

ENYONG, RUTH KINGSLEY

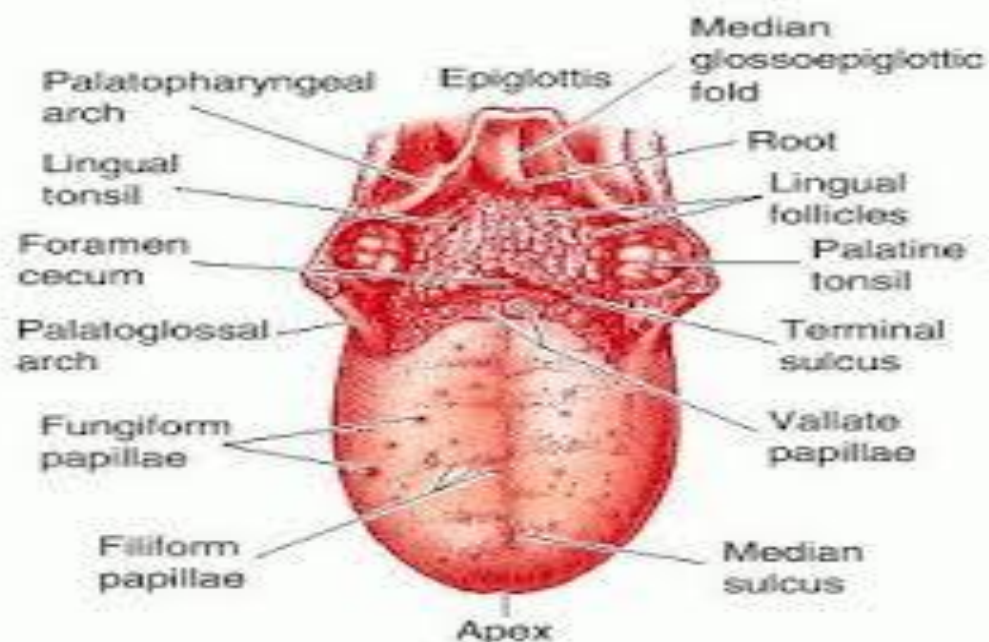
17/MHS01/119

MEDICINE AND SURGERY

GROSS ANATOMY OF HEAD AND NECK (ANA 301)

1. DISCUSS THE ANATOMY OF THE TONGUE AND COMMENT ON ITS APPLIED ANATOMY.

The tongue is a muscular organ in the mouth for mastication and is used in the act of swallowing. It has importance in the digestive system and is the primary organ of taste in the gustatory system. It is sensitive and kept moist by saliva and is richly supplied with nerves and blood vessels. The tongue also serves as a natural means of cleaning the teeth. A major function of the tongue is the enabling of speech in humans and vocalization. The average length of the human tongue from the oropharynx to the tip is 10 cm. The average weight of the tongue of adult males and females is 70g and 60g respectively.



The tongue is a muscular hydrostat that forms part of the floor of the oral cavity. It is divided into two parts, an oral part at the front and a pharyngeal part at the back. The left and right sides of the tongue are separated by a vertical section of fibrous tissue known as the lingual septum. This division is along the length of the tongue save for the very back of the pharyngeal part and is visible as a groove called the median sulcus. The human tongue is also divided into anterior and posterior parts by the terminal sulcus which is a V-shaped groove. The apex of the terminal sulcus is marked by a blind foramen, the foramen cecum, which is a remnant of the median thyroid diverticulum in early embryonic development. The anterior oral part is the visible part situated at the front and makes up roughly two-thirds the length of the tongue. The posterior pharyngeal part is the part closest to the throat, roughly one-third of its length. These parts differ in terms of their embryological development and nerve supply. The anterior tongue is, at its apex, thin and narrow. It is directed forward against the lingual surfaces of the lower incisor teeth. The posterior part is, at its root, directed backward, and connected with the hyoid bone by the hyoglossi and genioglossi muscles and the hyoglossal membrane, with the epiglottis by three glossoepiglottic folds of mucous membrane, with the soft palate by the glossopalatine arches, and with the pharynx by the superior pharyngeal constrictor muscle and the mucous membrane. It also forms the anterior wall of the oropharynx.

