

L'enseignement de l'anatomie des appareils digestif, urinaire et génital par l'utilisation de vidéos d'anatomie 3D en anglais, intérêts pédagogiques par rapport aux méthodes classiques d'enseignement



I. INTRODUCTION

The mouth is the initial portion of the alimentary tube. It occupies the lower third of the face limited by the maxilla upwards and the mandible downwards. It has the shape of an irregular cavity extending from the lips to the palatoglossal arches. Two main parts of the mouth are distinguished separated by the dental arches.

The vestibule of the mouth is the space between lips and cheeks outside and teeth and gingivae inside.

The mouth cavity proper is the space inside the teeth and gums.

The mouth is, thus, a complex that ensures four main functions, digestion, deglutition, respiration and communication. Although when closed, it is reduced to a slit, the labial cleft, bounded by the labia.

II. DESCRIPTIVE ANATOMY

A- SITUATION

The mouth extends from the lips to the palatoglossal arches, the anterior pillars of the fauces. It is enclosed by the lips and cheeks. The floor is largely occupied by the tongue, and the roof is the hard palate.

B- VESTIBULE OF THE MOUTH

The vestibule of the mouth is a closed curved space between lips forwards and cheeks laterally lying in contact with the teeth and gums of dental arches backwards. It consists of two inferior and superior horseshoe-shaped gutters.

The vestibule of the mouth communicates with the cavity of the mouth through the space behind the molar teeth and in the rest position with the teeth slightly parted. It is the preferred site for the release of saliva of parotid and labial glands. The parotid papilla projects towards the second upper molar tooth.

Each gutter contains a median mucous fold, the labial frenulum.

C- LIPS

The lips are two superior and inferior transverse and mobile fibromuscular folds. Their free borders limit the labial cleft. Their fused ends constitute the labial commissures of mouth.

The upper lip is marked by the philtrum, a large sulcus under the nose limited by two philtral crests and by the tubercle of the upper lip; it is separated from the cheek by the nasolabial fold.

The lower lip is separated from the chin by the mental fossa usually hairy.

The mucous part of the lips is the vermillion. It is pinkish on fair skin and brownish on black skin.

The cutaneomucous junction is the vermillion border.

The internal surface of the lips constitutes the external boundary of the vestibule of the mouth and is connected to the gingiva by the labial frenulum.

