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LEVEL: 300 LEVEL

ANATOMY OF THE HEAD AND NECK ASSIGNMENT

QUESTION 1: Discuss the anatomy of the tongue and comment on its applied anatomy.

The tongue is a unique organ located in the oral cavity that helps with the sense of tate as well as mastication and deglutition. The tongue is also an essential component of the speech pathway as it helps with articulation.

The tongue is a pink muscular organ and it is kept moist by the major and minor salivary gland, the tongue has an average length of 10cm and it is alos divided into three main parts:

* The tip or apex which is the most anterior and most mobile aspect of the organ.
* The Body bearing a rough superior surface that abuts the palate and is populated with taste buds and lingual papillae and a smooth inferior surface that is attached to the floor of the oral cavity by the lingual frenulum.
* The Base of the tongue is the most posterior aspect and it is populated by lymphoid aggregates known as lingual tonsils.

The tongue is limited anteriorly and laterally by the teeth, superiorly by the hard and soft palates. Inferiorly the root of the tongue is continous with the mucosa of the floor of the oral cavity; with sublingual salivary glands and vascular bundles being located below the mucosa.

The **palatoglossal** and **palatopharyngeal arches** (along with the [palatine tonsils](https://www.kenhub.com/en/library/anatomy/tonsils)) have lateral relations to the posterior third of the tongue. Posterior to the base of the tongue is the dorsal surface of the **epiglottis** and **laryngeal inlet**, and the posterior wall of the oropharynx. As mentioned earlier, the presulcal and postsulcal parts of the tongue differ not only by anatomical location, but also based on embryological origin, innervation, and the type of mucosa found on its surface.

Anterior two thirds

The presulcal tongue includes the apex and body of the organ. It terminates at the sulcus terminalis; which can be seen extending laterally in an oblique direction from the foramen cecum towards the palatoglossal arch. The mucosa of the dorsal surface of the oral tongue is made up of circumvallate, filiform, and fungiform papillae. There is also a longitudinal midline groove running in an anteroposterior direction from the tip of the tongue to the foramen cecum (frontal bone). This marks the embryological point of fusion of the lateral lingual swellings that formed the oral tongue. It also represents the location of the median lingual (fibrous) septum of the tongue that inserts in the body of the [hyoid bone](https://www.kenhub.com/en/library/anatomy/hyoid-bone).

On the lateral surface of the oral tongue are **foliate** **papillae** arranged as a series of vertical folds. The ventral mucosa of the oral tongue is comparatively unremarkable. It is smooth and continuous with the mucosa of the floor of the mouth and the inferior gingiva. The **lingual** **veins** are relatively superficial and can be appreciated on either side of the **lingual** **frenulum**. Lateral to the lingual veins are pleated folds of mucosa known as the **plica fimbriata**. They are angled anteromedially toward the apex of the tongue.

Posterior third

The remainder of the tongue that lies posterior to the sulcus terminalis is made up by the **base** of the organ. It lies behind the palatoglossal folds and functions as the anterior wall of the oropharynx.

Unlike the oral tongue, the pharyngeal tongue does not have any lingual papillae. Instead, its mucosa is populated by aggregates of lymphatic tissue known as the **lingual** **tonsils**. The mucosa is also continuous with the mucosa of the laterally located palatine tonsils, the lateral oropharyngeal walls, and the posterior epiglottis and glossoepiglottic folds.

Muscles

The tongue is chiefly a muscular organ with some amount of fatty and fibrous tissue distributed throughout its substance. All the muscles of the tongue are paired structures, with each copy being found on either side of the median fibrous septum. There are muscles that extend outside of the organ to anchor it to surrounding bony structures, known as **extrinsic** **muscles**. The other set of muscles are confined to each half of the organ and contribute to altering the shape of the organ; these are the **intrinsic** **muscles**.

**Intrinsic tongue muscles**

The intrinsic tongue muscles are responsible for adjusting the **shape** and **orientation** of the organ. It is made up of four paired muscles, which are discussed below in a dorsoventral manner.

The **superior longitudinal muscles** are made up of a thin layer of muscle fibers traveling in a mixture of oblique and longitudinal axes just deep to the superior mucosal surface of the organ. These fibers arise from the **median fibrous septum** as well as the **fibrous layer of submucosa** from the level of the epiglottis. They eventually insert along the **lateral and apical margins** of the organ. These muscles are responsible for **retracting** and **broadening** the tongue, as well as elevating the tip of the tongue. The net effect of these muscles results in **shortening** of the organ.

Another set of muscles occupy the dorsoventral plane of the tongue deep to the superior longitudinal muscles. These are **the vertical muscles** that arise from the root of the organ and genioglossus muscle and insert into the median fibrous septum, along the entire length of the organ. These muscles facilitate **flattening** and **widening** of the tongue.

Deep to the ventral muscles is the layer of **transverse** **muscles** of the tongue. They take a lateral route, extending from either side of the **medial lingual septum** (origin) to the **fibrous submucosa** along the lateral margins of the tongue (insertion). As these muscles contract, they cause the tongue to **narrow** and **elongate**.

Finally, the **inferior longitudinal muscles** travel above the ventral submucosa of the tongue. These fibers travel between **hyoglossus** and **genioglossus** as it arises from the **base** of the tongue and body of the **hyoid bone**. The fibers end in the **apex** of the tongue; allowing the muscle to pull the tip of the tongue inferiorly and also shortening the organ.

The intrinsic tongue muscles can operate independently, or in combination with each other to give rise to numerous shapes. **This is an important feature of the tongue as it facilitates molding of the food particles into a bolus in preparation for deglutition and speech**.

