → the tube passes between the true vocal cords to prevent adduction, suffocation, and brain death.

The false vocal cords have nothing to do with the voice, because there's a wide space (Rima Vestibuli) between them.

Narrow space (Rima Glottidis) is present between the true vocal cords.

### **Inferior Opening:**

It leads to the trachea.

Ventricle in the middle compartment:

Present between the true and false vocal cords.

Saccule (space): contains seromucous glands that secrete fluids that descend to the true vocal cords, but the fluids don't reach the false vocal cords.

The secretions lubricate the true vocal cords.

### **Vocal Folds:**

Consists of:

1. Ligament: extends from the vocal process until the angle of thyroid cartilage.  
The ligament was formed by the upper free edge of the cricothyroid membrane (conus elasticus)
2. Mucous membrane:  
True vocal cords → stratified squamous epithelium; because the true vocal cords can be injured, undergo rapid mitosis, and regeneration.
3. Vocalis Muscle: a striated muscle, responsible for the length of the vocal cords.
4. No Submucosa: no accumulation of fluids and edema (to prevent adduction of true vocal cords and suffocation).
5. No blood vessels: so it's white in color.

### **Vestibular Folds:**

False vocal cords.

Formed by the lower edge of the quadrangular membrane.

It's red because it's vascularized.

It's fixed (no role in voice production).

Space between them → rema vestibuli.

The Rema → form a triangular space.

Rema Glottidis

The narrowest part in the larynx.

This is important when putting an endotracheal tube.

The spaces (Rema) can be changed by the movement of arytenoid cartilage, because they're both attached to the arytenoid cartilage.

**Intrinsic Muscles:**

These muscles are present in the vocal cords.

Functions:

Adjust the tension of the true vocal cords:

Open and close the Rima glottides: (lateral cricoarytenoid: )....

Control the inner dimension of the vestibule: such as the aryepiglotticus muscle.

Close the Rima Vestibuli.

**Cricothyroid Muscle:**

2 parts: oblique and straight.

Origin: cricoid cartilage.

Insertion: lower border and inferior horn of the thyroid cartilage.

The most important muscle: it's intrinsic but it's present outside the larynx.

Supplied by the external laryngeal nerve.

Action: shortens the vocal cords or tensioning – high pitch of the voice.

Note: internal laryngeal nerve → sensory to the mucosa above the true vocal cords.

**Posterior Cricoarytenoid Muscles:**

Action: abduction (pulls the muscular process backwards and ...)

Nerve supply: recurrent laryngeal nerve.

**Lateral Cricoarytenoid Muscle:**

Adduction of the true vocal cords.

**Transverse Arytenoid Muscle:**

Closes the posterior part of the rima glottides.

Nerve supply: recurrent laryngeal nerve.

**Thyroarytenoid Muscle (Vocalis Muscle):**

Action: Relaxes the true vocal cords.

Nerve supply: recurrent laryngeal nerve.

**Oblique Arytenoid Muscle:**

O: muscular process of the arytenoid cartilage.

In: apex of...

**Aryepiglottic Muscle:**

It's present in the fold.

It widens the inlet of the larynx.

Nerve supply: recurrent laryngeal nerve.

**Extrinsic Muscles:**

Present outside the vocal cords.

**Elevators:** pulls the larynx upwards to close the inlet.

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**Functions of the Larynx:**

Respiration:

Phonation: adduction, compressed air column, and then partitioning of the air column.

Effort Closure:

when lifting weights: adduction of the true vocal cords, and cessation of breathing. The column of compressed air gives more strength to the muscles.

Swallowing:

Epiglottis: moves downwards.

Larynx: moves upwards.

**Blood Supply:**

Superior laryngeal artery → superior thyroid artery → external carotid artery.

The internal laryngeal nerve accompanies it.

External laryngeal nerve also accompanies.

Inferior laryngeal artery → inferior thyroid artery → thyro-cervical trunk → subclavian artery.

Recurrent laryngeal nerve accompanies it.

Note: recurrent laryngeal nerve is commonly injured during ligation of the inferior laryngeal artery.

..... clinical notes here.

**Veins:**

Superior thyroid vein: internal jugular vein.

Inferior thyroid vein: left brachiocephalic vein.

**Lymphatics:**

Upper half (above true vocal cords):

Lower half (below true vocal cords): into lymph nodes around the trachea – paratracheal lymph nodes.

All muscles of the larynx are supplied ...

Sensory:

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Vagus → secreto-motor to the glands.

Recurrent laryngeal nerve:

Right side: originates at the root of the neck → passes below subclavian artery → ascends between the trachea and esophagus.

Left side: originates at → descends below the arch of aorta → ascends between trachea and esophagus ... .

Carotid Sheath:

Contains the common carotid artery, internal jugular vein, and vagus nerve.

### **Clinical Notes:**

#### **Thyroidectomy:**

Especially if there's a tumor.

During ligation and cutting:

Superior thyroid artery: external laryngeal nerves.

Inferior thyroid artery: recurrent laryngeal nerves.

External laryngeal nerve injury (bilateral) → hoarseness and weakness of the voice.

Recurrent laryngeal nerve:

It has 4 stages:

1. Unilateral:
2. Bilateral:
3. Complete: the vocal cords remain in the middle - patent.
4. Bilateral Partial: superficial fibers are injured (these fibers innervate the abductors, so injury causes adduction and suffocation). After injury, there will be cyanosis; so they do tracheostomy.

#### **Tracheostomy:**

It can be done above the isthmus (between first and second tracheal rings).

Super-sternal (low tracheostomy): in the emergency, we might injure the veins (inferior thyroid vein, thyroidemia, jugular arch, anterior jugular vein) and cause bleeding.

