

ADEBAYO BLESSING OMOLOLA

17/MHS01/013

MEDICINE AND SURGERY

300 LEVEL

GROSS ANATOMY OF THE HEAD AND NECK

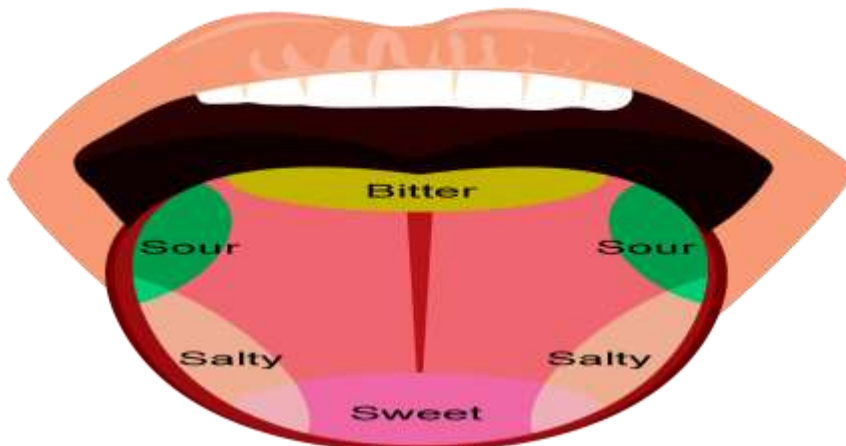
1. Discuss the Anatomy of the tongue and comment on its applied anatomy
2. Write an essay on the air sinuses

ANSWER

1. ANATOMY OF THE TONGUE

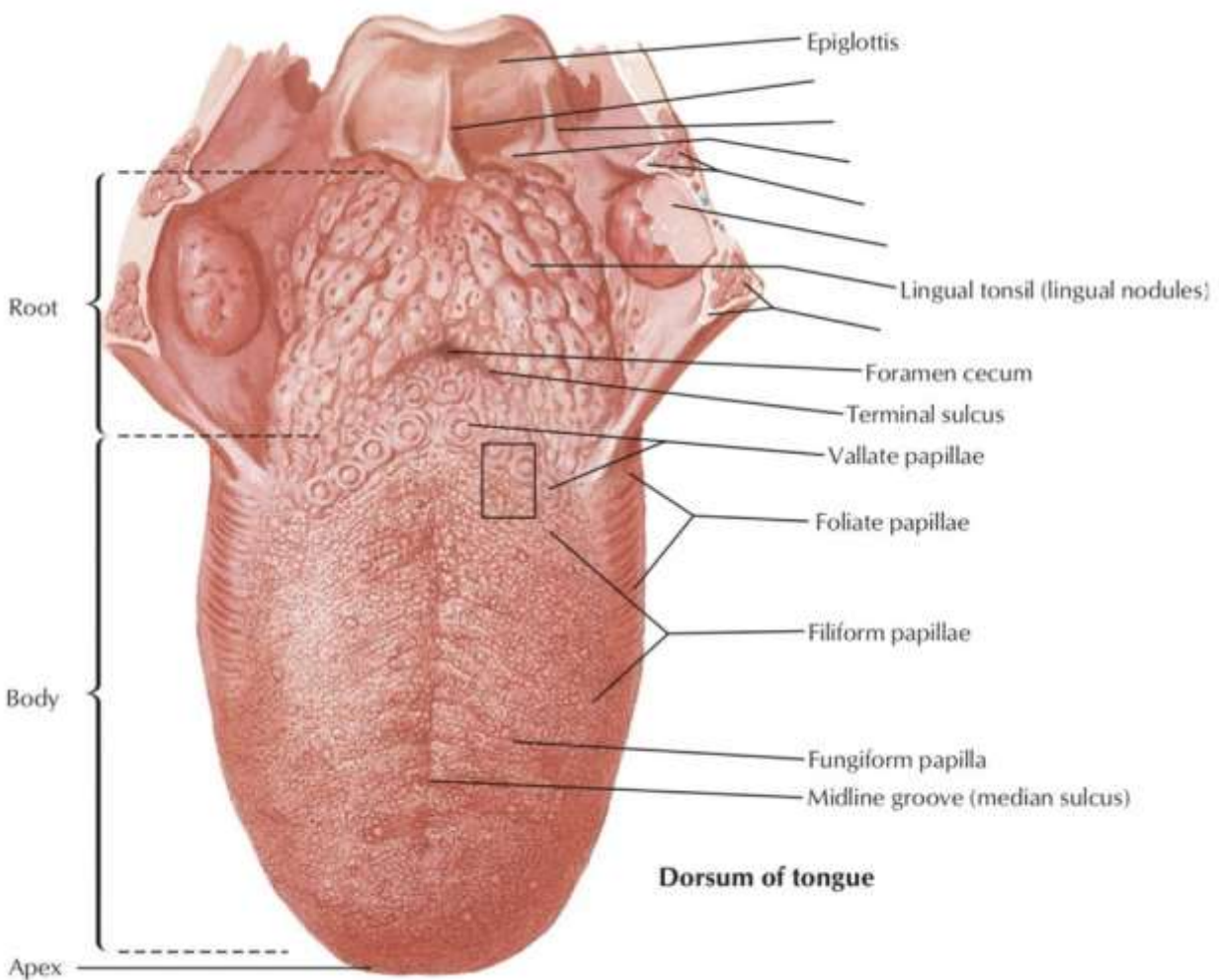
The tongue is a mobile muscular organ that can assume a variety of shapes and positions. The tongue is covered with moist, pink tissue called mucosa. Tiny bumps called papillae give the tongue its rough texture. It is sensitive and kept moist by saliva and is richly supplied with nerves and blood vessels. It is partly in the oral cavity and partly in the oropharynx. The tongue is involved with mastication, taste, deglutition (swallowing), articulation, and oral cleansing; however, its main functions are forming words during speaking and squeezing food into the oropharynx when swallowing.

