

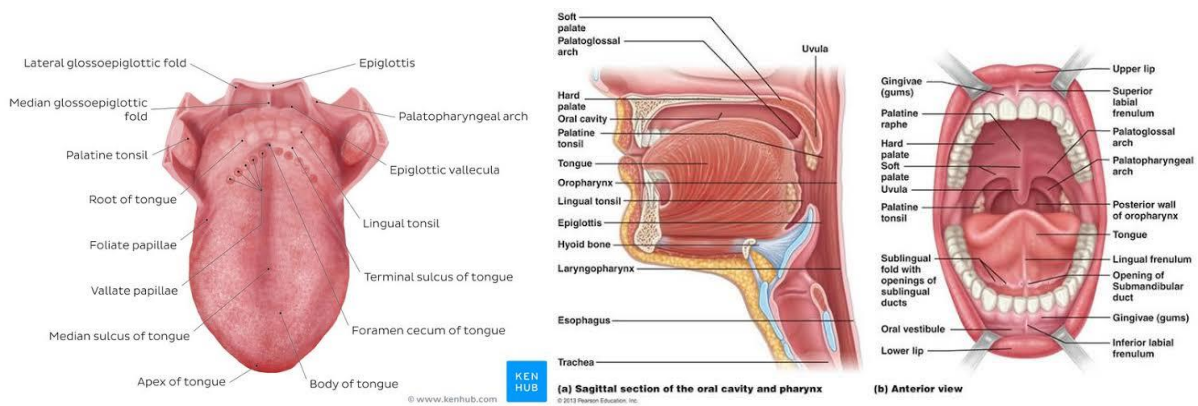
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DEPARTMENT: MEDICINE AND SURGERY
COURSE: GROSS ANATOMY OF THE HEAD AND NECK
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QUESTION 1

Discuss the Anatomy of the tongue and comment on its applied anatomy.

ANSWER

The tongue is a mobile muscular organ covered with mucous membrane. It can assume a variety of shapes and positions. It is partly found in the oral cavity and oropharynx. It is involved in a number of functions which are articulation, mastication, taste, oral cleansing and deglutition.



PARTS AND SURFACES OF THE TONGUE

The tongue has three parts which are:

- The Root of the tongue
- The Body of the tongue
- The Apex of the tongue

The **root** of the tongue which is also known as the **base** is attached to the posterior portion of the tongue. It extends between the mandible, hyoid and the nearly vertical posterior surface of the tongue. It is populated by lingual tonsils and foliate papillae along the posterolateral surface.

The **body** of the tongue is the anterior two thirds of the tongue between the root and the apex. Its superior is rough and populated by lingual papillae while its inferior surface is smooth and attached to the floor by the lingual frenulum.

The **apex** or **tip** of the tongue is the anterior end of the body that rests against the incisor teeth. The body and apex of the tongue are extremely mobile.

The tongue has two surfaces which are

- The Superior surface
- The Inferior surface

THE SUPERIOR SURFACE

It is also known as the dorsum of the tongue. It is characterized by

- **Terminal Sulcus (Sulcus terminalis)** is a V-shaped groove that divides the tongue into the anterior/presulcal part and posterior/postsulcal part.
- **Foramen Cecum** is found at the apex of the V-shaped groove which points posteriorly. It is a small pit which is frequently absent and it is non-functional remnant of the proximal part of the embryonic thyroglossal duct from which the thyroid gland developed.
- Presence of **Lingual papillae** on the anterior two third of the tongue.
- Presence of lymphatic aggregations known as **Lingual tonsil** on the posterior one third of the tongue.

The terminal sulcus is seen extending laterally in an oblique direction from the foramen cecum towards the palatoglossal arch and it divides dorsum of the tongue transversely into two parts like I stated earlier, the presulcal/anterior part and the postsulcal/posterior part.

The anterior/presulcal part makes up the anterior two thirds of the dorsum of the tongue and it includes the apex and body of the tongue. It has a longitudinal midline groove running in anteroposterior direction from the tip of the tongue to the foramen cecum, dividing the tongue into left and right parts. The mucosa of the anterior part is relatively thin and closely attached to the underlying muscle. It has a rough texture because of the presence of the numerous papillae known as the lingual papillae and they are of four types namely:

- Vallate Papillae
- Foliate Papillae; poor developed in humans
- Filiform Papillae
- Fungiform Papillae