**Extrinsic tongue muscles**

While the shape of the tongue is determined by the intrinsic muscles of the tongue, **movement of the organ within (and out of) the oral cavity is dependent on the extrinsic tongue muscles.** There are four pairs of **extrinsic** **muscles**, which can be viewed as those arising from above the tongue, and those that originate from below the tongue.

**Styloglossus** and **palatoglossus** are the two muscles arising from above. **Palatoglossus** is anatomically a part of the pharyngeal group of muscles. However, its attachments to the tongue mean that it is also an extrinsic tongue muscle. It originates from the oral part of the **aponeurosis of the soft palate**. Here, and also at its insertion in the **lateral margins of tongue**, the muscle is wider than along its middle section. Its role as an extrinsic tongue muscle is to **elevate** the dorsal surface of the tongue, and (while working synergistically with the contralateral palatoglossus) to act as a **sphincter** at the oropharyngeal isthmus.

**Styloglossus** originates from the anterolateral surface of the **styloid process**. Not only does it contribute to the stylomandibular ligament, but it also assists in **retraction** of the tongue (moving it posterosuperiorly). It is the smallest and shortest of the three styloid muscles. At the lateral margin of the tongue, the muscle bifurcates into **longitudinal** and **oblique** **components**. The former pierces the tongue on the dorsolateral aspect and integrates with the inferior longitudinal muscle; while the latter crosses over and decussates with hyoglossus.

***Genioglossus*** and **hyoglossus** arise from below. **Genioglossus** originates from a slender tendon that is attached to the superior genial tubercle found on the inner surface of the **symphysis menti**.

This attachment prevents the tongue from falling backward and obstructing the airway when an individual is supine. The lower fibers of the muscle also have indirect attachments to the anterior part of the **body of the hyoid bone** via its slender aponeurosis.

It is a triangular, midline structure that travels posterosuperiorly at which point the upper fibers of the muscle interdigitate with the intrinsic muscles, before attaching along the length of the **inferior** **surface** **of the tongue** (extending from the root to the tip).

**Hyoglossus** originates from the entire **greater cornu of the hyoid bone** as a slender, quadrilateral muscle. It is often accompanied by **chondroglossus** (may be considered as part of the hyoglossus), which arises from the base of the lesser cornu of the hyoid bone. Hyoglossus takes a vertical course cranially, where it pierces the inferolateral margins of the tongue and subsequently blends between the inferior longitudinal muscles and the styloglossus.

The extrinsic muscles play an important role in pressing and molding the food bolus in preparation for the initial phase of [swallowing](https://www.kenhub.com/en/library/anatomy/stages-of-swallowing). Additionally, they are used to move the bolus posteriorly into the oropharyngeal inlet. Furthermore, the action of palatoglossus closes off the oropharyngeal isthmus in order to prevent food from moving cranially during swallowing. Although some of these muscles are able to act in isolation, it is the combined effect of all the intrinsic and extrinsic muscles that allows the tongue to have significant **flexibility**.



**credit: ken hub**

QUESTION 2: WRITE AN ESSAY ON THE AIR SINUSES

The paranasal sinuses are air-filled **extensions** of the respiratory part of the nasal cavity. There are **four** paired sinuses, named according to the bone in which they are located; maxillary, frontal, sphenoid and ethmoid.

The function of the sinuses is not clear. It is thought that they may contribute to the **humidifying**of the inspired air. They also reduce the weight of the skull.

Sinuses are formed in childhood by the nasal cavity **eroding** into surrounding bone. As they are outgrowths of the nasal cavity, they all drain back into it – **openings** to the paranasal sinuses are found on the **roof** and **lateral** walls of the nasal cavity. The inner surface is lined by a respiratory mucosa.

**Frontal Sinuses**: These are the most **superior** in location, found under the forehead. The frontal sinuses are variable in size, but always triangular-shaped. They drain into the nasal cavity via the**frontonasal duct,** which opens out at the hiatus semilunaris on the lateral wall.

**Sphenoid Sinuses**:  The sphenoid sinuses also lie relatively superiorly, at the level of the spheno-ethmodial recess.  They are found more **posteriorly,** and are related superiorly and laterally to the **cranial cavity**. The sphenoid sinuses drain out onto the roof of the nasal cavity.  The relationships of this sinus are of clinical importance – the**pituitary gland** can be surgically accessed via passing through the nasal roof, into the sphenoid sinus and through the sphenoid bone.

**Ethmoidal Sinuses**: There are three ethmoidal sinuses; anterior, middle and posterior. They empty into the nasal cavity at different places:

Anterior – Hiatus semilunaris

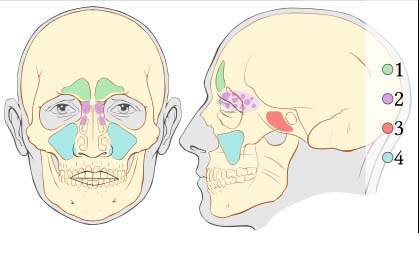
Middle – Ethmoid bulla

Posterior – Superior meatus

**Maxillary Sinuses:**The largest of the sinuses. It is located laterally and slightly **inferiorly** to the nasal cavities. It drains into the nasal cavity at the **hiatus semilunaris,** underneath the **frontal sinus** opening. This is a potential pathway for spread of infection – fluid draining from the frontal sinus can enter the maxillary sinus.

CLINICAL ANATOMY: As the paranasal sinuses are continous with the nasal cavity, an upper respiratory tract infection can spread to the sinuses. Infection to the sinuses can cause inflammation particularly pain and swelling of the mucosa and it is known as sinusitis. if more than one sinus is affected it is called parasinusitis.

The maxillary nerve supplies both the maxillary sinus and maxillary teeth and so inflammation of that sinus can present with toothache.

 Frontal sinus

Ethmoid sinus

sphenoid sinus

Maxillary sinus

of that sinus Can present with **toothache**