

The practical Lab of the First week Mon 29/03

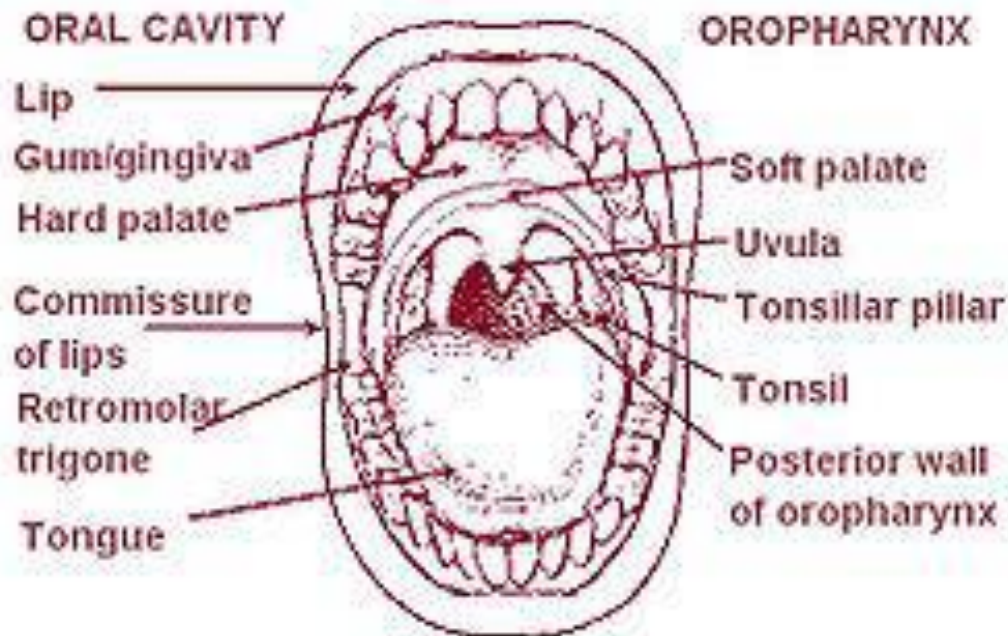
- 1- Oral Cavity
- 2- Teeth
- 3- Mandible (Muscle of mastication)
- 4- Tongue
- 5- Muscles of the tongue
- 6- Hard and Soft Palate
- 7- Salivary glands
- 8- Pharynx

Time Sheet

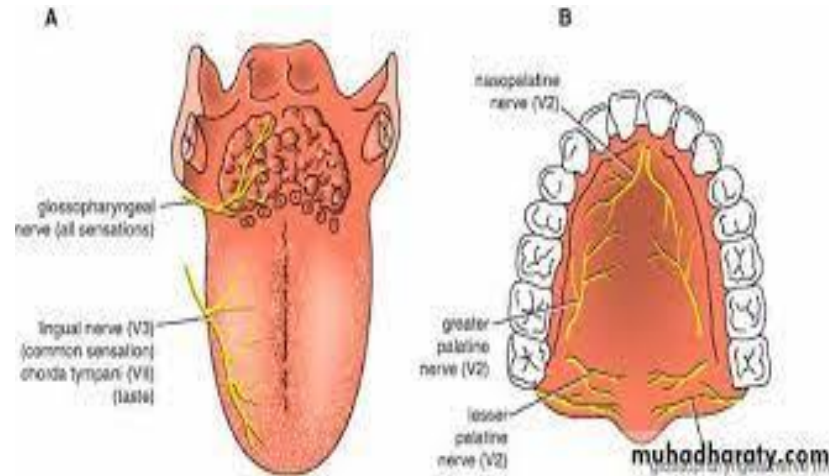
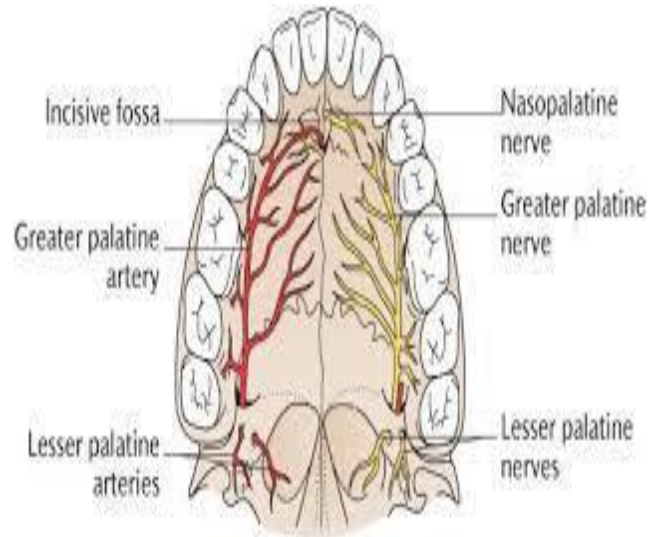
LAB	Date	Day	Subject
LAB 1	29/3-30/3	Sunday Monday	Oral Cavity Teeth Mandible (Muscle of mastication) Tongue Muscles of the tongue
LAB 2	31/3-1/4	Tuesday Wednesday	Hard and Soft Palate Salivary glands Pharynx Palatine tonsils