The upper surface of the tongue is called the dorsum, and is divided by a groove into symmetrical halves by the median sulcus. The foramen cecum marks the end of this division (at about 2.5 cm from the root of the tongue) and the beginning of the terminal sulcus. The foramen cecum is also the point of attachment of the thyroglossal duct and is formed during the descent of the thyroid diverticulum in

embryonic development. The terminal sulcus is a shallow groove that runs forward as a shallow groove in a V shape from the foramen cecum, forwards and outwards to the margins (borders) of the tongue. The terminal sulcus divides the tongue into a posterior pharyngeal part and an anterior oral part. The pharyngeal part is supplied by the glossopharyngeal nerve and the oral part is supplied by the lingual nerve (a branch of the mandibular branch (V3) of the trigeminal nerve) for somatosensory perception and by the chorda tympani (a branch of the facial nerve) for taste perception. Both parts of the tongue develop from different pharyngeal arches.

On the undersurface of the tongue is a fold of mucous membrane called the frenulum that tethers the tongue at the midline to the floor of the mouth. On either side of the frenulum are small prominences called sublingual caruncles that the major salivary submandibular glands drain into.

The eight muscles of the human tongue are classified as either intrinsic or extrinsic. The four intrinsic muscles act to change the shape of the tongue, and are not attached to any bone. The four extrinsic muscles act to change the position of the tongue, and are anchored to bone.

The four extrinsic muscles originate from bone and extend to the tongue. They are the genioglossus, the hyoglossus (often including the chondroglossus) the styloglossus, and the palatoglossus. Their main functions are altering the tongue's position allowing for protrusion, retraction, and side-to-side movement. The genioglossus arises from the mandible and protrudes the tongue. It is also known as the tongue's "safety muscle" since it is the only muscle that propels the tongue forward. The hyoglossus, arises from the hyoid bone and retracts and depresses the tongue. The chondroglossus is often included with this muscle. The styloglossus arises from the styloid

process of the temporal bone and draws the sides of the tongue up to create a trough for swallowing. The palatoglossus arises from the palatine aponeurosis, and depresses the soft palate, moves the palatoglossal fold towards the midline, and elevates the back of the tongue during swallowing.

The four paired intrinsic muscles of the tongue originate and insert within the tongue, running along its length. They are the superior longitudinal muscle, the inferior longitudinal muscle, the vertical muscle, and the transverse muscle. These muscles alter the shape of the tongue by lengthening and shortening it, curling and uncurling its apex and edges as in tongue rolling, and flattening and rounding its surface. This provides shape and helps facilitate speech, swallowing, and eating. The superior longitudinal muscle runs along the upper surface of the tongue under the mucous membrane, and elevates, assists in retraction of, or deviates the tip of the tongue. It originates near the epiglottis, at the hyoid bone, from the median fibrous septum. The inferior longitudinal muscle lines the sides of the tongue, and is joined to the styloglossus muscle. The vertical muscle is located in the middle of the tongue, and joins the superior and inferior longitudinal muscles. The transverse muscle divides the tongue at the middle, and is attached to the mucous membranes that run along the sides.

The tongue receives its blood supply primarily from the lingual artery, a branch of the external carotid artery. The lingual veins drain into the internal jugular vein. The floor of the mouth also receives its blood supply from the lingual artery. There is also a secondary blood supply to the root of tongue from the tonsillar branch of the facial artery and the ascending pharyngeal artery. An area in the neck sometimes called the Pirogov triangle is formed by the intermediate tendon of the digastric muscle, the posterior border of the mylohyoid muscle,

and the hypoglossal nerve. The lingual artery is a good place to stop severe hemorrhage from the tongue.

Innervation of the tongue consists of motor fibers, special sensory fibers for taste, and general sensory fibers for sensation. Motor supply for all intrinsic and extrinsic muscles of the tongue is supplied by efferent motor nerve fibers from the hypoglossal nerve (CN XII), with the exception of the palatoglossus, which is innervated by the vagus nerve (CN X). Innervation of taste and sensation is different for the anterior and posterior part of the tongue because they are derived from different embryological structures (pharyngeal arch 1 and pharyngeal arches 3 and 4, respectively). The tip of tongue drains to the submental nodes. The left and right halves of the anterior two-thirds of the tongue drains to submandibular lymph nodes, while the posterior one-third of the tongue drains to the jugulo-omohyoid nodes.

In the case of its microanatomy, the upper surface of the tongue is covered in masticatory mucosa a type of oral mucosa which is of keratinized stratified squamous epithelium. Embedded in this are numerous papillae that house the taste buds and their taste receptors. The lingual papillae consist of filiform, fungiform, vallate and foliate papillae and only the filiform papillae are not associated with any taste buds. The tongue can also divide itself in dorsal and ventral surface. The dorsal surface is a stratified squamous keratinized epithelium which is characterized by numerous mucosal projections called papillae. The lingual papillae covers the dorsal side of the tongue towards the front of the terminal groove . The ventral surface is stratified squamous non-keratinized epithelium which is smooth.

