Today's lecture discuss: 1- the mouth 2- the teeth
3- the tongue 4- the palates
5- the salivary glands

(u dnt have to refer to the slides, I've included everything in slides (1-27) except some figures.

1-) THE ORAL CAVITY:

*The oral cavity has two fissures: 1- anterior fissure (oral fissure)
2- posterior fissure (oropharyngeal isthmus).

A-) The upper and the lower lips, these lips are two fleshy folds that surround the oral orifice. They are covered internally by oral mucosa (stratified squamous non-keratinized epithelium), and externally by skin (stratified squamous keratinized epithelium), and their core is formed by a striated muscle (orbicularis oris) and the muscles that radiate from the lips into the face. Most of Orbicularis oris fibers are derived from the buccinator muscle. The lips also contain the labial blood vessels and nerves, connective tissue, and many small salivary glands.

Remember: the buccinator muscle is a muscle that forms the muscular compartment of the cheeks and its contraction presses the cheek against the teeth and allow the person to blow.
*The philtrum: is the shallow vertical groove seen in the midline on the outer surface of the upper lip, and it's formed embryologically by the fusion of the medial nasal processes.

*THE MOUTH (ORAL) CAVITY:

*The mouth extends from the lips to the pharynx.

*The entrance into the pharynx, the oropharyngeal isthmus, is formed on each side by the palatoglossal fold.

*The mouth is divided into the vestibule and the mouth cavity proper by the closed upper and lower teeth.

*THE VESTIBULE:

*importance of the vestibule: the parotid duct opens on a small papilla into the vestibule opposite the upper second molar tooth.
* The oral fissure is a slitlike space between the lips that connects the oral vestibule with the exterior.

*The vestibule is limited above and below by the reflection of the mucous membrane from the lips and cheeks to the gums.

*The lateral wall of the vestibule is formed by the cheek, which is made up by the buccinator muscle and is lined with mucous membrane.

*The tone of the buccinator muscle and that of the muscles of the lips keeps the walls of the vestibule in contact with one another.

**THE MOUTH PROPER:**

* boundaries of the mouth proper:

1-) The roof: is formed by the hard palate in front and the soft palate behind.

2-) The floor: is formed largely by the anterior two thirds of the tongue and by the reflection of the mucous membrane from the sides of the tongue to the gum of the mandible.

3-) Laterally: the cheeks (are muscular structures → buccinator muscle, which is lined internally by mucus membrane "stratified squamous non-keratinized epithelium", and externally by the skin.

4-) Posteriorly: the oropharyngeal isthmus (this isthmus connects the oral cavity to the orophrynx).

5-) Anteriorly: the teeth" the incisors" (because the jaws are closed).

**The isthmus: is a narrow passage connecting two large cavities.**
The oral mucosa:

*The mucus membrane that covers the palate is tough and adherent to the periosteum, while the one which covers the cheeks and the floor of the mouth is loose and forms folds of mucosa.

*The mucous membrane of the gingival (gum) is strongly attached to the alveolar periosteum.

*The oral mucosa forms several folds:

1-) the palatoglossal fold (arch); between the tongue and the palate.

2-) the palatopharyngeal arch; between the pharynx and the palate.

*between these two arches and at both sides of the isthmus, the palatine tonsils are located as shown in the figure.

3-) the frenulum of the tongue which connects the undersurface of the tongue in the midline to the floor of the mouth.

* Lateral to the frenulum, the mucous membrane forms a fringed fold, the plica fimbriata.

* The submandibular duct of the submandibular gland opens onto the floor of the mouth on the summit of a small papilla on either side of the frenulum of the tongue.
* The sublingual gland projects up into the mouth, producing a low fold of mucous membrane, the sublingual fold.

Numerous ducts of the gland open on the summit of the fold.

4-) the superior and inferior labial frenulums; between the upper / lower lips and the gum.

(refer to the figure and try to identify all the aforementioned structures).