Subject One: Oral Cavity

The student should study parts of the oral cavity



The student should study Sensory Innervation of the Mouth, and blood supply of the mouth



Nerve supply of palate: nasopalatine and greater palatine (branches of maxillary N.)

Blood supply of palate: greater and lesser palatine arteries (branches of maxillary A.)

Nerve supply of the tongue:

Posterior 1/3: glossopharyngeal N. (Sensory) & hypoglossal N. (Motor)

Anterior 2/3: hypoglossal (motor) except palatoglossus muscle which is innervated by branches of vagus & accessory

Facial nerve- chorda tympani (special sensation)

Trigeminal - mandibular - lingual (general sensations)

Blood supply of the tongue:

Lingual + ascending pharyngeal + tonsillar branch of facial

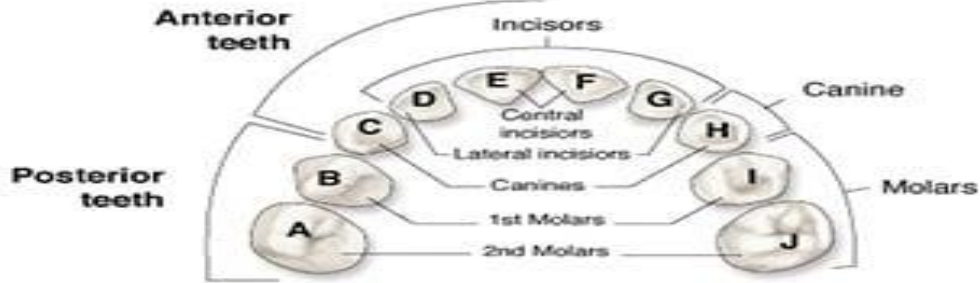
Subject Two: Teeth

Deciduous Teeth

- There are 20 deciduous 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

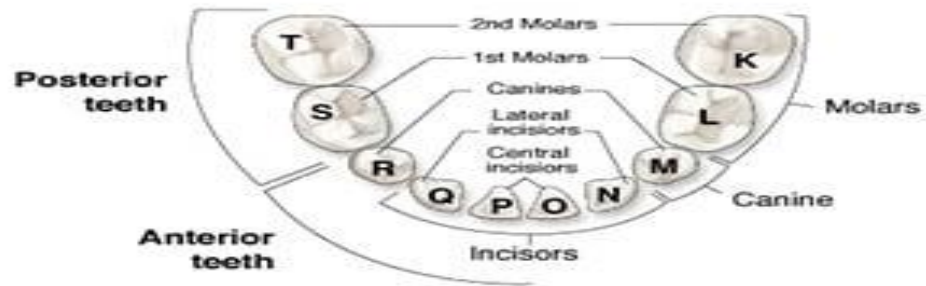
PRIMARY TEETH

MAXILLARY



RIGHT

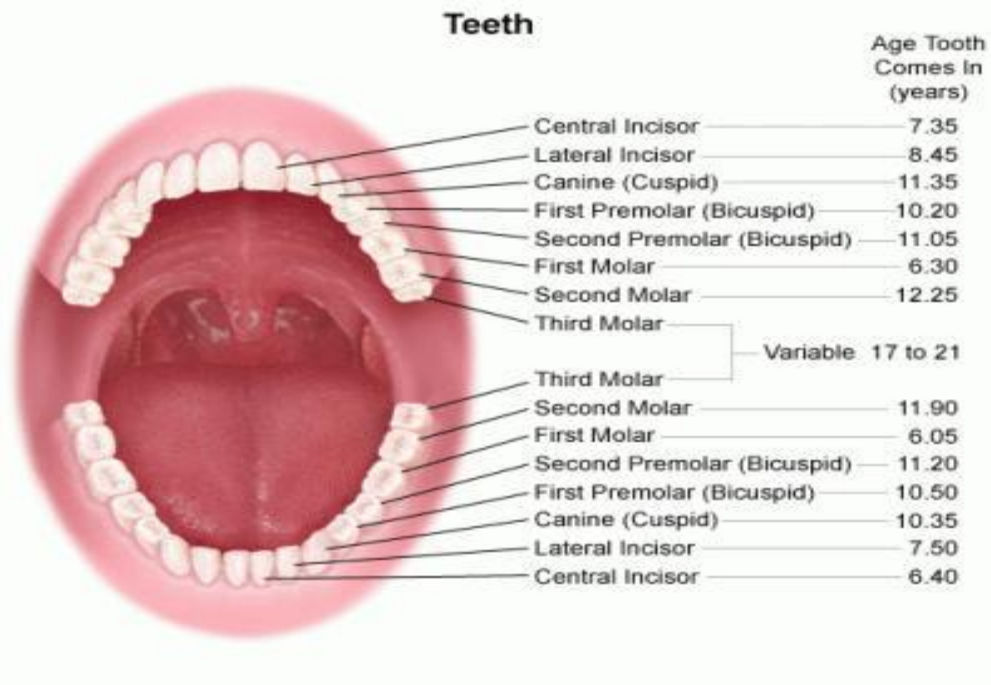
LEFT



MANDIBULAR

Permanent Teeth

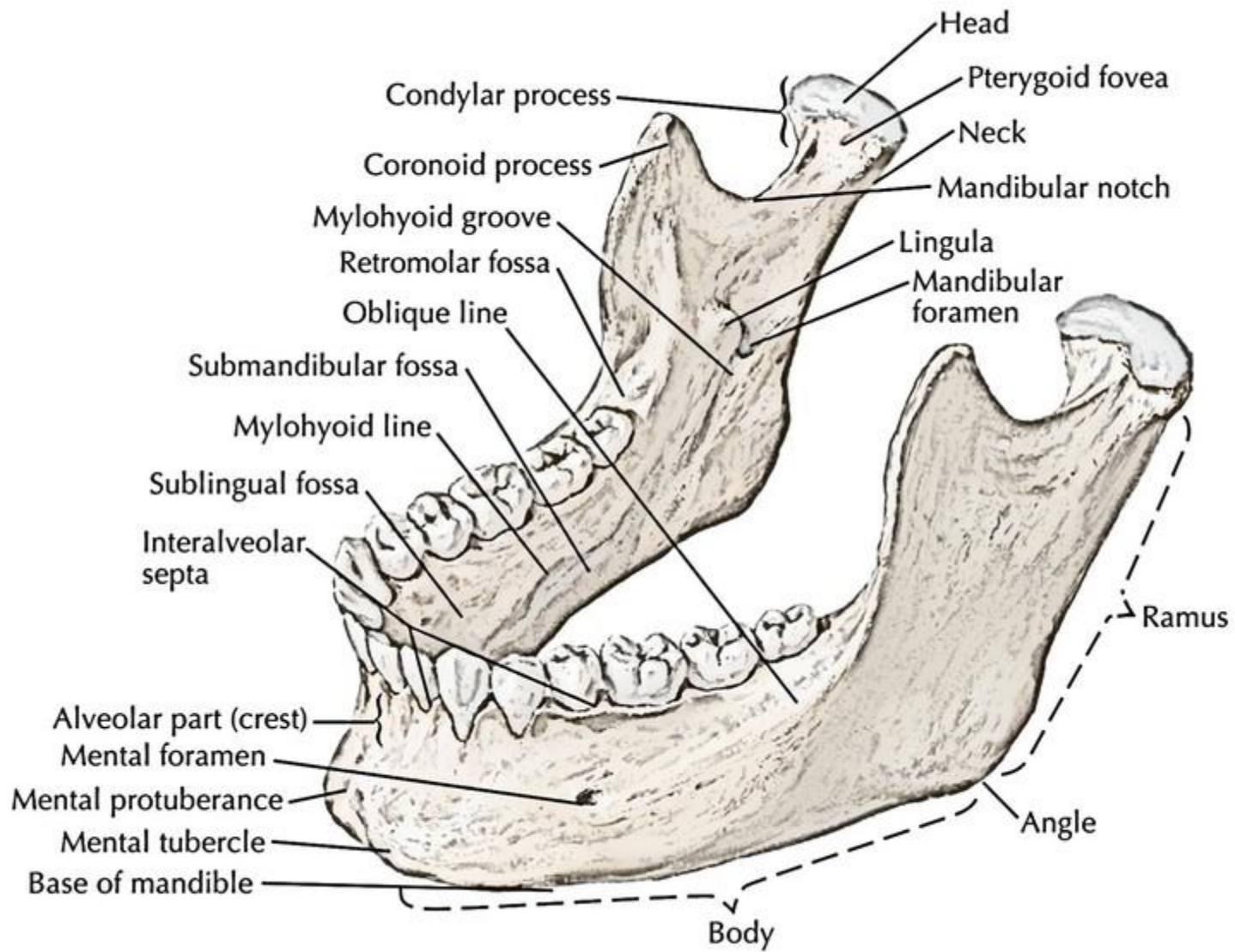
- There are 32 permanent teeth: four incisors, two canines, four premolars, and six molars in each jaw
- They begin to erupt at 6 years of age
- The last tooth to erupt is the third molar, which may happen between the ages of 17 and 30
- The teeth of the lower jaw appear before those of the upper jaw.