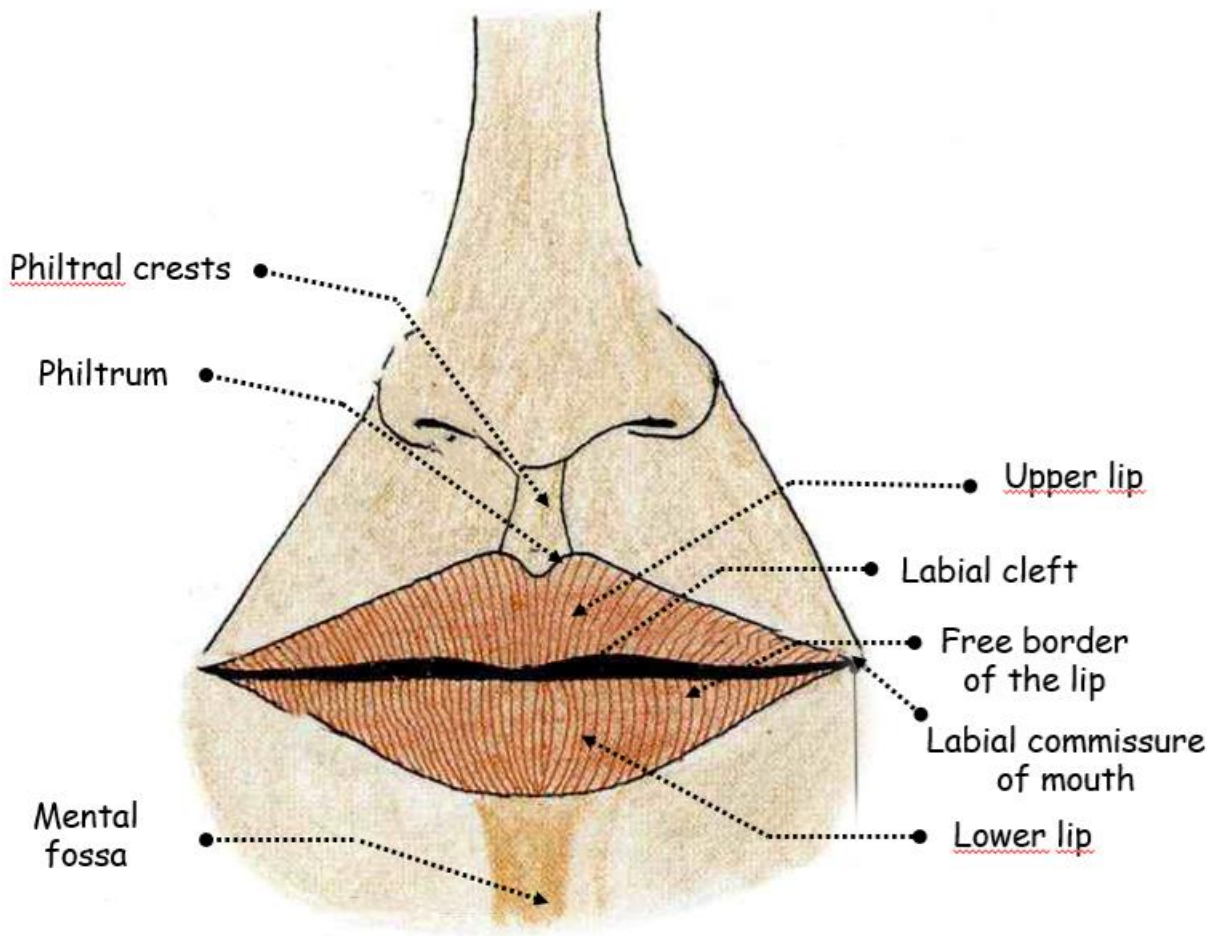


Figure 1: Anterior view of the mouth showing the lips

D- CHEEKS

The cheeks constitute the lateral walls of the vestibule situated between, upwards, the zygomatic arch and the infra-orbital margin, downwards, the lower margin of the mandibular body, forwards, the lips and, backwards, the anterior border of sternocleidomastoid muscle.

E- TEETH AND GINGIVAE

The teeth are arranged in the alveolar bone of the maxilla upwards and the mandible downwards.

The upper dental arch is half ellipse-shaped and the lower dental arch is in the shape of a parabola. Tooth sockets are cavities in the alveolar bone of the jaws giving attachment to the periodontal ligament and which walls are projections of the alveolar bone between the teeth.

The teeth are hard and white organs plugged into the tooth sockets of the maxilla and mandible.

The deciduous dentition, also known as milk teeth, is formed of five teeth in each half jaw, twenty in all, two incisors, one canine and two molars.

The permanent dentition consists of eight teeth in each half-jaw, thirty-two teeth in all, from the midline, two incisors, one canine, two premolars and three molars. In clinical dentistry it is common to refer to teeth by numbers, one to eight starting from the midline.

The visible portion of the teeth is the crown, the neck or dental cervix is the portion that connects the outer structures of the crown to the outer structures of the root, the latter is the hidden portion of the tooth that plugs it to the tooth sockets.

The gingivae are the thick mucous membrane covering the alveolar processes of the jaws fixed to the neck of the tooth where it forms the gingival sulcus.

F- CAVITY OF THE MOUTH

The cavity of the mouth extends from the dental to the palatoglossal arches.

It is enclosed by the hard and soft palates. The floor of the mouth is largely occupied by the tongue. The hard palate is half ellipse-shaped concave downwards and circumscribed forwards by the dental arch, it is continuous at its posterior margin with the soft palate. It stands towards C2 vertebra and separates the oral and nasal cavities.

