

NAME: IDRIS ESTHER OLUFUNMILOLA

MATRIC NO: 17/MHS01/148

ANATOMY ASSIGNMENT

1. ANATOMY OF THE TONGUE

The tongue is a mass muscle that can be divided into different parts based on landmarks. This differentiation is helpful to connect its structure to specific unique functions. The bumps on the tongue are called papillae and these vary in shape and location and are associated with taste buds. The muscles within and surrounding the tongue control its movement.

PARTS OF THE TONGUE

- Root: This is the most often defined as the back third of the tongue. It sits low in the mouth and near the throat, and it is relatively fixed in place. It is attached to the hyoid bone and mandible (lower jaw). It is close in proximity to two muscles: geniohyoid and mylohyoid muscles.
- Body: The rest of the tongue, notably the forward two-thirds that lie in front of the sulcus. It is extremely mobile and serves multiple functions.
- Apex: This is the tip of the tongue, a pointed portion most forward in the mouth. It is also extremely mobile.
- Dorsum: This is the curved upper surface towards the back. It has a V-shaped groove on it called the terminal sulcus.
- Inferior Surface: Underneath the tongue lies this last feature, important for the ability to visualise veins that allow the rapid absorption of specific medications.

TYPES OF PAPIILLAE

- Vallate Papillae: These large, flat-topped bumps lie just in front of the terminal sulcus, located about two-thirds back on the surface of the

tongue. They are surrounded by deep trenches- into which ducts open from fluid-producing glands and their walls are covered in taste buds.

- Folate Papillae: Though poorly developed in humans, these small folds of the mucosa surface of the tongue are found to the sides. They also have taste receptors located in taste buds.
- Filiform Papillae: Lying in V-shape rows parallel to the terminal sulcus, these bumps are elongated and numerous. They contain nerve endings that are sensitive to touch. Appearing scaly, thread like, and pinkish-grey in colour, they can make the tongues of some animals (cat) especially rough. At the tongue's tip, these papillae sit more cross wise (arranged transversely).
- Fungiform Papillae: Scattered among the filiform papillae are these oddly mushroom-shaped spots that may be pink or red in coloration. They are commonly found along the tip or sides of the tongue. Many contain the receptors for taste within taste buds.

NOTE: The back of the tongue has no papillae but underlying lymphatic tissue that may give it an irregular, cobblestone appearance.

MUSCLES

- Intrinsic Muscles

The intrinsic muscles only attach to other structures in the tongue. There are four paired intrinsic muscles of the tongue and they are named by the direction in which they travel

- Superior longitudinal muscle
- Inferior longitudinal muscle
- Transverse muscle
- Vertical muscle

These muscles affect the shape and size of the tongue- for example, in tongue rolling and have a role in facilitating speech, eating and swallowing.

- Extrinsic Muscles

The extrinsic muscles are as follows:

Genioglossus

Attachments: Arises from the hyoid bone and inserts into the side of the tongue

Function: Retracts and elevates the tongue

Hypoglossus

Attachments: Arises from the hyoid bone and inserts into the side of the tongue

Function: depresses and retract the tongue

Styloglossus

Attachments: Originates at the styloid processes of the temporal bone and inserts into the side of the tongue

Function: Retracts and elevates the tongue

Palatoglossus

Attachments: Arises from the palatine aponeurosis and inserts broadly across the tongue

Function: Elevates the posterior aspect of the tongue

NOTE: All the intrinsic and extrinsic muscles are innervated by the hypoglossal nerve, except palatoglossus which has vagal innervation

INNERVATION

- Anterior 2/3 responsible for general sensation is supplied by the trigeminal nerve. Specifically the lingual nerve a branch of the mandibular nerve

- Anterior 2/3 for taste is supplied from the facial nerve. In the petrous part of the temporal bone, the facial nerve gives off three branches one of which is chorda tympani. This travels through the middle ear, and continues on to the tongue.
- The posterior 1/3 of the tongue is slightly easier. Both touch and taste are supplied by the glossopharyngeal nerve

VASCULATURE

The lingual artery (branch of the external carotid) does most of the supply but there is a branch from the facial artery called the tonsillar artery, which can provide some collateral circulation. Drainage is by the lingual vein.

