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**MATRIC NUMBER: 17/MHS01/216**

**DEPARTMENT: MEDICINE AND SURGERY**

**COURSE CODE: ANA 301**

**COURSE TITLE: GROSS ANATOMY OF THE HEAD AND NECK**

**QUESTION**

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

**ANATOMY OF THE TONGUE**

The tongue is a muscular organ covered with mucous membrane and it is partly in the oral cavity and partly in the oropharynx. The tongue aids in several functions like; articulation, that is; forming words during speaking, squeezing food into the oropharynx, mastication, taste and oral cleansing.

PARTS AND SURFACE OF THE TONGUE

 The tongue has a root, body and apex. Its root is the attached posterior portion, extending between the mandible, hyoid and the nearly vertical posterior surface of the tongue. The body of the tongue is the anterior approximately two third of the tongue between the root and the apex. The apex is the anterior end of the tongue, which rests against the incisor teeth.

 The tongue has two surfaces, the posterior and superior surfaces, which forms the dorsal surface or the dorsum of the tongue and the inferior surface which rests against the floor of the mouth and is referred to as the underside of the tongue. The surfaces are separated by the margin of the tongue, which is related on each side to the lingual gingivae and lateral teeth.

THE DORSUM OF THE TONGUE; the dorsum of the tongue is characterized by a v-shaped groove termed the terminal sulcus of the tongue. Its angle points posteriorly to the foramen cecum. The foramen cecum is a small pit that is frequently absent and is the non functional remnant of the proximal part of the embryonic throglossal duct from which the thyroid gland develops. The dorsum of the tongue is divided transversely by the terminal sulcus into the presulcal anterior part in the oral cavity and the postsulcal posterior part in the oropharynx. A midline groove divides the anterior part of the tongue into the left and right and its mucosa is relatively thin and attached to the underlying muscle. This anterior part has a rough texture because of the numerous small lingual papillae, which are; vallate, foliate, filiform and fungiform papillae.

 The vallate papillae are large and flat topped papillae that lie directly anterior to the terminal sulcus. They are arranged in a v-shaped row and are surrounded by deep circular trenches. The walls of the trenches are studded with taste buds and the serous glands drain into the trenches. The foliate papillae are small lateral folds of the lingual mucosa, they are poorly developed in humans. The filiform papillae are long and numerous, containing afferent nerve endings that are sensitive to touch. They are pinkish-gray and are also arranged in a v-shaped row that are parallel to the terminal sulcus except at the apex where it tends to be arranged transversely. The fungiform papillae are mushroom shaped, pink or red spots scattered among the filiform papillae, but are most numerous at the apex and margins of the tongue. The papillae contain taste receptors in the taste buds except the foliate papillae.

 The posterior part of the tongue has a thick and freely moveable mucosa. It has no lingual papilla. The underlying lymphoid nodules generally called the lingual tonsil, give it an irregular cobblestone appearance.

THE UNDERSIDE OF THE TONGUE; it is covered with a thin, transparent mucous membrane. It is connected to the floor of the mouth by a midline fold called the frenulum of the tongue. It allows the anterior part of the tongue to move freely and a lingual vein runs through each side of the frenulum.

MUSCLES OF THE TONGUE

 The muscles of the tongue do not act in isolation, some of its muscles perform multiple actions, as parts of a single muscle are capable of acting independently and producing different actions. Hence, the muscles of the tongue are grouped into extrinsic and intrinsic muscles. The extrinsic muscles alter position of the tongue and the intrinsic muscles alter the shape of the tongue. The extrinsic and intrinsic muscles of the tongue on each side are separated by a median fibrous lingual septum, which merges posteriorly with the lingual aponeurosis.

Extrinsic Muscles of the Tongue

1. Genioglossus- this is a fan-shaped muscle which constitutes a bulk of the tongue. Its bilateral activity depresses the tongue, its posterior part pulls the tongue anteriorly for protrusion, its anterior part retracts the apex of the protruded tongue. The unilateral contraction of the genioglossus deviates the tongue to contralateral side.
2. Hyoglossus- it is a thin, quadrilateral muscle. It depresses the tongue especially by pulling its sides inferiorly. Hyoglossus helps shorten the tongue.
3. Styloglossus- this is a small, short, triangular muscle. It retrudes the tongue and curls its sides. The styloglossus works with the genioglossus in forming a central trough during swallowing.
4. Palatoglossus- this is a narrow crescent-shaped palatine muscle. It forms the posterior column of the isthmus of fauces. It is capable of elevating the posterior tongue or depressing the soft palate. Palatoglossus constricts the isthmus of fauces.