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

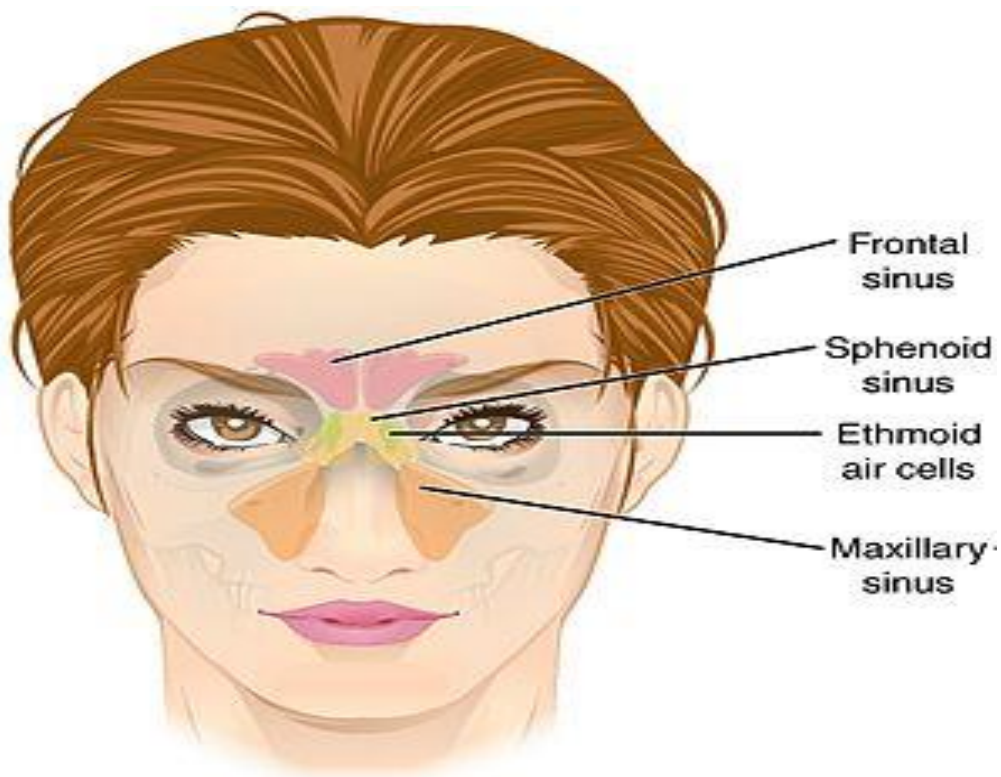
swallowing. The tongue is prone to several pathologies including glossitis and other inflammations such as geographic tongue, and median rhomboid glossitis; burning mouth syndrome, oral hairy leukoplakia, oral candidiasis (thrush), black hairy tongue and fissured tongue. There are several types of oral cancer that mainly affect the tongue. Mostly these are squamous cell carcinomas. Food debris, desquamated epithelial cells and bacteria often form a visible tongue coating. This coating has been identified as a major factor contributing to bad breath (halitosis) which can be managed by using a tongue cleaner.

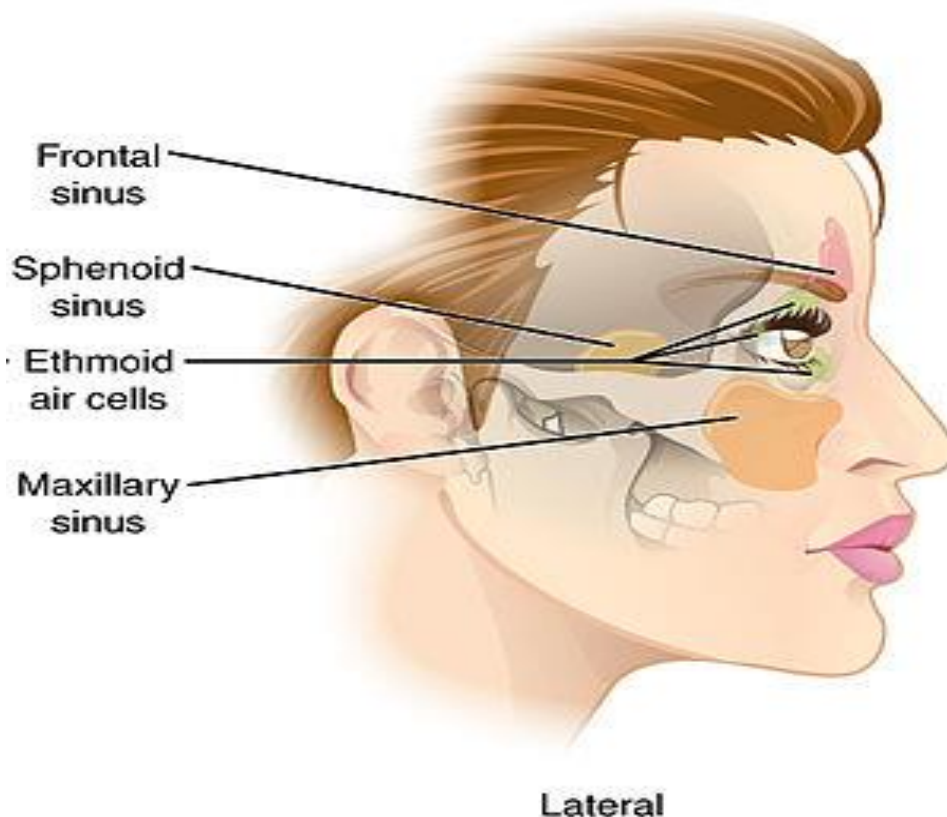
The sublingual region underneath the front of the tongue is an ideal location for the administration of certain medications into the body. The oral mucosa is very thin underneath the tongue, and is underlain by a plexus of veins. The sublingual route takes advantage of the highly vascular quality of the oral cavity, and allows for the speedy application of medication into the cardiovascular system, bypassing the gastrointestinal tract. This is the only convenient and efficacious route of administration (apart from Intravenous therapy) of nitroglycerin to a patient suffering chest pain from angina pectoris.