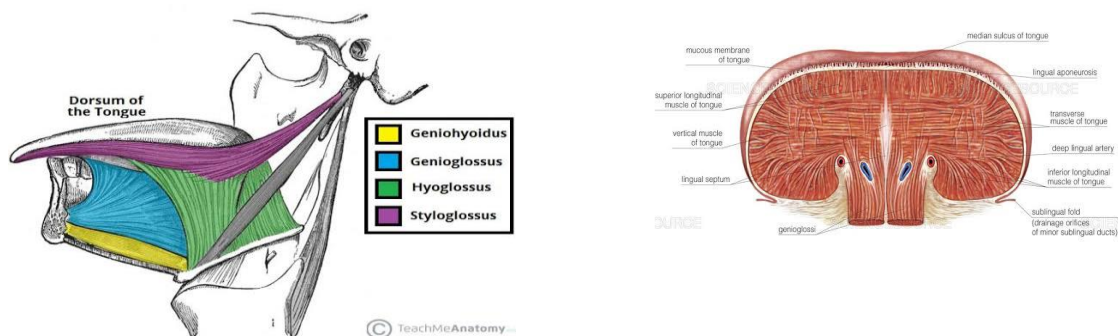
The posterior/postsulcal part makes up the posterior one third of the dorsum of the tongue and it makes up the base of the tongue lying behind the palatoglossal folds and functioning as the anterior wall of the oropharynx. Unlike the presulcal part, it lacks lingual papillae instead the mucosa which is thick and freely mobile is populated by aggregates of lymphoid modules known as Lingual tonsil collectively and this nodules give the posterior part an irregular cobblestone appearance.

THE INFERIOR SURFACE

It is known as the underside of the tongue and it is covered with a thin, transparent mucous membrane. It has a smooth surface and it is continuous with the floor of the mouth and inferior gingiva. The surface is connected to the floor of the mouth by **the lingual frenulum** and lateral to it on each side is the deep lingual vein which is visible through the mucosa. Presence of sublingual folds with openings of the sublingual duct.

THE MUSCLES OF THE TONGUE.

There are four intrinsic and extrinsic muscles on each side of the tongue and they are separated by a median fibrous lingual septum, which extends vertically from the midline groove of the tongue. The intrinsic muscles of the tongue include the **superior and inferior longitudinal, transverse, and vertical** muscles and they are confined to the tongue and are not attached to bone. The extrinsic muscles of the tongue are the **genioglossus, hyoglossus, styloglossus, and palatoglossus** and they originate outside the tongue and attach to it.



INNERVATION

- All the muscles of the tongue are supplied by CN XII, the hypoglossal nerve except for the palatoglossus which is actually a palatine muscle supplied by the pharyngeal plexus
- For general sensation (touch and temperature), the mucosa of the anterior two thirds of the tongue is supplied by the lingual nerve, a branch of the mandibular division of the trigeminal nerve, CN V3.
- For special sensation (taste), this part of the tongue, except for the vallate papillae, is supplied through the chorda tympani nerve, a branch of the facial nerve, CN VII. The chorda tympani join the lingual nerve and runs anteriorly in its sheath.
- The mucous membrane of the posterior third of the tongue and the vallate papillae are supplied by the lingual branch of the glossopharyngeal nerve (CN IX) for both general and special sensation (taste).
- Twigs of the internal laryngeal nerve, a branch of the vagus nerve (CN X), supply mostly general but some special sensation to a small area of the tongue just anterior to the epiglottis. These mostly sensory nerves also carry parasympathetic secretomotor fibres to serous glands in the tongue.
- There are four basic taste sensations: sweet, salty, sour, and bitter. Sweetness is detected at the apex, saltiness at the lateral margin, and sourness and bitterness at the posterior part of the tongue. All other “tastes” expressed by gourmets are olfactory (smell and aroma).

VASCULATURE OF THE TONGUE

ARTERIAL SUPPLY

The lingual artery gives rise to the arteries of the tongue and are derived from the external carotid artery. They pass deep to the hyoglossus muscle on entering the tongue.

- **Dorsal lingual arteries** supply the posterior part, the root of the tongue, and send a tonsillar branch to the palatine tonsil.
- **Deep lingual artery** supplies the anterior part of the tongue; the dorsal and deep arteries communicate with each other near the apex of the tongue.
- **Sublingual artery** supplies the sublingual gland and the floor of the mouth.

VENOUS DRAINAGE

The veins of the tongue are the:

- **Dorsal lingual veins**, which accompany the lingual artery.
- **Deep lingual veins**, which begin at the apex of the tongue and run posteriorly beside the lingual frenulum to join the sublingual vein.

All lingual veins terminate, directly or indirectly, in the internal jugular vein.

LYMPHATICS

Lymphatic drainage of the tongue takes the following routes:

- Lymph from the posterior third drains to the **superior deep cervical lymph nodes** on both sides.
- Lymph from the medial part of the anterior two thirds drains to the **inferior deep cervical lymph nodes**.
- Lymph from lateral parts of the anterior two thirds drains to the **submandibular lymph nodes**.
- Lymph from the apex of the tongue and frenulum drains to the **submental lymph nodes**.
- Lymph from the posterior third and the area near the midline groove drains bilaterally.