LYMPHATIC DRAINAGE

The lymphatic drainage of the tongue is as follows:

Anterior two thirds- initially into the submental and submandibular nodes, which empty into the cervical lymph nodes

Posterior third- directly into the deep cervical lymph nodes

APPLIED ANATOMY

- Aglossia

This is a congenital defect resulting in a partial development or complete absence of a tongue. It is commonly associated with craniofacial and limb defects (Adactylia Syndrome) and is thought to belong to the family of oromandibular limb hypogenesis syndrome or OLHS. It is believed to be caused by the heat-induced vascular disruption near the fourth week of development.

- Ankyloglossia

The lingual frenulum is a small fold of mucous membrane that connects the middle of the lower surface of the tongue to the floor of the mouth. If it is too short, often from birth, the tongue may be abnormally retracted into the lower

jaw. This lower position leads to a condition that is colloquially known as 'tongue tied'. This may be rarely checked especially if it is at the back of the tongue, and often goes untreated. It may be recognized with early infancy swallowing problems and speech impairment at school age as the short frenulum may interfere with tongue movements and function. Clipping the frenulum is simple surgery and this frenulectomy may be necessary for infants to free the tongue for normal speech development.

- Oral Cancer

A growth or ulcer appears on the tongue and grows steadily. Oral cancer is more common in people who drink alcohol heavily and/or smoke

- Canker sores

Small, painful ulcers appear periodically on the tongue and mouth. A relatively common condition whose cause is unknown and are unrelated to the sores caused by herpes viruses. Canker sores are not contagious

- Geographic tongue

This is a benign, asymptomatic condition characterized by the presence of large patches with the greyish-white border covering the dorsum of an otherwise normal tongue. It is caused by inflammation of the mucous membrane of the tongue, which results in loss of lingual papillae. The lesions are known to migrate over time. The name arises from the map-like appearance of the tongue in this condition.

- Fissure tongue (scrotal tongue, plicated tongue)

This occurs when several furrows present on the dorsal surface of the tongue. It can be an oral manifestation of psoriasis. It is generally painless and benign, and is often associated with other syndromes e.g Down Syndrome

2. AIR SINUSES

Air sinuses also known as Paranasal sinuses are group of four paired 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 these 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

Maxillary sinus

The maxillary sinus is also known as antrum of Highmore. It is pyramidal in shape and is the largest of the paranasal sinuses. It drains into the middle meatus of the nose through the osteomeatal complex. It is the first sinus to appear as a shallow groove. At birth, it measures about 7x4x4mm. It continues to develop throughout childhood at the annual rate of 2mm vertically and 3mm anteroposteriorly. It reaches its final size in the seventeenth to eighteenth year of life

Structure

It has three recesses:

- an alveolar recess pointed inferiorly, bounded by the alveolar process of the maxilla
- A zygomatic recess pointed laterally, bounded by the zygomatic bone
- An infraorbital recess pointed superiorly, bounded by the inferior orbital surface of the maxilla

The medial wall is composed primarily of cartilage. The ostia for drainage are located high on the medial wall and open into the semilunar hiatus of the lateral nasal cavity. Because of the position of the ostia, gravity cannot drain the maxillary sinus contents when the head is erect. The ostium of the maxillary sinus is high up on the medial wall and on the average is 2.4mm in diameter, with a mean volume of about 10ml.

The sinus is lined with mucoperiosteum, with cilia that beat toward the ostia. This membranous lining is referred to as the Schneiderian membrane which is histologically a bilaminar membrane with pseudostratified ciliated columnar epithelial cells on the internal side and periosteum on the osseous side. The size of the sinuses varies in different skull and even on two sides of the same skull.