There are four basic taste sensations: sweet, salty, sour, and bitter. Sweetness is detected at the apex. Saltiness at the anterolateral margins. Sourness at the posterolateral margins. Bitterness at the posterior part of the tongue



Parts and Surfaces of the Tongue

- **A root:** It is the part of the tongue that rests on the floor of the mouth. It is usually defined as the posterior third of the tongue.
- **A body:** Is the anterior two thirds of the tongue
- **An apex(Tip of the tongue):** Is the anterior two thirds of the tongue
- **A curved dorsum (Dorsal surface of the tongue):** Is the posterosuperior surface, which is located partly in the oral cavity and partly in the oropharynx. It has a V-shaped groove on it called the terminal sulcus.
- **An inferior surface:** Underneath the tongue. Important for the ability to visualize veins that allow the rapid absorption of specific medications.



The dorsum is characterized by a V-shaped groove called the terminal sulcus or groove (sulcus terminalis). Posterior to this groove is foramen cecum. This small pit (frequently absent) is the non-functional remnant of the proximal part of the embryonic thyroglossal duct from which the thyroid gland developed.

The terminal sulcus divides the dorsum of the tongue into the:

- Anterior (oral) part in the oral cavity proper
- Posterior (pharyngeal) part in the oropharynx

The margin of the tongue is related on each side to the lingual gingivae and lateral teeth.

The mucous membrane over the anterior part of the dorsum of the tongue is thin and closely attached to the underlying muscle. A shallow midline groove of the tongue divides the tongue into right and left halves called the median sulcus.

The mucous membrane on the anterior part of the tongue is rough because of the presence of numerous small lingual papillae (small nipple like process):

- **Vallate papillae:** Large and flat topped, they lie directly anterior to the terminal sulcus and are arranged in a V-shaped row.
- **Foliate papillae:** Small lateral folds of the lingual mucosa. They are poorly developed in humans. They also have taste receptors located in taste buds.
- **Filiform papillae:** Lying in V-shape rows parallel to the terminal sulcus. Long and numerous, they contain afferent nerve endings that are sensitive to touch.
- **Fungiform papillae:** Mushroom shaped pink or red spots, they are scattered among the filiform papillae but are most numerous at the apex and margins of the tongue. Many contain receptors for taste within taste buds.

The mucous membrane of the posterior part of the tongue is thick and freely movable. It has no lingual papillae, but the underlying lymphoid nodules give this part of the tongue an irregular, cobblestone appearance. The lymphoid nodules are

known collectively as the lingual tonsil. The pharyngeal part of the tongue constitutes the anterior wall of the oropharynx.

The inferior surface of the tongue is covered with a thin, transparent mucous membrane through which one can see the underlying veins. This surface is connected to the floor of the mouth by a midline fold called the frenulum of the tongue. The frenulum allows the anterior part of the tongue to move freely. On each side of the frenulum, a deep lingual vein is visible through the thin mucous membrane.