All lymph from the tongue ultimately drains to the deep cervical lymph nodes and pass via the jugular venous trunks into the venous system.

APPLIED ANATOMY

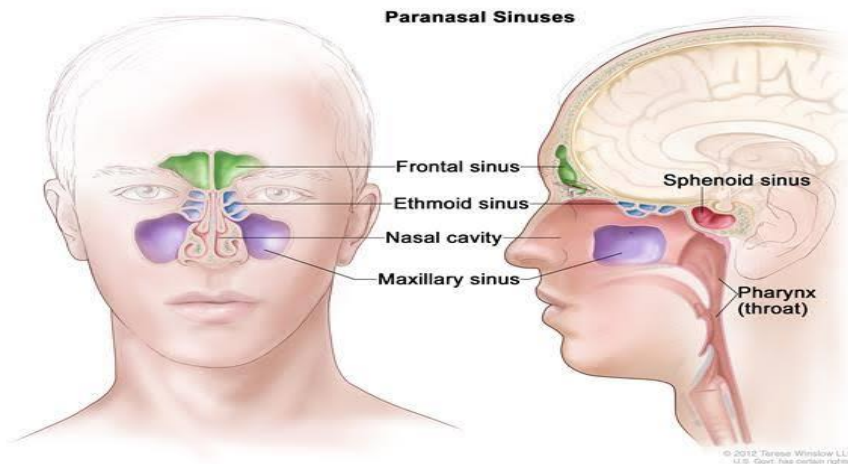
1. **Ankyloglossia (“tongue-tied”)** occurs due to an abnormal length of the lingual frenulum which causes limited manipulation of the tongue during speech and results in speech impediment. In the most common form, the frenulum extends to the tip of the tongue. It can be corrected surgically by severing the lingual frenulum.
2. **Fissured tongue** otherwise known as **plicated tongue** occurs when several small furrows present on the dorsal surface of the tongue. It can be an oral manifestation of psoriasis and it is general painless and benign and is often associated with other syndromes.

QUESTION 2

Write an essay on the air sinuses

ANSWER

These are air-filled extensions of the respiratory part of the nasal cavity into the following cranial bones; frontal, ethmoid, sphenoid and maxilla. These sinuses are named according to the bones in which they are located. They are also known as paranasal sinuses.



FRONTAL SINUS

The right and left frontal sinuses are between the outer and the inner tables of the frontal bone, posterior to the superciliary arches and the root of the nose. They are usually detectable at age 7 in children. Each sinus drains through a frontonasal duct into the ethmoidal infundibulum, which opens into the semilunar hiatus of the middle meatus. The frontal sinuses are innervated by branches of the supraorbital nerves (CN V1).

ETHMOIDAL SINUS

The ethmoidal cells (sinuses) include several cavities that are located in the lateral mass of the ethmoid bone between the nasal cavity and the orbit. The anterior ethmoidal cells drain directly or indirectly into the middle meatus through the infundibulum. The middle ethmoidal cells open directly into the middle meatus. The posterior ethmoidal cells, which form the ethmoidal bulla, open directly into the superior meatus. The ethmoidal sinuses are supplied by the anterior and posterior ethmoidal branches of the nasociliary nerves (CN V1).

SPHENOIDAL SINUS

The sphenoidal sinuses, unevenly divided and separated by a bony septum, occupy the body of the sphenoid bone; they may extend into the wings of this bone in the elderly. Because of these sinuses, the body of the sphenoid is fragile. Only thin plates of bone separate the sinuses from several important structures: the optic nerves and optic chiasm, the pituitary gland, the internal carotid arteries, and the cavernous sinuses. They open into the sphenoidal recess. The posterior ethmoidal artery and nerve supply the sphenoidal sinuses.

MAXILLARY SINUS

The maxillary sinuses are the largest of the paranasal sinuses. These large pyramidal cavities occupy the bodies of the maxillae. The apex of the maxillary sinus extends toward and often into the zygomatic bone. The base of the maxillary sinus forms the inferior part of the lateral wall of the nasal cavity. The roof of the maxillary sinus is formed by the floor of the orbit. The floor of the maxillary sinus is formed by the alveolar part of the maxilla. The roots of the maxillary teeth, particularly the first two molars, often produce conical elevations in the floor of the maxillary sinus. Each sinus drains by an opening, the maxillary ostium, into the middle meatus of the nasal cavity by way of the semilunar hiatus. Because of the superior location of this opening, it is impossible for the sinus to drain when the head is erect until the sinus is full. The arterial supply of the maxillary sinus is mainly from superior alveolar branches of the maxillary artery; however, branches of the greater palatine artery supply the floor of the sinus. Innervation of the maxillary sinus is from the anterior, middle, and posterior superior alveolar nerves, branches of CN V2.