The soft palate is a fibromuscular and mobile diaphragm. It hangs down from the back of the hard palate and its free border fuses at the sides with the palatoglossal and palatopharyngeal arches around the palatine fossa and tonsil and is continuous with the uvula at the midline. It separates the the oropharynx from the nasopharynx.

The floor of the mouth is formed by, forwards, the mandible, backwards, the hyoid bone and downwards, three pairs of muscles the mylohyoids, the geniohyoids and the anterior bellies of digastric muscles.

G- TONGUE

The tongue is the mouth; all the rest is accessory. In fact, the tongue largely occupies the floor of the mouth. It straddles the pharynx and the mouth and is attached to the hyoid bone, the mandible, the hard palate and the styloid process of temporal bone.

The tongue is oval with a large posterior end. It is highly mobile. The main parts of the tongue consist of the dorsum, tip, inferior surface and root. It is bounded by two lateral edges.

The oral part of the dorsum is represented by the anterior two-thirds which face upwards towards the hard palate. It is convex and is marked by a median longitudinal sulcus.

The pharyngeal part or the base of the tongue is the posterior one-third which faces backwards and forms the anterior wall of the oropharynx. It is united to the epiglottis by the glossoepiglottic folds at the valleculae.

They are separated by the sulcus terminalis, an ill-defined shallow groove in the form of a V with the apex pointing backwards. At the apex of the sulcus is a small depression, the foramen caecum, which is the remains of the upper end of the thyroglossal duct.

Behind the sulcus terminalis, there are no papillae, the pharyngeal part had a nodular appearance.

In front of the sulcus terminalis, the vallate papillae are dozen in number and are arranged in the form of a V with the apex pointing backwards with many taste buds surrounding it.

The fungiform papillae are discrete pink pinheads more numerous towards the edges of the tongue; each bears a few taste buds.

The filiform papillae have a velvety appearance and provide a non-slip surface for moving a food bolus.