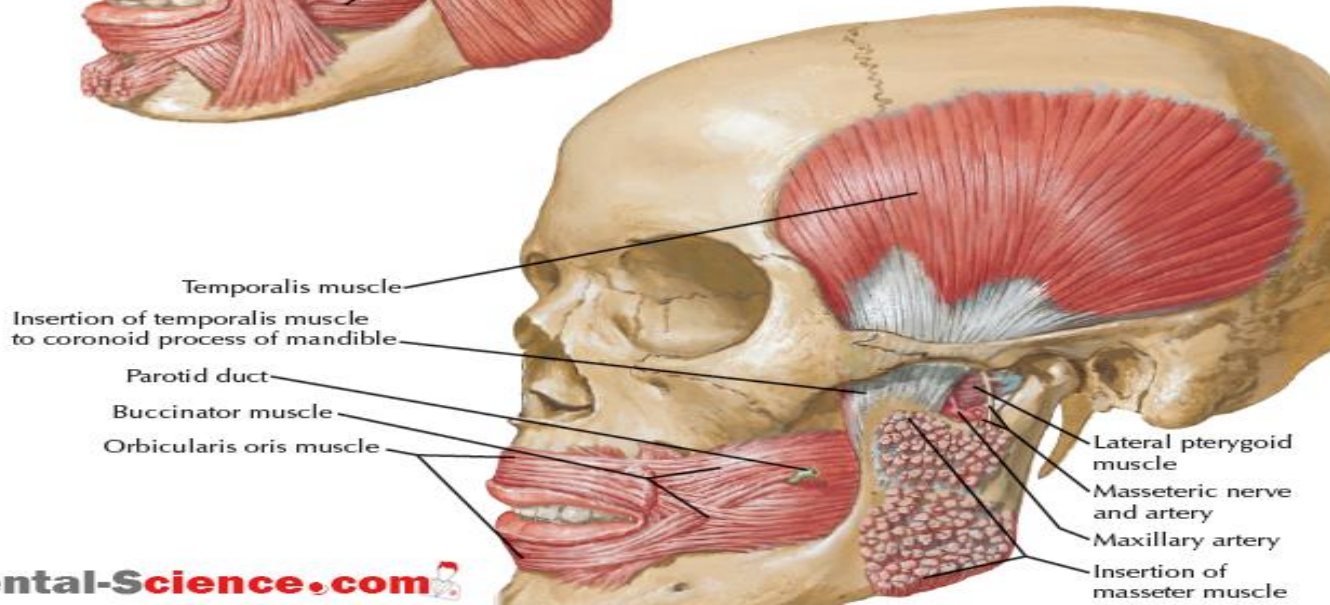
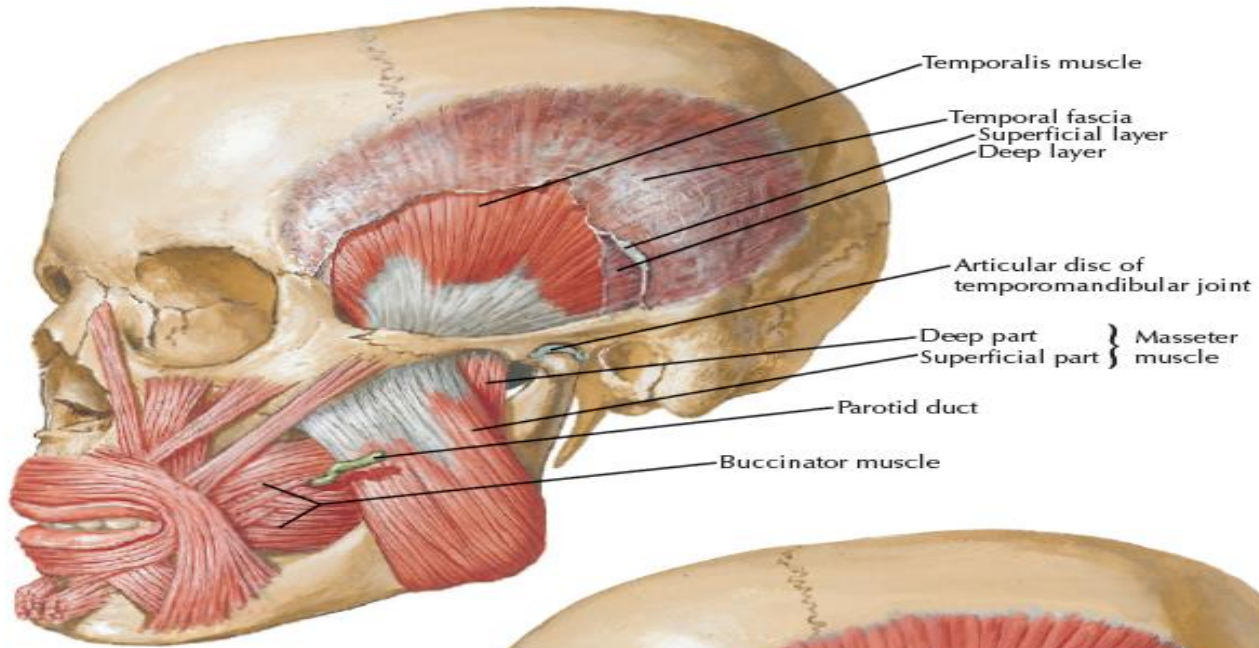