*In the vestibule the mucous membrane is tethered to the buccinator muscle by elastic fibers in the submucosa to prevent redundant folds of mucous membrane from being bitten between the teeth when the jaws are closed*

INNervation of the mouth: (sensory and motor):

1-) The Roof: The greater palatine and nasopalatine nerves from the maxillary division of the trigeminal nerve.

Rule: the upper jaw and its relations are innervated by the maxillary nerve branches while the lower jaw and its relations are innervated by the mandibular nerve branches.

2-) The Floor: The lingual nerve, a branch of the mandibular division of the trigeminal nerve, (general sensation of the anterior two thirds of the tongue).

**General sensation**: pain, touch, and temperature which is different from the special sensation (taste).

3-) Cheek: A-) sensation: The buccal nerve, a branch of the mandibular division of the trigeminal nerve innervates both the skin externally and the mucosa internally  B-) motor to the buccinator muscle the buccal branch of the facial nerve).

4-) the gum: (sensory innervation) → A-) the lingual nerve innervate the lingual part of the gum (toward the tongue)

→ B-) the buccal nerve innervate the labial part of the gum (toward the lips)
5-) special sensation : (taste) → The taste fibers travel in the chorda tympani nerve, a branch of the facial nerve to the oral part of the tongue (anterior two thirds).

6-) the posterior one third of the tongue is innervated by the glossopharyngeal nerve (general sensation).

?? * does the posterior one third contain taste buds?
Answer: NO, but the circumvalate papillae is located in the anterior two thirds BUT it follows the posterior one third developmentally and it’s innervated by the glossopharyngeal nerve.

2-) THE TEETH:

*The gingivae (gums) are specialized regions of the oral mucosa that surround the teeth and cover adjacent regions of the alveolar bone. (it’s very hard).

* The teeth are attached to sockets (alveoli) in two elevated arches of bone on the mandible below and maxilla above.

* We have two types of teeth:
Deciduous Teeth and permanent teeth.

*There are 20 deciduous (milky or baby teeth) teeth: four incisors, two canines, and four molars in each jaw.
They begin to erupt about 6 months after birth and have all erupted by the end of 2 years.
The teeth of the lower jaw usually appear before those of the upper jaw.

*There are 32 permanent teeth: four incisors, two canines, four premolars, and six molars in each jaw.
They begin to erupt at 6 years of age.
The last tooth to erupt is the third molar, which may happen between the ages of 17 and 30 → sometimes it doesn’t erupt, and in certain cases it can cause infection and in this case it
requires surgical removal, and most of the time it erupt normally.

The teeth of the lower jaw appear before those of the upper jaw.

The first permanent tooth to erupt is the first molar so sometimes the child (6 years old) may not notice it.

![Teeth Diagram]

3-) THE TONGUE:

*Is a muscular structure (striated muscle covered with mucous membrane) that forms part of the floor of the oral cavity and part of the anterior wall of the orophrynx.

*It’s divided into → 1-) anterior two thirds (oral part) 2-)posterior one third (root of the tongue/pharyngeal surface).

Also to → left and right parts by a median fibrous septum. (each half has its own muscles and nerve supply). so the left hypoglossal nerve (XII), supplies the muscles of the tongue in the left half and the right nerve supplies the right half.

*It has two surfaces the → the dorsal surface and the inferior (lower surface).
* The anterior two thirds is oriented horizontally, while the posterior one third is curved inferiorly and backward to become oriented in the vertical plane (so you can't see the root of the tongue when looking to the mirror).

* The anterior part and the posterior part of the dorsal surface is separated by a V-shaped terminal sulcus of the tongue.

* The apex of this sulcus is directed posteriorly and forms a small pit (the foramen cecum: the foramen cecum is an embryologic remnant and marks the site of the upper end of the thyroglossal duct).

The foramen cecum: marks the site in embryo where the epithelium invaginates to form the thyroid gland (it's the site from where the thyroglossal duct has originated).