2. WRITE AN ESSAY ON THE AIR SINUSES.

The air sinuses are also known as the paranasal sinuses. The paranasal sinuses are a group of four paired air-filled spaces that surround the nasal cavity. Humans possess four paired paranasal sinuses, divided into subgroups that are named according to the bones within which the sinuses are located. They include: the maxillary sinuses (the largest of the paranasal sinuses, located under the eyes in the maxillary bones, open in the back of the semilunar hiatus of the nose.

They are innervated by the trigeminal nerve CN Vb), the frontal sinuses (superior to the eyes, in the frontal bone, which forms the hard part of the forehead. They are also innervated by the trigeminal nerve CN Va), the ethmoidal sinuses (are formed from several discrete air cells within the ethmoid bone between the nose and the eyes. They are innervated by the ethmoidal nerves, which branch from the nasociliary nerve of the trigeminal nerve CN Va) and the sphenoidal sinuses (in the sphenoid bone. They are innervated by the trigeminal nerve CN Va & Vb). The paranasal air sinuses are lined with respiratory epithelium (ciliated pseudostratified columnar epithelium).





Paranasal sinuses form developmentally through excavation of bone by air-filled sacs (pneumatic diverticula) from the nasal cavity. This process begins prenatally (intrauterine life), and it continues through the course of an organism's lifetime. The results of experimental studies suggest that the natural ventilation rate of a sinus with a single sinus ostium (opening) is extremely slow. Such limited ventilation may be protective for the sinus, as it would help prevent drying of its mucosal surface and maintain a near-sterile environment with high carbon dioxide concentrations and minimal pathogen access. Thus composition of gas content in the maxillary sinus is similar to venous blood, with high carbon dioxide and lower oxygen levels compared to breathing air. At birth only the maxillary sinus and the ethmoid sinus are developed but not yet pneumatized; only by the age of seven they are fully aerated. The sphenoid sinus appears at the age of three, and

the frontal sinuses first appear at the age of six, and fully develop during adulthood.

The clinical significances of the air sinuses can be seen in cancer and inflammations. The paranasal sinuses are joined to the nasal cavity via small orifices called ostia. These become blocked easily by allergic inflammation, or by swelling in the nasal lining that occurs with a cold. If this happens, normal drainage of mucus within the sinuses is disrupted, and sinusitis may occur. Because the maxillary posterior teeth are close to the maxillary sinus, this can also cause clinical problems if any disease processes are present, such as an infection in any of these teeth. These clinical problems can include secondary sinusitis, the inflammation of the sinuses from another source such as an infection of the adjacent teeth. These conditions may be treated with drugs such as decongestants, which cause vasoconstriction in the sinuses; reducing inflammation; by traditional techniques of nasal irrigation; or by corticosteroid. In the case of cancer, malignancies of the paranasal sinuses comprise approximately 0.2% of all malignancies. About 80% of these malignancies arise in the maxillary sinus. Men are much more often affected than women. They most often occur in the age group between 40 and 70 years. Carcinomas are more frequent than sarcomas. Metastases are rare. Tumours of the sphenoid and frontal sinuses are extremely rare.