Intrinsic Muscle of the Tongue

1. Superior longitudinal muscle- this is a thin layer of muscle, deep to the mucous membrane of the dorsum of the tongue. It curls the tongue longitudinally upwards, elevating the apex and sides of the tongue and it shortens the tongue.
2. Inferior longitudinal muscle- it is a narrow band close to the inferior surface. It curls the tongue longitudinally downwards, depresses the apex and shortens the tongue.
3. Transverse muscle- it lies deep to the superior longitudinal muscle. It narrows and elongates the tongue.
4. Vertical muscle- the fibers of this muscle intersects the transverse muscle. It flattens and broadens the tongue.

VASCULATURE OF THE TONGUE

Innervations

All muscles of the tongue receive motor innervations from cranial nerve xii (hypoglossus nerve). The palatoglossus is supplied by the pharyngeal plexus. For general sensation, the mucosa of the anterior two third is innervated by the lingual nerve, which is a branch of the third division of cranial nerve v (trigeminal nerve). For special sensation (taste), it is supplied by the chorda tympani nerve/ a branch of cranial nerve vii (facial nerve). The mucosa of the posterior third and the vallate papillae are innervated by the lingual branch of the glossopharyngeal nerve (cranial nerve ix), for both general and special sensation. Just anterior to the epiglottis, a small area of the tongue is innervated by twigs of internal laryngeal nerve for mostly general and some special sensation.

Arterial supply

The arteries of the tongue are derived from the lingual artery, which arises from the external carotid artery. It passes through the hypoglossus. The dorsal lingual arteries supply the root of the tongue, the deep lingual arteries supply the body of the tongue. The deep lingual arteries communicate with each other but 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 accompanies the lingual arteries. The deep lingual veins begin at the apex of the tongue, run posteriorly beside the lingual frenulum to join the sublingual vein. Some or all the veins may drain into the internal jugular vein or they do so indirectly by first forming a lingual vein that accompanies the lingual artery.

Lymphatic drainage

The lymph from the tongue drain via four routes;

Lymph from the root of the tongue drain bilaterally into the superior deep cervical lymph nodes.

Lymph from the medial part of the body drains bilaterally and directly to the inferior deep cervical lymph nodes.

Lymph from the left and right lateral parts of the body drain into the submandibular lymph nodes on the ipsilateral side.

Lymph from the apex and frenulum drain into the submental lymph nodes.

 All lymph from the tongue drain into the deep cervical nodes and passes via the jugular venous trunks into the venous system at right and left venous angles.

CLINICAL ANATOMY

1. Paralysis of genioglossus- the tongue tends to fall posteriorly, obstructing the airway and presenting the risk of suffocation. Insertion of an airway aids in preventing the tongue from relapsing.
2. Injury to hypoglossal nerve- could be due to a fracture to the mandible. This causes atrophy on one side of the tongue.
3. Lingual carcinoma- cancer of the tongue.

**AIR SINUSES**

The air sinuses or paranasal sinuses are a group of four paired air filled spaces that surround the nasal cavity. They are named in relation to the facial bones in which they are located like; the maxillary sinuses located under the eyes, the frontal sinuses located above the eyes, the ethmoidal sinuses located between the eyes and the sphenoidal sinuses behind the eyes.

 The maxillary sinuses are the largest air sinuses that lie under the eyes and are innervated by the trigeminal nerve (maxillary division). The frontal sinuses are innervated by the ophthalmic division of the trigeminal nerve. The ethmoidal sinuses are formed from discrete air cells within the ethmoid bone between the nose and the eyes. They are innervated by the ethmoidal nerves, which are a branch of the nasociliary nerve of the ophthalmic division of the trigeminal nerve. The sphenoidal sinuses are innervated by the ophthalmic and maxillary divisions of the trigeminal nerve.

 The air sinuses are lines with repiratory epithelium, that is, the ciliated pseudostratified columnar epithelium. They are joined to the nasal cavity via small orifices called ostia. These openings could become blocked by allergic inflammation or by swelling in the nasal lining caused by cold. This therefore, interrupts drainage of mucus within the sinuses and sinusitis may occur. Inflammation of the sinuses may occur from other source like the teeth and this is termed secondary sinusitis. This condition may be treated with drugs such as decongestants, which cause vasoconstriction in the sinuses, hence, reducing inflammation.

 The air sinuses are also prone to cancer with malignancy which compromise approximately 0.2 of all malignancies. About 80percent of malignancies occur in the maxillary sinuses and men are much more often affected than women. Carcinomas are more frequent than sarcomas. Metastases are rare. Tumors of the sphenoid and frontal sinuses are extremely rare.