* Four types of papillae are present on the upper surface of the anterior two thirds of the tongue:

1-) the filiform papillae: very numerous.

2-) the fungiform papillae: less numerous.

3-) the vallate papillae: the largest papillae, they are found immediately anterior to the terminal sulcus of the tongue in the anterior two thirds but as mentioned they developmentally (embryologically) follow the posterior one third. (innervated by glossopharyngeal nerve).

* All these papillae except the filiform papillae contain taste buds on their surface and responsible for tasting (special sensation which is transferred via the chorda tympani "branch of the facial nerve").

* The mucous membrane covering the posterior third of the tongue is devoid of papillae but has an irregular surface caused by the
presence of underlying lymph nodules which are collectively called the lingual tonsil. ( **NO PAPILLAE IN THE POSTERIOR ONE THIRD** ) .

*The mucous membrane on the inferior surface of the tongue is reflected from the tongue to the floor of the mouth.

*In the midline anteriorly, the undersurface of the tongue is connected to the floor of the mouth by a fold of mucous membrane, the frenulum of the tongue. ( mentioned previously)

*On the lateral side of the frenulum, the deep lingual vein can be seen through the mucous membrane.

*Lateral to the lingual vein, the mucous membrane forms a fringed fold called the plica fimbriata .

* The mucus membrane that covers the dorsum of the tongue is different from the one that covers the inferior ( lower ) surface , how is that ?

Answer : the mucosa covering the dorsum is parakeratinized ( can be injured and replaced ) while that of the lower surface is non-keratinized .

**MUSCLES OF THE TONGUE :**

*the tongue is completely divided into left and right halves by the median septum and this means that all the muscles of the tongue are paired .

*The muscles of the tongue are divided into two types: intrinsic and extrinsic .

1-) intrinsic muscles : originate and insert within the substance of the tongue ( confined to the tongue and are not attached to bone) → longitudinal , transverse and vertical fibers ( different directions ) . FUNCTION : Alter for the shape of the tongue .

*Nerve supply : **Hypoglossal nerve**.
2-) extrinsic muscles: originate from outside the tongue and insert into the tongue, these muscles attach the tongue to the styloid process and the soft palate above and to the mandible and the hyoid bone below. Ex: the styloglossus muscle connects the tongue to the styloid process of the temporal bone as it originates from the styloid process and insert into the tongue.

*these muscles elevate, depress, protrude and retract the tongue.

* These muscles are attached to bones and the soft palate.

*They are:

1-) the genioglossus: originates from the superior genial spine of mandible (superior mental tubercle) and insert in the lower surface of the tongue from posterior to anterior so when it contracts it pulls the tongue from posterior to anterior so it protrudes the apex of tongue through mouth.

2-) the hyoglossus: originates from the body and greater cornu of hyoid bone, it depresses tongue.

3-) the styloglossus: originates from the styloid process of temporal bone, it draws tongue upward and backward.

4-) the palatoglossus: this muscle is a muscle of the soft palate and the tongue, it originates from the palatine aponeurosis and passes anterioinferiorly to insert to the lateral side of tongue and it pulls the roots of tongue upward and backward (elevation) and depresses the soft palate and this movement facilitate the narrowing and closure of the oropharyngeal sthmus as a result separate the oral cavity from the orophrynx.

Clinical correlation: The genioglossus muscle is innervated by the hypoglossal nerve (XII) so asking a patient to protrude his/her tongue can be used to test the hypoglossal nerve, so if the the two nerves on both sides are functioning normally, the tongue should protrude evenly in the midline, BUT if the one of them is injured and not fully functioning the tip of the tongue will protrude pointing to that side (injured side).

NOTE: the taste won't be affected because it's carried by the facial nerve (chorda tympani) also the general sensation will be spared because it's carried by the lingual nerve.
*Except for the palatoglossus, which is innervated by the cranial accessory nerve (XI) with the vagus nerve, all the muscles of the tongue are innervated by the hypoglossal nerve (XII).

