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18/MHS01/383

300LVL

GROSS ANATOMY ASSIGNMENT

QUESTIONS

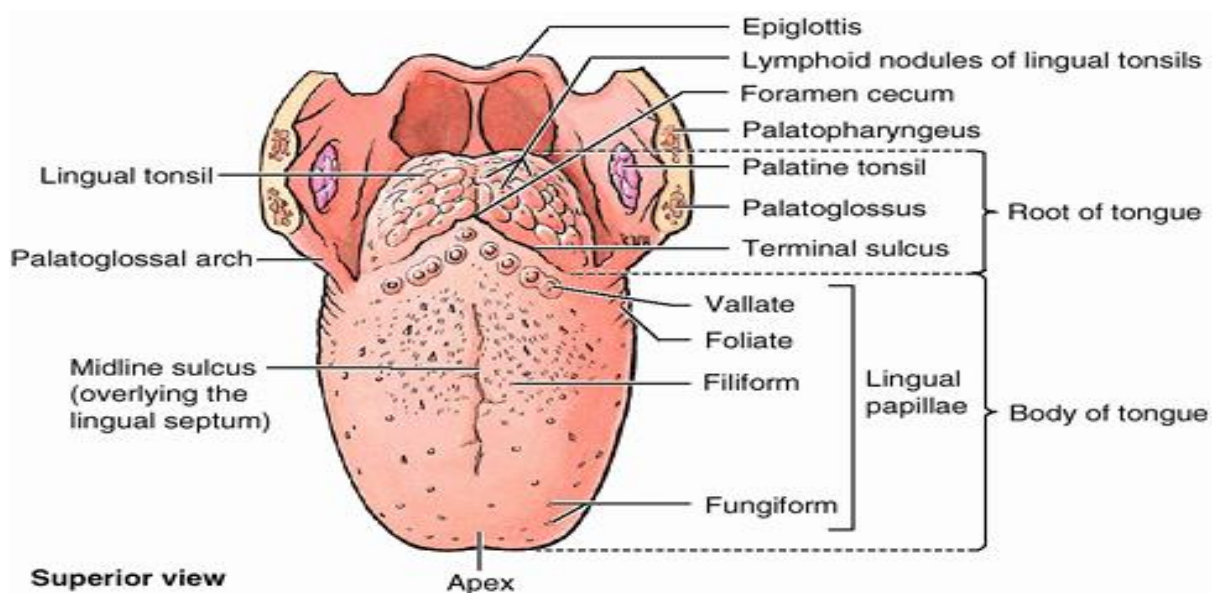
1. Discuss the anatomy of the tongue and add a note on its clinical anatomy
2. Write an essay on the air sinuses

ANSWER 1

THE TONGUE

The tongue is a pink, muscular organ located within the oral cavity proper. It is kept moist by the products of the major and minor salivary glands, which aids the organ as it facilitates deglutition, speech, and gustatory perception. While there is significant variability in the length of the tongue among individuals, on average, the organ is roughly 10 cm long. It has the following parts:

- **The root of the tongue:** 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
- **The body of the tongue:** is the anterior two thirds of the tongue
- **The apex (tip) of the tongue:** is the anterior end of the body, which rests against the incisor teeth. The body and apex of the tongue are extremely mobile.
- **The dorsum (dorsal surface) of the tongue:** is the posterosuperior surface, which is located partly in the oral cavity and partly in the oropharynx.



- The dorsum is characterized by a V-shaped groove called the **terminal sulcus** or **groove (sulcus terminalis)** and posterior to this groove is **the foramen cecum**. The terminal sulcus divides the dorsum of the tongue into the **anterior (oral) part** in the **oral cavity proper** and the **posterior (pharyngeal)** part in the **oropharynx**. The margin of the tongue is related on each side to the lingual gingivae and lateral teeth.