MUSCLES OF THE TONGUE

The tongue is essentially a mass of muscles that is mostly covered by mucous membrane.

These various muscles are grouped as intrinsic muscles (those entirely within the tongue that affect shape) and extrinsic muscles (those that originate outside the tongue, attach to it and surrounding bones, and affect its position).

INTRINSIC MUSCLES:

- **Superior Longitudinal:** Curls the tip and sides of the tongue upward and shortens the tongue.
- **Inferior Longitudinal:** Curls the tip of the tongue downward and shortens the tongue.
- **Transverse:** Narrows and elongates the tongue, increasing its height and causing it to stick out (protrude).
- **Vertical:** Flattens and broadens the tongue within the mouth, causing it to protrude or push against the front teeth.

EXTRINSIC MUSCLES:

- **Genioglossus:** A large fan-shaped muscle, it contributes most of the bulk to the tongue. It lowers the tongue and may pull it forward to stick out or even to wag it back and forth.
- **Hyoglossus:** A thin, four-sided muscle that lowers the tongue and pulls it back into the mouth.

- **Styloglossus:** Another small, short muscle with fibers that interdigitate with the hyoglossus muscle. It can retract the tongue and draw it up to create a trough for swallowing a bolus of food.
- **Palatoglossus:** In fact, more part of the soft palate than the tongue proper, it works to elevate the back portion of the tongue.

ARTERIAL SUPPLY

The arteries of the tongue are derived from the lingual artery, which arises from the external carotid artery. On entering the tongue, the lingual artery passes deep to the hyoglossus muscle and give rise to the:

- **The dorsal lingual arteries** which supply the posterior part (root). The dorsal lingual arteries are prevented from communicating by the lingual septum
- **The deep lingual arteries** supply the anterior part. The deep lingual arteries communicate with each other near the apex of the tongue.

VENOUS DRAINAGE

The veins of the tongue are the dorsal lingual veins, which accompany the lingual artery.

- The deep lingual veins, which begin at the apex of the tongue, run posteriorly beside the lingual frenulum to join the sublingual vein.
- The sublingual veins in elderly people are often varicose (enlarged and tortuous)

All these lingual veins terminate, directly or indirectly, in the Internal Jugular Vein.

THE LYMPHATIC DRAINAGE OF THE TONGUE

Lymph from the tongue takes the following routes:

- I. Lymph from the posterior third drains into the superior deep cervical lymph nodes.

- II. Lymph from the medial part of the anterior two thirds drains directly to the inferior deep cervical lymph nodes.
- III. Lymph from the lateral parts of the anterior two thirds drains to the submandibular lymph nodes.
- IV. The apex and frenulum drain to the submental lymph nodes.
- V. The posterior third and the medial part of the anterior two thirds drain bilaterally.

INNERVATION OF THE TONGUE

Motor innervation: All muscles of the tongue, except the palatoglossus (actually a palatine muscle supplied by the vagus nerve(X) of the pharyngeal plexus), receive motor innervation from the hypoglossal nerve (CN XII)

Sensory innervation

The anterior two thirds of the tongue are supplied by:

- i. The lingual nerve (CN V₃) for general sensation
- ii. The chorda tympani, a branch of the facial nerve (CN VII) transferring nerve fibers to the lingual nerve, for taste

The posterior third of the tongue and the vallate papillae are supplied by:

- i. The lingual branch of the glossopharyngeal nerve (CN IX) for both general sensation and taste.
- ii. Another contribution is made by the internal laryngeal branch of the vagus (CN X) for general sensation and taste

APPLIED ANATOMY

- **Genioglossus muscle paralysis:** When this muscle becomes paralyzed, the tongue falls backward, potentially obstructing the airway and increasing the risk of suffocation. Total relaxation of the tongue occurs during general anesthesia. As such, this shift of the tongue must be prevented to avoid blocking the airway. This is usually accomplished by inserting a temporary breathing tube during surgery.