Remember that the cranial accessory nerve is branched to:
1- spinal part that innervates the trapezius muscle and the sternocleidomastoid muscle.
2- a cranial part that is distributed with the vagus nerve to some muscles, palatoglossus is one of them.

*Movements of the tongue:

*Protrusion: The genioglossus muscles on both sides acting together

*Retraction: Styloglossus and hyoglossus muscles on both sides acting together.

*Depression: Hyoglossus muscles on both sides acting together

*Retraction and elevation of the posterior third: Styloglossus and palatoglossus muscles on both sides acting together

*Shape changes: Intrinsic muscles

*Sensory innervation:

*Anterior two thirds: Lingual nerve branch of mandibular division of trigeminal nerve (general sensation) and chorda tympani branch of the facial nerve (taste).

*Posterior third: Glossopharyngeal nerve (general sensation and taste) → The explanation is mentioned earlier.
*BLOOD SUPPLY*: (the doctor didn’t mention them in the lecture)

*The lingual artery, the tonsillar branch of the facial artery, and the ascending pharyngeal artery supply the tongue.

*The veins drain into the internal jugular vein.

*LYMPH DRAINAGE*:

*Tip: Submental lymph nodes*

*Sides of the anterior two thirds: Submandibular and deep cervical lymph nodes*

*Posterior third: Deep cervical lymph nodes*

4-) THE PALATES:

*The roof of the oral cavity consists of the palates which has two part; the anterior hard palate and the posterior soft palate.

*The anterior palate separate the oral cavity from the nasal cavity and it’s a bony plate covered by mucosa from above and below, the mucosa above is a respiratory mucosa which forms the floor of the nasal cavity while the mucosa below is an oral mucosa and forms the roof of the oral cavity.
**IN BRIEF**: The palate forms the roof of the mouth and the floor of the nasal cavity.

*The hard palate is formed by the palatine processes of the maxillae (anterior three fourths) and the horizontal plates of the palatine bones (posterior one fourth) → the palatine bone has two foramina; the greater and the lesser palatine foramen for the passage of the greater and lesser palatine nerves and vessels.*

*The hard palate is continuous behind with the soft palate.

**SOFT PALATE:**

*The soft palate is a mobile fold attached to the posterior border of the hard palate and acts as a valve that can be:
→ depressed, to help to close the oropharyngeal isthmus.
→ elevated, to separate the nasopharynx from the oropharynx.

*Its free posterior border presents in the midline is a conical projection called the uvula (a tear shaped muscle projection in the midline).

*The soft palate is continuous at the sides with the lateral wall of the pharynx.

*The soft palate is composed of mucous membrane, palatine aponeurosis, and muscles.

*The mucous membrane covers the upper and lower surfaces of the soft palate. (the upper surface is part of the respiratory tract which contains pseudostratified ciliated columnar epithelium, while the lower surface is part of the digestive tract which contains stratified squamous non-keratinized epithelium).

*The palatine aponeurosis is a fibrous sheet attached to the posterior border of the hard palate and it is the expanded tendon of the tensor veli palatini muscle. (will be explained later).

*The four muscles of the soft palate are: 1-) the tensor veli palatini, 2-) the levator veli palatini, 3-) the palatoglossus, 4-) the
palatopharyngeus, plus the musculus uvulae (that forms the uvulae).

*The palatoglossus and the palatopharyngeus muscles are in the lower surface of the soft palate while the levator veli palatini and the tensor veli palatini are in the upper surface.

*The muscle fibers of the tensor veli palatine originates from the spine of sphenoid, auditory tube, its fibers converge as they descend from their origin to form a narrow tendon, which turns mediially around the pterygoid hamulus. Its tendon and together with the tendon of the opposite side, expands to form the palatine aponeurosis.

*When the muscles of the two sides contract, the soft palate is tightened so that the soft palate may be moved upward or downward as a tense sheet.