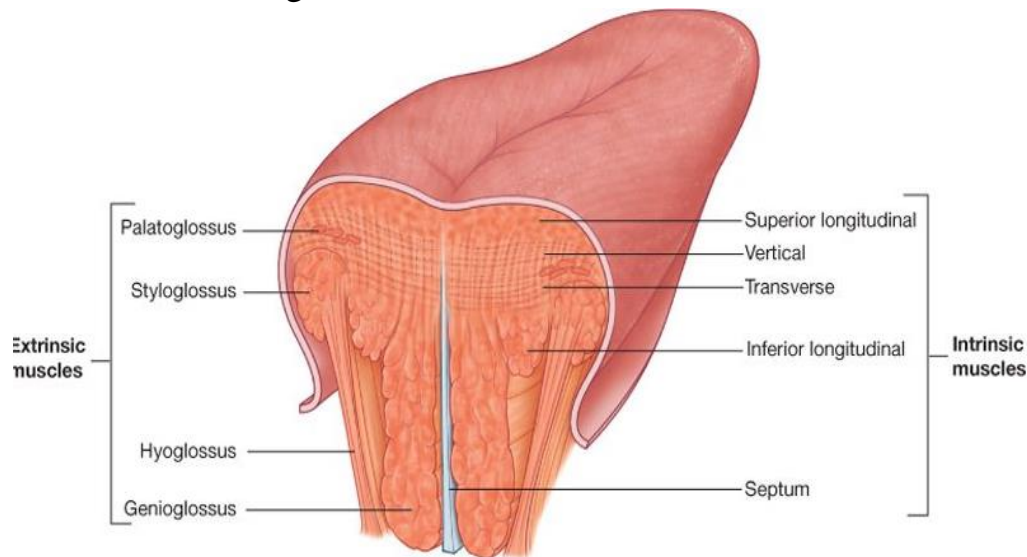
PAPILLAE

The anterior surface of the tongue is rough with numerous nipple like processes called papillae which include:

- 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
- Filiform papillae: 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
- The vallate, foliate, and most of the fungiform papillae contain taste receptors in the taste buds. A shallow midline groove of the tongue divides the tongue into right and left halves called the **median sulcus**. 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 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**. It is important to note that here 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

MUSCLES

The tongue is a chiefly muscular organ with some amount of fatty and fibrous tissue distributed throughout its substance. There are muscles that extend outside of the organ to anchor it to surrounding bony structures known as the **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 of the tongue.



EXTRINSIC MUSCLES

These include:

- genioglossus
- Hyoglossus
- styloglossus
- palatoglossus

They originate outside the tongue and attach to it, they mainly move the tongue but also alter its shape as well.

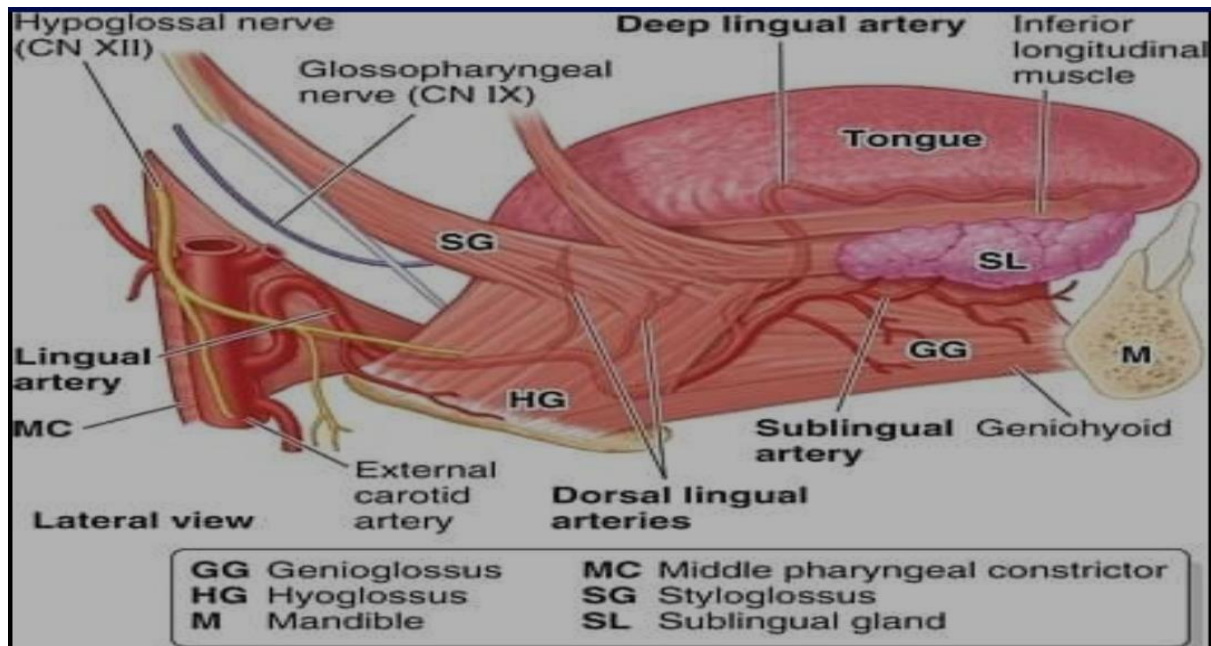
INTRINSIC MUSCLES

These include:

- superior longitudinal muscle
- inferior longitudinal muscle
- transverse muscle
- vertical muscles

They have their attachments entirely within the tongue and are not attached to bone. They are responsible for adjusting the shape and orientation of the organ.

NEUROVASCULATURE 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) and the deep lingual arteries supply the anterior part.

The deep lingual arteries communicate with each other near the apex of the tongue. The dorsal lingual arteries are prevented from communicating by the lingual septum.

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 IJV

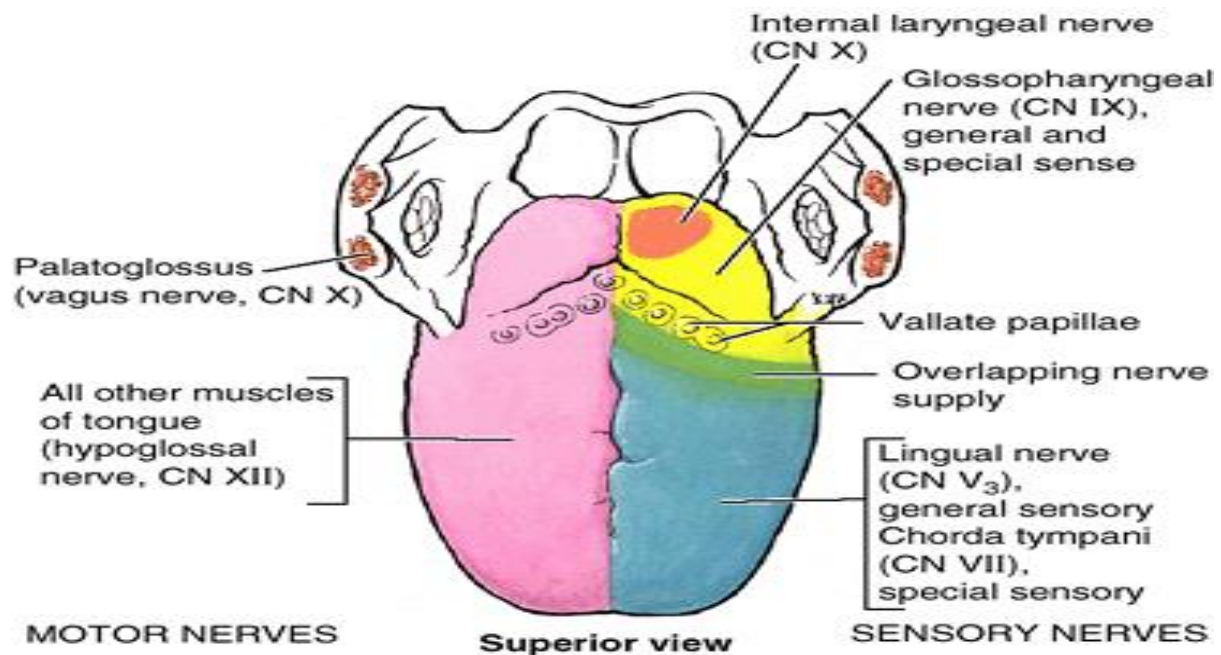
LYMPHATIC DRAINAGE

Lymph from the tongue takes four routes:

- Lymph from the posterior third drains into the **superior deep cervical lymph nodes**
- Lymph from the medial part of the anterior two thirds drains directly to the **inferior deep cervical lymph nodes**
- Lymph from the lateral parts of the anterior two thirds drains to the **submandibular lymph nodes**
- The apex and frenulum drain to the **submental lymph nodes**

- 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:

- the lingual nerve (CN V₃) for general sensation
- 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:

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

CLINICAL ANATOMY

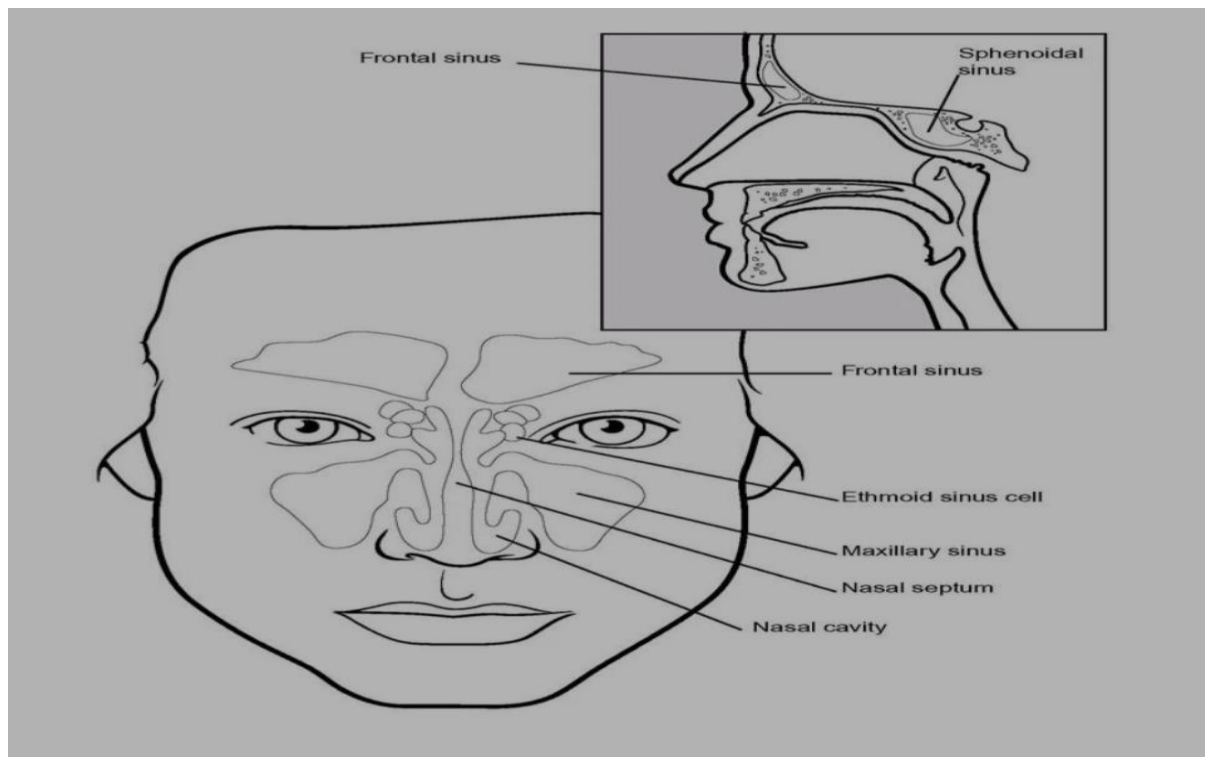
1. A congenital disorder of the tongue is that of ankyloglossia also known as tongue-tie. The tongue is tied to the floor of the mouth by a very short and thickened frenulum and this affects speech, eating, and swallowing.
2. The tongue is prone to several pathologies including glossitis and other inflammations such as geographic tongue, and median rhomboid

glossitis; burning mouth syndrome, oral hairy leukoplakia, oral candidiasis (thrush), black hairy tongue and fissured tongue.

3. A **lingual carcinoma** in the posterior part of the tongue metastasizes to the superior deep cervical lymph nodes on both sides, whereas a tumor in the anterior part usually does not metastasize to the inferior deep cervical lymph nodes until late in the disease. Because these nodes are closely related to the IJV, metastases from the tongue may be widely distributed through the submental and submandibular regions and along the IJVs in the neck.
4. **Thyroglossal Duct Cyst:** A cystic remnant of the thyroglossal duct, associated with development of the thyroid gland, may be found in the root of the tongue and be connected to a sinus that opens at the foramen cecum. Surgical excision of the cyst may be necessary. Most thyroglossal duct cysts are in the neck, close or just inferior to the body of the hyoid bone.