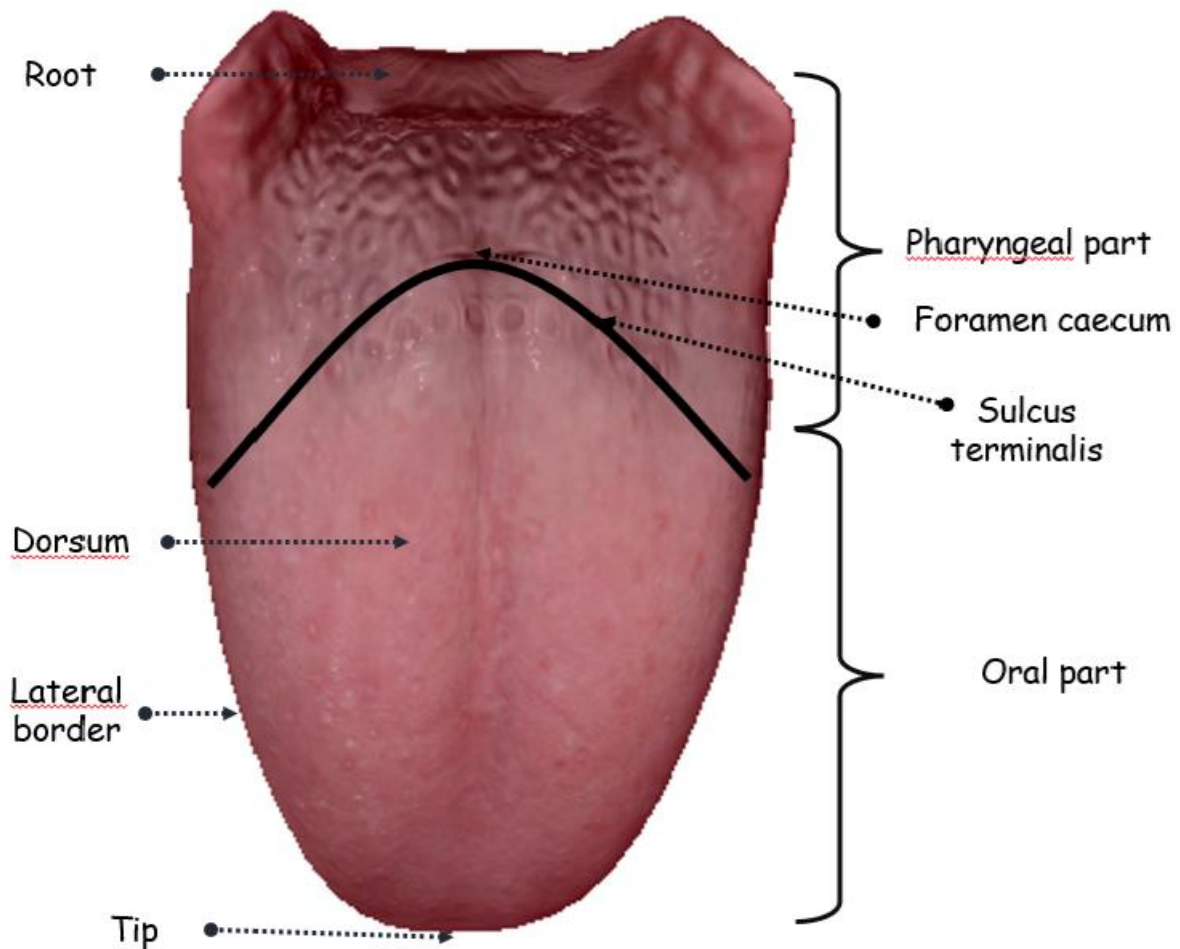


Figure 2: Superior view of the tongue

At the inferior surface of the tongue, the lingual frenulum is a small midline septum of mucous membrane that unites the base to the floor of the mouth; the median longitudinal sulcus may be absent.

The sublingual fold and caruncle lie laterally on each side of the frenulum near the base of the tongue; near the apex, is the large eminence of the genioglossus and hyoglossus muscles. Here the sublingual veins are quite visible under the transparent mucosa.

The lateral edges are lateral boundaries of the tongue that slim down from the base to the tip parallel to the dental arches. They are rich of lingual glands.

The base of the tongue is the thickest and largest part of the tongue. It lies on the floor of the mouth and is fixed to the mandible and the hyoid bone through the hyoglossus and genioglossus muscles.

It constitutes the lower wall of the oropharyngeal isthmus and contains the lingual tonsils.

The tip of the tongue is aligned with the midline sulcus continuous on the dorsum and inferior surface in contact with the incisors, it contains the anterior salivary gland.