*Levator veli palatini: originates from Petrous part of temporal bone, auditory tube and insert to the Palatine aponeurosis and it raises soft palate.

*Palatopharyngeus: originates from the palatine aponeurosis and inserts into posterior border of thyroid cartilage it elevates wall of pharynx, pulls palatopharyngeal folds medially.

*Musculus uvulae: originates from the Posterior border of hard palate and insert to the mucous membrane of the uvula and it elevates the uvula.

*the lower muscles depresses the soft palate and they are attached to the tongue.

*IMPORTANCE OF THE SOFT PALATE:

→ it separates the the oropharynx from the nasopharynx, Normally, the air passes from the nasopharynx to the oropharynx to the larynx (The soft palate is in the midline), while when swallowing the soft palate is elevated upwards and backwards and the posterior wall of the pharynx moves anteriorly so the nasopharynx is completely closed. → the exact
mechanism is explained under the topic: the movement of the soft palate

Movements of the soft palate:

* The pharyngeal isthmus (the communicating channel between the nasal and oral parts of the pharynx) is closed by raising the soft palate. (and the uvula forms the roof of this isthmus)

* Closure occurs during the production of explosive consonants in speech.

* HOW DOES THIS CLOSURE OCCURS? 

1* The soft palate is raised by the contraction of the levator veli palatini on each side.

2* At the same time, the upper fibers of the superior constrictor muscle contract and pull the posterior pharyngeal wall forward.

3* The palatopharyngeus muscles on both sides also contract so that the palatopharyngeal arches are pulled medially, like side curtains.

Clinical correlation:

When a child (baby) is fed he continuously vomit, and sometimes this vomiting may re-enter the nasopharynx and through the ostacian tube (which opens in the lateral wall of the nasopharynx) to reach the middle ear and cause otitis media, WHY IS THAT? because the soft palate is not completely functioning, so the mum is advised to hold the baby in an erect position until the baby belches.

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4*By this means the nasal part of the pharynx is closed off from the oral part.

*NERVE SUPPLY OF THE PALATES:

1-MOTOR:*The palatine muscles is innervated by the cranial accessory nerve with the vagus nerve via the pharyngeal branch to the pharyngeal plexus. EXCEPT, the levator vali palatine, which is innervated by the nerve to medial pterygoid (branch of mandibular → stem of mandibular nerve.)

2-SENSORY:*The greater and lesser palatine nerves from the maxillary division of the trigeminal nerve enter the palate through the greater and lesser palatine foramina

*The nasopalatine nerve, also a branch of the maxillary nerve, enters the front of the hard palate through the incisive foramen.

*The glossopharyngeal nerve also supplies the soft palate

*BLOOD SUPPLY OF THE PALATE:

The greater palatine branch of the maxillary artery (to the hard palate) and the lesser palatine branch to the soft palate, the ascending palatine branch of the facial artery, and the ascending pharyngeal artery

*LYMPH DRAINAGE OF THE PALATE:

Deep Cervical Lymph Nodes.

*The palatoglossal arch is a fold of mucous membrane containing the palatoglossus muscle, which extends from the soft palate to the side of the tongue

*The palatoglossal arch marks where the mouth becomes the pharynx.

*The palatopharyngeal arch is a fold of mucous membrane behind the palatoglossal arch runs downward and laterally to join the pharyngeal wall, it contains within its fold the palatopharyngeus muscle.
*The palatine tonsils, which are masses of lymphoid tissue, are located between the palatoglossal and palatopharyngeal arches.

5-) **THE SALIVARY GLANDS**

We have three major salivary glands:

1-) the parotid gland
2-) the submandibular gland
3-) the sublingual gland

1-) **THE PAROTID GLAND**:

*The parotid gland is the largest salivary gland and is composed mostly of serous acini. (it’s a serous gland), it located anterior and below the tragus and external auditory meatus in a deep hollow and it overlaps the meseter muscle (which insert into the ramus of the mandible) and the ramus of the mandible, posteriorly it’s related to the sternocleidomastoid muscle and the mastoid process.

