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The Larynx

The larynx is an organ that provides a protective sphincter at the inlet of the air passages and is responsible for voice production. The larynx is covered in front by the infrahyoid strap muscles and at the sides by the thyroid gland.
The framework of the larynx is formed of cartilages that are held together by ligaments and membranes, moved by muscles, and lined by mucous membrane.

Cartilages of the Larynx

Thyroid cartilage: This is the largest cartilage of the larynx and consists of two laminae of hyaline cartilage that meet in the midline in the prominent V angle (the so-called Adam's apple). The posterior border extends upward into a **superior cornu** and downward into an **inferior cornu.** On the outer surface of each lamina there is an oblique line for the attachment of muscles.

Cricoid cartilage: it's formed of hyaline cartilage and shaped like a signet ring, having a broad plate behind and a shallow arch in front. The cricoid cartilage lies below the thyroid cartilage, and on each side of the lateral surface is a facet for articulation with the inferior cornu of the thyroid cartilage. Posteriorly, the lamina has on its upper border on each side a facet for articulation with the arytenoid cartilage. All these joints are synovial.

Arytenoid cartilages: There are two arytenoid cartilages, which are small and pyramid shaped and located at the back of the larynx. They articulate with the upper border of the lamina of the cricoid cartilage. Each cartilage has an

1- **apex** above that articulates with the small corniculate cartilage,
2- **base** below that articulates with the lamina of the cricoid cartilage
3- **vocal process** that projects forward and gives attachment to the vocal ligament
4- **Muscular process** that projects laterally gives attachment to the posterior and lateral cricoarytenoid muscles.

Corniculate cartilages: Two small conical-shaped cartilages articulate with the arytenoid cartilages. They give attachment to the aryepiglottic folds.
Cuneiform cartilages: These two small rod-shaped cartilages are found in the aryepiglottic folds and serve to strengthen them.

Epiglottis: This leaf-shaped lamina of elastic cartilage lies behind the root of the tongue, the sides of the epiglottis are attached to the arytenoid cartilages by the aryepiglottic folds of mucous membrane. The upper edge of the epiglottis is free. The covering of mucous membrane passes forward onto the posterior surface of the tongue as the **median glossoepiglottic fold;** the depression on each side of the fold is called the **vallecula**.

Membranes and Ligaments of the Larynx

Thyrohyoid membrane: This connects the upper margin of the thyroid cartilage to the hyoid bone. In the midline, it is thickened to form the **median thyrohyoid ligament.**

Cricotracheal ligament: This connects the cricoid cartilage to the first ring of the trachea.

Quadrangular membrane: This extends between the epiglottis and the arytenoid cartilages. Its thickened inferior margin forms the **vestibular ligament.**

Cricothyroid ligament: The lower margin is attached to the upper border of the cricoid cartilage. The superior margin of the ligament, instead of being attached to the thyroid cartilage, ascends on the medial surface of the thyroid cartilage. Its upper free margin, composed almost entirely of elastic tissue, forms the important **vocal ligament** on each side. The vocal ligaments form the interior of the **vocal folds (vocal cords)**. The anterior end of each vocal ligament is attached to the thyroid cartilage, and the posterior end is attached to the vocal process of the arytenoid cartilage.

Inlet of the Larynx

The opening is wider in front than behind and is bounded in front by the epiglottis, laterally by the aryepiglottic fold of mucous membrane, and posteriorly by the arytenoid cartilages with the corniculate cartilages. The cuneiform cartilage lies within and strengthens the aryepiglottic fold and produces a small elevation on the upper border.

Laryngeal Folds

Vestibular Fold

The vestibular fold is a **fixed** fold on each side of the larynx. It is formed by mucous membrane covering the vestibular ligament and is vascular and **pink** in color.

Vocal Fold (Vocal Cord)

The vocal fold is a **mobile** fold on each side of the larynx and is concerned with voice production. It is formed by mucous membrane covering the vocal ligament and is avascular and **white** in color. **The vocal fold moves with respiration and its white color is easily seen when viewed with a laryngoscope**.

Cavity of the Larynx

The cavity of the larynx divided into three regions:

1- **vestibule,** which is situated between the inlet and the vestibular folds
2- **middle region,** which is situated between the vestibular folds above and the vocal folds below
3- **lower region,** which is situated between the vocal folds above and the lower border of the cricoid cartilage below

Muscles of the Larynx

The muscles of the larynx may be divided into two groups: extrinsic and intrinsic.

Extrinsic Muscles

These muscles move the larynx up and down during swallowing. Note that many of these muscles are attached to the hyoid bone, which is attached to the thyroid cartilage by the thyrohyoid membrane. It follows that movements of the hyoid bone are accompanied by movements of the larynx.

Elevation: The digastric, the stylohyoid, the mylohyoid, the geniohyoid, the stylopharyngeus, the salpingopharyngeus, and the palatopharyngeus muscles

Depression: The sternothyroid, the sternohyoid, and the omohyoid muscles

Intrinsic Muscles

Two muscles modify the laryngeal inlet :

1. **Narrowing the inlet:** The oblique arytenoid muscle
2. **Widening the inlet:** The thyroepiglottic muscle

Five muscles move the vocal folds (cords) :

1. **Tensing the vocal cords:** The cricothyroid muscle
2. **Relaxing the vocal cords:** The thyroarytenoid (vocalis) muscle
3. **Adducting the vocal cords:** The lateral cricoarytenoid muscle
4. **Abducting the vocal cords:** The posterior cricoarytenoid muscle
5. **Approximates the arytenoid cartilages:** The transverse arytenoid muscle

Mucous Membrane of the Larynx

The mucous membrane of the larynx lines the cavity and is covered with ciliated columnar epithelium. On the vocal cords, however, where the mucous membrane is subject to repeated trauma during phonation, the mucous membrane is covered with stratified squamous epithelium.

Nerve Supply of the Larynx

Sensory Nerves

Above the vocal cords: The internal laryngeal branch of the superior laryngeal branch of the vagus

Below the level of the vocal cords: The recurrent laryngeal nerve

Motor Nerves

All the intrinsic muscles of the larynx except the cricothyroid muscle are supplied by the recurrent laryngeal nerve. The cricothyroid muscle is supplied by the external laryngeal branch of the superior laryngeal branch of the vagus.

Blood Supply of the Larynx

Upper half of the larynx: The superior laryngeal branch of the superior thyroid artery

Lower half of the larynx: The inferior laryngeal branch of the inferior thyroid artery

Lymph Drainage of the Larynx

The lymph vessels drain into the deep cervical group of nodes.