The infraorbital canal usually projects into the cavity as a well-marked ridge extending from the roof to the anterior wall; additional ridges are sometimes seen in the posterior wall of the cavity and are caused by the alveolar canals

The mucous membranes receive their postganglion parasympathetic nerve innervation for mucous secretion originating from the greater petrosal nerve (a branch of the facial nerve). The superior alveolar (anterior, middle, and posterior) nerves, branches of the maxillary nerve provide sensory innervation.

Walls

The nasal wall presents in the disarticulated bone, a large, irregular aperture, communicating with the nasal cavity. In the articulated skull this aperture is much reduced in size by the following bones:

- The uncinat process of the ethmoid above
- The ethmoidal process of the interior nasal concha below
- The vertical part of the palatine behind
- A small part of the lacrimal above and in front

The sinus communicates through an opening into the semilunar hiatus on the lateral nasal wall.

On the posterior wall are the alveolar canals, transmitting the posterior superior alveolar vessels and nerves to the molar teeth.

The floor is formed by the alveolar process, and, if the sinus is of an

average size, is on a level with the floor of the nose; if sinus is large it reaches below this level. Projecting into the floor of the antrum are several conical processes, corresponding to the roots of the first and second maxillary molar teeth; in some cases the floor can be perforated by the apices of the teeth.

The roof is formed by floor of the orbit. It is traversed by infraorbital nerves and vessels.

Clinical significance

- Maxillary sinusitis

This is inflammation of the maxillary sinuses. The symptoms of sinusitis are headache, usually near the involved sinus, and foul-smelling nasal or pharyngeal discharge, possibly with some systemic signs of infection such as fever and weakness. The skin over the involved sinus can be tender, hot and ven reddened due to the inflammatory process in the area. On radiographs, there is opacification (or cloudiness) of the usually translucent sinus due to retained mucus.

Frontal sinus

Structure

The frontal sinuses are situated behind the brow-ridges and are funnel-shaped. They are rarely symmetrical and the septum between them frequently deviates to one or other side of the the middle line. The mucosa membrane in this sinus is innervated by supraorbital nerve which carries the post ganglionic parasympathetic nerve fibers for mucous secretion from the ophthalmic nerve and supplied by the supraorbital artery and anterior ethmoidal artery.

Development

The frontal sinuses are absent at birth, but generally fairly well developed between the seventh and eighth years only reaching their full size after puberty. The frontal bone is membranous at birth and there is rarely more than a

recess until the bone tissue starts to ossify about age two. Consequently, this structure does not show on the radiographs before that time. Approximately 5% of people have absent frontal sinuses.

Function

Through its copious mucus production, the sinus is an essential part of the immune defense/air filtration carried out by the nose.

Fractures

Frontal sinus fractures occur from trauma to the part of the frontal bone that overlies the sinus, often from motor vehicle accidents and falls. The hallmarks of the frontal sinus fracture is a frontal depression in the anterior table of the bone. additionally, clear fluid leaking from the nose may indicate that fractures to the posterior table have torn into the dura mater, creating a cerebrospinal fluid leak.

Goals in management are to protect the intracranial structure, control any existing CSF leakage, prevent late complications, aesthetically correct the deformity caused, if any. In anterior table fractures, if the table is minimally displaced, there will be no treatment necessary, only observation. If largely displaced, the correction is open reduction and internal fixation. If inhibiting the nasofrontal outflow tract, procedure is to undergo open reduction and internal fixation of the anterior table and osteoplastic flap with obliteration.

In posterior table fractures, a non displaced fracture with no CSF leak will only be observed. Those with a CSF leak will undergo sinus exploration will be required to determine the required level of cranialisation, obliteration and reparation to the dura.