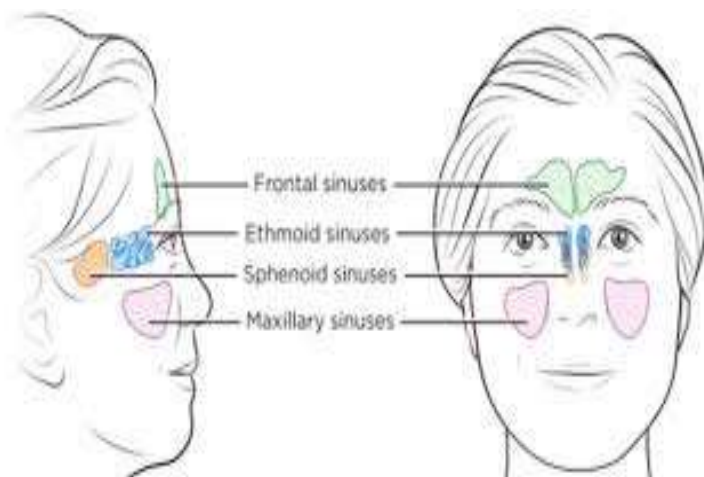
- **Lingual carcinoma:** Cancer, or carcinoma, may affect the tongue. This is more likely due to infections from human papillomavirus (HPV) or from the use of tobacco, including chewing or smoking. The back of the tongue has lymphatic drainage that may cause aggressive cancers to metastasize to the superior deep cervical lymph nodes on both sides of the neck. Cancers of the tongue may require surgical treatment, radiation therapy, and even chemotherapy if metastatic.
- **Hairy tongue:** Papillae can overgrow the surface of the tongue, giving it a white or black appearance. Scraping off the papillae corrects this harmless condition.

2. AIR SINUSES

The air (paranasal) sinuses are air-filled extensions of the respiratory part of the nasal cavity.

They are centered on the nasal cavity and have various functions, including lightening the weight of the head, humidifying and heating inhaled air, increasing the resonance of speech, and serving as a crumple zone to protect vital structures in the event of facial trauma.

There are four paired sinuses, named according to the bone in which they are located; maxillary, frontal, sphenoid and ethmoid. The maxillary sinuses are located under the eyes; the frontal sinuses are above the eyes; the ethmoidal sinuses are between the eyes and the sphenoidal sinuses are behind the eye.



Frontal Sinus: The frontal sinus is located superior to the orbit and within the frontal bone. The typical volume at the adult stage is 4 to 7 mL. The frontal sinus drains into the frontal recess via the middle meatus (this drainage can be variable, either medial or lateral to the uncinate, depending on its attachment).

The frontal sinus vasculature consists of the supraorbital and supratrochlear arteries and ophthalmic and supraorbital veins. Its innervation is provided by the supraorbital and supratrochlear nerves (CNV1).

Sphenoid Sinus: The sphenoid sinuses are located centrally and posteriorly within the sphenoid bone. They drain into the sphenoidal recess located within the superior meatus.

The sphenopalatine artery supplies the sinus, and venous drainage is via the maxillary vein. Innervation is provided by the sphenopalatine nerve, which is comprised of parasympathetic fibers and CN V2. The typical adult size is 0.5 to 8 mL.

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

The ethmoid sinuses are supplied by the anterior and posterior ethmoid arteries, respectively. These arteries are branches of the ophthalmic artery, which is a branch off of the internal carotid artery.

Ethmoid sinus venous drainage is by the maxillary and ethmoid veins. The anterior and posterior ethmoid veins provide innervation.

Maxillary Sinuses: The largest of the sinuses. The maxillary sinus is located under the eyes in the maxillary bone. Adjacent structures include the lateral nasal wall, the orbital floor, and the posterior maxillary wall which contains the pterygopalatine fossa.

The maxillary sinus is innervated by the infraorbital nerve (CN V2). The maxillary and facial arteries supply the sinus, and the maxillary vein supplies venous drainage.

Blood Supply and Lymphatics: The major artery of the maxillary sinus is the internal maxillary artery, a branch of the external carotid artery. The ethmoid and frontal sinuses have a variety of blood supplies, including meningeal vessels for the cribriform plate above the ethmoid sinuses, as well as the posterior wall of the frontal air cells. The sphenoid sinuses may derive blood supply from small branches of the cavernous internal carotid arteries.

Nerves: The major nerve running below the frontal sinus is the first division of the fifth cranial nerve. The major nerve of the inferior aspect of the maxillary sinus is the second division of the fifth cranial nerve. This nerve has sensory but no specific motor functions, as opposed to the third division of cranial nerve five, the latter of which has both sensory (primarily skin of the jaw and the teeth) and motor functions (primarily muscles of mastication).