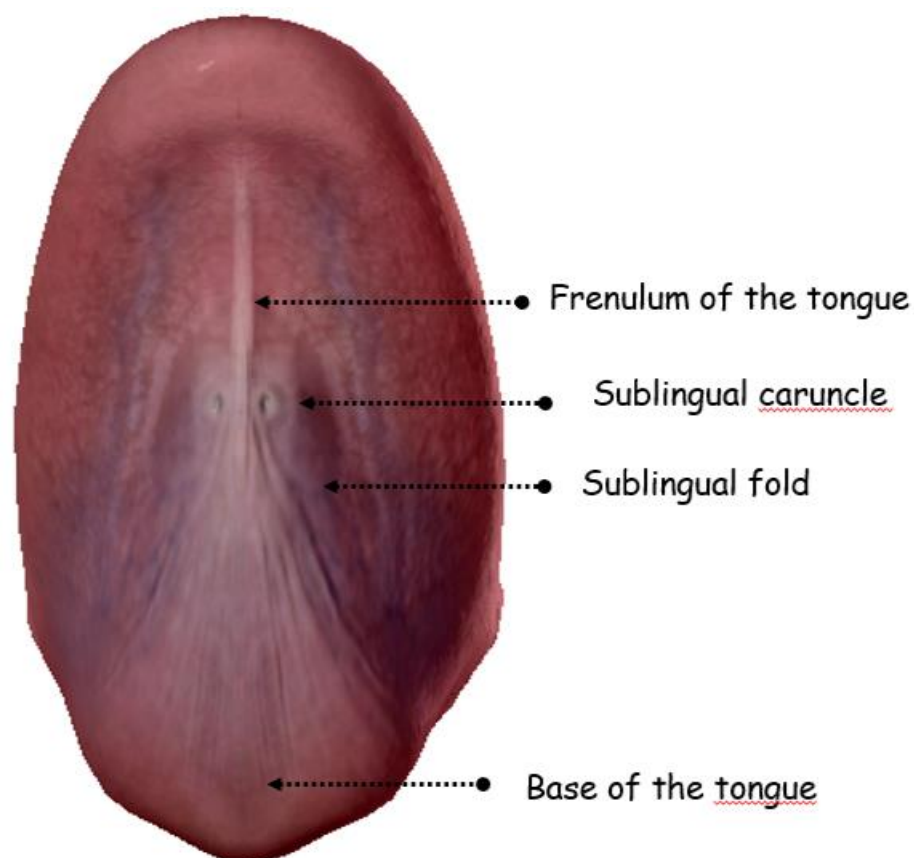


Figure 3: Inferior view of the tongue

III. STRUCTURE

A- VESTIBULE OF THE MOUTH

The vestibule of the mouth is lined by stratified squamous epithelium. It is continuous with the gingivae in the alveolar margins of the jaws. The vestibule of the mouth constitutes a great site of excretion of saliva.

B- LIPS

The lips are made of four layers.

From the outer to the inner layer, the skin is thick, rich in sebaceous glands and hairy.

The orbicularis oris muscle forms the muscle of the lips.

The mucous membrane lines the internal surface and the free border of the lip covering the vermillion, it is rich in labial glands.

C- CHEEKS

The cheeks are made of 4 layers, from the outer to inner layer, the skin, the subcutaneous tissue, the muscles of the cheek and the oral mucous membrane.

The subcutaneous tissue consists of the suctorial pad between masseter and buccinator crossed by the parotid duct and the facial vessels and nerves.

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The muscles of the cheek are, namely, from surface to depth, zygomaticus minor, zygomaticus major, levator labii superioris alaeque nasi, risorius, posterior fibres of platysma, levator labii superioris, levator anguli oris, depressor labii inferioris and buccinator covered by the buccopharyngeal fascia.

D- CAVITY OF THE MOUTH

The hard palate is made of, from surface to depth, the palatine mucous membrane, strongly united with the periosteum forms the mucoperiosteum. It contains palatine glands over the horizontal plate of palatine bone. Macroscopically, it shows transverse masticatory ridges on each side of the median raphe and is smoothly polish over the horizontal plate of palatine.

Then, the palatine process of maxilla is made of, forwards, the mammalian premaxilla containing the incisive fossa and foramina. The greater and lesser palatine foramina are situated laterally.

The horizontal plate of palatine bone is sutured backwards to the palatine process of maxilla completing the hard palate backwards.

The hard palate is lined upwards by the nasal mucous membrane which is respiratory.