Clinical significance

Infection of the frontal sinus causing sinusitis can give rise to serious complications as it is in close proximity to the orbit and cranial cavity (orbital cellulitis, epidural and subdural abscess, meningitis). Endonasal approach into the frontal sinus in children with acute and chronic frontal sinusitis without the usage

of surgical optics is not successful, because in this case the operation is performed almost blindly and technically difficult even in adults.

Ethmoid sinuses

The ethmoid sinuses or ethmoid air cells of the ethmoid bone are one of the four paired paranasal sinuses. The cells are variable in both size and number in the lateral mass of each of the ethmoid bones and cannot be palpated during an extraoral examination. They are divided into anterior and posterior groups. The ethmoid air cells are numerous thin walled cavities situated in the ethmoidal labyrinth and completed by the frontal, maxilla, lacrimal, sphenoidal, and palatine bones. They lie between the upper parts of the nasal cavities and the orbits, and are separated from these cavities by thin bony lamellae.

The groups of the ethmoidal air cells drain into the nasal meatuses.

- The posterior group the posterior ethmoidal sinus drains into the superior meatus above the middle nasal concha; sometimes one or more opens into the sphenoidal sinus.
- The anterior group the anterior ethmoidal sinus drains into the middle meatus of the nose by way of the infundibulum

The two groups are divided by the basal lamella. This is one of the bony divisions of the ethmoid bone and is mostly contained inside the ethmoid labyrinth. Medially the lamella becomes the bony part of the middle concha.

Development

The ethmoidal cells (sinuses) are not present at birth, however by 2 years of age they are recognisable through the use of Computerised Tomography (CT) scanning.

Innervation

The ethmoidal air cells receive sensory fibers from the anterior and posterior ethmoidal nerves, and the orbital branches of the pterygopalatine

ganglion, which carry the postganglionic parasympathetic nerve fibers for mucous secretion from the facial nerve.

Haller cell

Haller cells are infraorbital ethmoidal air cells lateral to the lamina papyracea. These may arise from the anterior or posterior ethmoidal sinuses.

Clinical significance

Acute ethmoiditis in childhood and ethmoidal carcinoma may spread superiorly causing meningitis and cerebrospinal fluid leakage or it may spread laterally into the orbit causing proptosis and diplopia

Sphenoidal sinus

The sphenoidal sinus is located within the body of the sphenoid bone. The sphenoidal sinuses vary in size and shape, owing to the lateral displacement of the intervening septum, which may insert on the carotid canal, they are rarely symmetrical. They cannot be palpated during an extraoral examination.

Structure

When exceptionally large, or the sphenoid sinuses may extend into the roots of the pterygoid processes or great wings, and may invade the basilar part of the occipital bone.

Each sinus opens into the roof of the nasal cavity via apertures on the posterior wall of the sphenoidal recess directly above the choana. The apertures are located high on the anterior walls of the sinuses themselves.

Development

They are present as very small cavities at birth, slowly develop with the growth of the skull. Just after puberty the sinuses finish development.

Nerve supply

The mucous membrane receives sensory innervation by the posterior ethmoidal nerves (branch of the ophthalmic nerve), and postganglionic parasympathetic fibers of the facial nerve that synapsed at the pterygopalatine ganglion which controls secretion of mucus.

Clinical significance

- A potential complication of sphenoidal sinusitis is cavernous sinus thrombosis.
- If fast-growing tumor erodes the floor of the sinus, the vidian nerve could be in danger.

If the tumor spreads laterally, the cavernous sinus and all its constituent nerves could be in danger. An endonasal surgical procedure called sphenoidotomy may be carried out to enlarge the sphenoid sinus, usually in order to drain it.

Use in neurosurgery

Because only thin shelves of bone separate the sphenoidal sinuses from the nasal cavities below and hypophyseal fossa above, the pituitary gland can be surgically approached through the roof of the nasal cavities by first passing through the anteroinferior aspect of the sphenoid bone and into the sinuses, followed by entry through the top of the sphenoid bone into the hypophyseal fossa.