ANSWER 2

AIR SINUSES



The air sinuses, four on each side, are cavities in the bones that adjoin the nose. They are outgrowths from the nasal cavity and retain their communications with it by means of drainage openings, or ostia. Consequently,

their lining is mucous membrane similar to that found in the nose. The mucus secretion formed is propelled by small, hairlike processes called cilia through the ostia of the sinuses to the nasal cavity. From there it is eventually swallowed or expelled. All sinuses are absent or small at birth; they gradually enlarge until puberty, when they usually grow rapidly.

The **two frontal sinuses** are situated in the frontal bone immediately above and between the eye sockets, or orbits. They are usually unequal in size and have the shape of an irregular pyramid with its apex directed upward. The thin bony wall separating the two cavities sometimes is absent.

It is rare to recognize the frontal sinuses until the age of seven years, and their maximum growth occurs after puberty. They vary considerably in size and are usually larger in the male than in the female, averaging, when fully developed, approximately 3 cm (1.2 inches) in height, 2.5 cm (1 inch) in width, and 2 cm (0.8 inch) in depth. The front, or anterior, wall is thick skull bone; behind the sinuses lies bone covering the brain, and the floor of the sinuses slopes toward their openings into the nose.

The **maxillary sinuses** are not only the largest of the air sinuses but also the first to appear, being present in the fourth month of intrauterine life. Each is a pyramidal space, its roof formed by the floor of the eye socket, and its floor by the palate and teeth-bearing bone. The roots of the upper-jaw teeth may project through the floor into the sinus cavity or may be so closely related to the floor that extraction leads to the formation of an opening between mouth and sinus (oro-antral fistula). The maxillary sinuses reach their maximum size by about age 12, when all the permanent teeth except the third molars have erupted. The nerves supplying the upper teeth run through the front wall of the sinus and may be irritated during acute antral infections with resultant toothache.

The **ethmoidal sinuses**, from 3 to 18 thin-walled cavities between the nasal cavities and the eye sockets, make up the ethmoidal labyrinths. Their walls form most of the inner walls of the eye sockets and are joined together by a thin perforated plate of bone at the roof of the nose. This bone, the cribriform plate, transmits the olfactory nerves that carry the sense of smell.

The sinuses contained within each labyrinth are arranged in three noncommunicating groups, all of which open into the nasal cavity. All produce mucus whose function is to lubricate the cilia lining the nasal passages.

The **sphenoidal sinuses** are situated back of the nose in the sphenoidal bone, which forms a forward part of the base of the skull and contains the depression, or fossa, for the pituitary gland. The sinuses are separated from each other by a

bony wall, or septum, that is rarely in the midline, and they discharge their mucus through an opening in the front wall of the sinus into the nose.

These sinuses appear before birth but remain small until the age of 10, when they grow rapidly; rapid growth also occurs at about puberty. Sphenoidal sinuses are important in the surgical approach to the pituitary gland for patients with breast cancer or pituitary tumours.

Functions Of The Paranasal Sinuses

Comprehensive studies on the comparative anatomy and physiology of the nose and paranasal sinuses have been made in humans and in lower animals. The presence of the sphenoidal and frontal sinuses in carnivores such as the dog, hyena, and tiger is related to an increased area of olfaction and consequent improvement in the sense of smell. Ethmoidal air cells are found only in higher apes and humans and are probably the result of restriction of the olfactory area.

The maxillary sinuses are largest in humans, in the higher apes, and in capuchin and howler monkeys; they are absent in baboons, lorises, and tapirs. It has been suggested that these sinuses play a part in phonation, that they aid in conservation of heat from the nasal fossae, and that they serve to lighten the skull, but evidence for these theories is lacking.

Clinical significance

The most common disorder affecting the paranasal sinuses is infection, a condition that is known as sinusitis.

Polyps, consisting of swollen nasal lining, may grow from both the maxillary and ethmoidal sinuses and cause nasal obstruction. They occur most commonly as a result of nasal allergy and require surgical removal.

Cancers affecting the paranasal sinuses are rare, especially in the sphenoidal and frontal area. They occur most commonly among the Bantu of South Africa, where they are related to the long-term use of a homemade snuff that is carcinogenic. Recently, however, it has been shown that certain woodworkers in the furniture industry have a greatly increased incidence of nasal sinus cancer.