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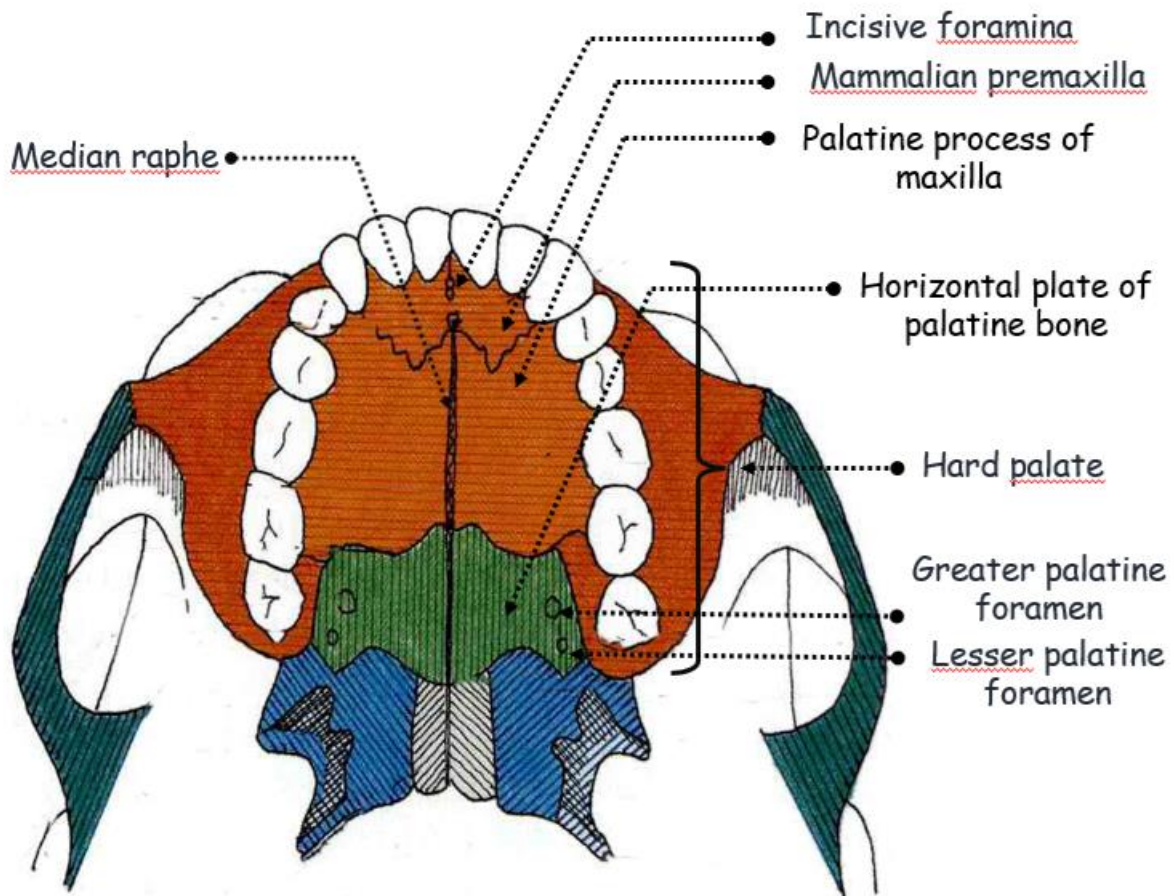


Figure 2: Inferior view of the hard palate

The soft palate is made of, from surface to depth, the mucous membrane, continuous with that of hard palate on the oral surface containing scattered taste buds and lymphoid follicles and lined by squamous non-keratinizing epithelium. It is continuous with that of nasopharynx through the nasal surface of the soft palate.

The muscles of soft palate are five paired muscles, tensor palati muscle in front of the aponeurosis of soft palate, tensor palati muscle behind, palatoglossus muscle, palatopharyngeus muscle and muscle of the uvula.

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The aponeurosis of soft palate is a fibrous and resistant layer fixed to the posterior layer of the hard palate and to the hamulus of the medial pterygoid plate.