*The facial nerve divides the gland into superficial and deep lobes.
*The parotid duct (5 cm) emerges from the anterior border of the gland (one finger below the zygomatic arch) and passes forward over the lateral surface of the masseter then turns medially to penetrate the buccinator muscle of the cheek and it enters the vestibule of the mouth upon a small papilla opposite to the upper second molar tooth.

*The gland is surrounded by two capsules: 1) the outer tough capsule from the deep cervical investing fascia, so any swelling of the gland causes severe pain because this capsule prevents the enlargement of the gland. 2) the inner capsule which is the normal dense connective tissue that surround the gland and sends septa to separate it into lobes and lobules.

**Structures that pass through the gland:**

The parotid gland encloses the external carotid artery, the retromandibular vein, and the origin of the extracranial part of the facial nerve [VII].

1*The branches of the facial nerve is found within the substance of the gland "most superficial" → (the facial nerve exits the cranial fossa through the stylomastoid foramen → it gives the posterior auricular never as it exits → continues to the parotid where it divides into five branches; 1-temporal nerve 2-zygomatic nerve 3-buccal nerve 4-mandibular nerve 5-cervical nerve( which supplies the platysma muscle). SO the surgeon
should be careful when dealing with the parotid gland in order to avoid injuring the facial nerve branches as this injury may lead to facial muscles paralysis.

2*the retromandibular vein (intermediate position): is formed within the substance of the parotid as the superficial temporal and the maxillary veins meet and it divides into anterior and posterior branches at the level of the gland's base, the anterior branch meets the facial vein to form the **common facial vein** that ends in the internal jugular vein while the posterior branch meets the posterior auricular vein to form the **external jugular** that drains into the subclavian vein.

3*the external carotid artery: (the most deep structure) it enters the parotid and within its substance it gives the superficial temporal and the maxillary arteries which also supplies the gland.

4*the auriclotemporal nerve (branch of mandibular nerve is seen in the upper border of the gland)

*RELATIONS OF THE GLAND:
The parotid lies in the parotid bed that is formed by:

1-) the sternocleidomastoid muscle behind

2-) the ramus of mandible in front.

3-) superiorly, the base of the trench is formed by the external acoustic meatus and the posterior aspect of the zygomatic arch.

DEEP RELATIONS OF THE GLAND:
*The gland has a base and an apex that is directed toward the pharynx. SO it's divided into two parts:

1-) Anteriomedial 2-) posteriomedial parts.

*The posteriomedial part is called the **gland's bed** and it's related to two muscles the posterior belly of the digastric and the stylohyoid muscle and to two arteries; the external and internal carotid arteries and to the internal jugular vein and the
last four cranial nerves. (This means that the carotid sheath (more precisely the upper one third of the carotid sheath lies in the bed of the parotid, along with its aforementioned contents).

*The anteriomedial part is related to the ramus of the mandible, the messeter muscle and the medial pterygoid muscle.

**NERVE SUPPLY TO THE PAROTID GLAND:**

1- general sensation: via the auriclotemporal nerve (branch of mandibular).

2-sympathetic innervation: the sympathetic comes through the external carotid from the superior cervical sympathetic ganglia in the neck (note that there are superior, inferior and middle cervical ganglia, the superior gives the sympathetic innervation with the branches of external carotid artery).

3-parasympathetic innervation: Parasympathetic secretomotor supply arises from the glossopharyngeal nerve.

The parasympathetic ganglia (otic ganglia), which is located below the foramen oval → the preganglionic fibers (lesser petrosal nerve) they synapse in the ganglia, → the postganglionic fibers (auriclotemporal nerve).

*SO the AURICLOTEMPORAL nerve caries two types of fibers
1-) sensory fibers to the gland
2-) postganglionic parasympathetic fibers to the gland.

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