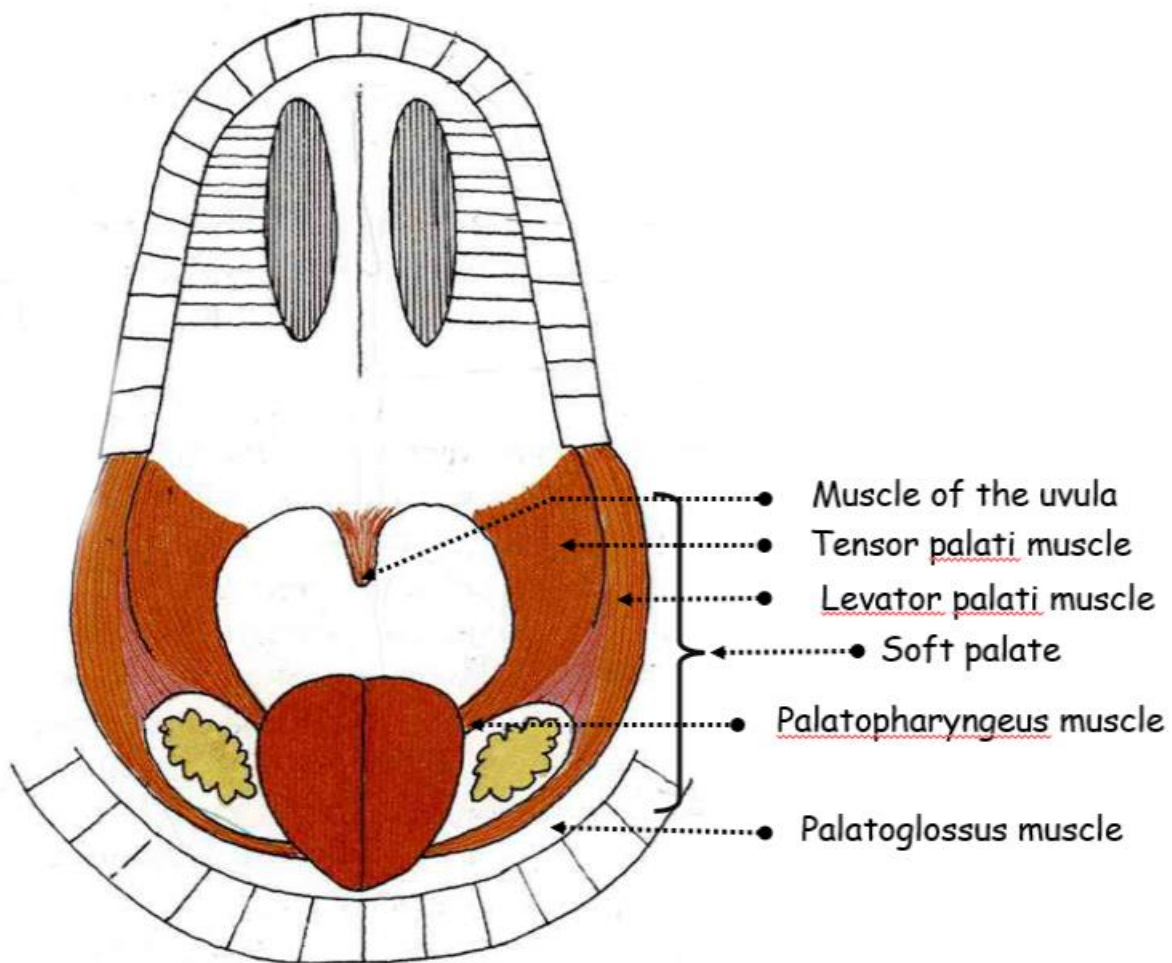


Figure 2: Anterior view of the mouth opened

E- TONGUE

The tongue is a mass of skeletal muscle. It is mostly covered by mucous membrane.

The hyoglossal membrane is a layer of fibrous tissue that connects the base of the tongue to the

upper margin of the body of hyoid bone, it is continuous at its anterior surface with a midline fibrous septum dividing the organ into two symmetrical halves.

The midline fibrous septum is a falciform layer of fibrous tissue median, flattened sagittally and concave downwards fixed to the hyoglossal membrane and to its adjoining part of the hyoid bone; it ends near the apex of the tongue between its muscular mass.

Its upper border is convex near the dorsum of the tongue and its upper concave border is in contact with the most medial intersecting fibres of genioglossus muscles.

The intrinsic muscles of the tongue are wholly within the tongue and not attached to bone.

The extrinsic muscles have bony attachments. Four muscles are distinguished in each group and in each half of the tongue. Thus, the tongue is a mass of sixteen skeletal muscles.

The extrinsic muscles are attached to the mandible, the hyoid bone and to the styloid process of temporal bone. Namely, the extrinsic muscles of the tongue are, from inside to outside, genioglossus, hyoglossus, styloglossus and palatoglossus muscles.

The intrinsic muscles of the tongue are superior longitudinal muscle, inferior longitudinal muscle, transverse muscle and vertical muscle.

IV. ANATOMICAL RELATIONS

The mouth is a major cavity of the face lying between, upwards, the nasal cavity and maxillary sinuses, downwards, the infrahyoid region including posterior and anterior triangles of the neck, laterally, the masseter muscle and, backwards, the pharynx.

V. BLOOD SUPPLY; LYMPH DRAINAGE AND NERVE SUPPLY

A- LIPS

The arteries of the lips are the superior and inferior labial arteries. They are branches of the facial artery. Each of them divides into two branches posterior and anterior. They run across the lip beneath the red margin, one in front and the other behind the orbicularis oris and anastomose end to end at the midline.

The veins of the lips are similar to arteries. They flow into the facial vein.

The lymph drainage of the lips is ensured by submandibular and submental nodes.

The facial nerve represents the motor nerve supply of the lips when the trigeminal nerve is the sensitive nerve of the lips.

B- CAVITY OF THE MOUTH

The cavity of the mouth is supplied by the greater palatine artery. It is a branch of the maxillary artery, terminal branch of the external carotid artery. It emerges from the greater

palatine foramen and passes around the palate, lateral to the nerve, to enter the incisive foramen and pass up into the nose.

The veins accompany the artery back to the pterygoid plexus. Other veins pass back to the supratonsillar region and join the pharyngeal plexus.

The lymph drainage of the cavity of the mouth flow into retropharyngeal nodes and deep cervical nodes.

The sensitive nerve supply of the cavity of the mouth is ensured by the greater palatine nerve from the maxillary via the pterygopalatine ganglion and nasopalatine nerves for the area of the premaxilla behind the incisor teeth.

The motor supply is held by the accessory and vagus nerves except the tensor palati muscle supplied by the mandibular nerve, third main branch of the trigeminal nerve.

C- TONGUE

The lingual artery is the main artery of the tongue. It is a branch of the external carotid artery that runs above the greater horn of the hyoid bone deep to hyoglossus muscle and passes forwards to the tip of the tongue. Beneath the hyoglossus muscle, it gives off dorsal lingual branch into the posterior part and deep lingual branch into the anterior part. At the anterior border of hyoglossus muscle, it gives a branch to the sublingual gland and the floor of the mouth. The tonsillar branch of the facial and the ascending pharyngeal arteries participate more

accessorily to the arterial supply of the tongue. The fibrous septum dividing the two halves of the tongue prevents any significant anastomosis of blood vessels across the midline.

The veins accompany the arteries.

The deep lingual vein come from the inferior surface of the tongue, superficial to hyoglossus in its course and is joined at the anterior border of that muscle by the sublingual vein from the sublingual gland.

The dorsal lingual vein come from the dorsum of the tongue.

They come together as the lingual vein that flows into the internal jugular vein.

The tongue is particularly drained through the floor of the mouth. In fact, Lymph from one side, especially of the posterior part, may reach nodes of both sides of the neck.

The lymphatics of the tip flow into submental nodes.

Those of the anterior part flow into submandibular nodes and then to nodes of both the upper and lower end of the deep cervical group.

Those of the posterior part flow directly into deep cervical nodes.

The motor nerve of the tongue is the hypoglossus nerve.

The sensitive and sensorial supply of the tongue is ensured by the lingual nerve, branch of the mandibular nerve, third major branch of the trigeminal nerve, for its anterior part. It is supplied by the facial nerve through the chorda tympani.

The glossopharyngeal nerve supplies the posterior part of the tongue.

VI. CONSLUSION

The mouth is the initial portion of the digestive system. It is made of multiple components with multiple major functions. It has a diverse blood supply, lymph drainage and nerve supply.