Subject Three: Mandible (Muscle of mastication)

The student should study the parts of the mandible and its relation to gland and muscle attachment.

For each muscle the student should study origin, insertion, nerve supply and action.

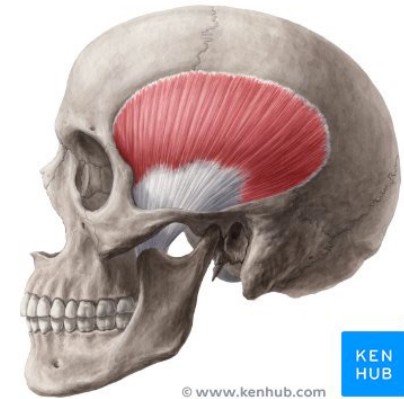




Muscles of mastication

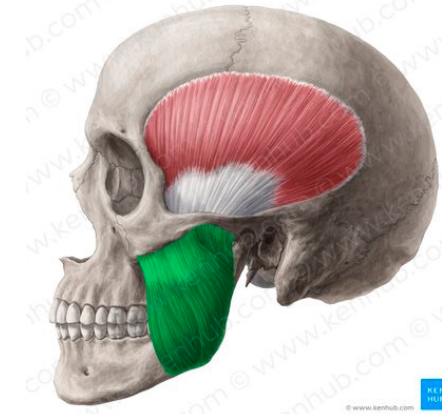
Temporalis

Origin	Temporal fossa (up to inferior temporal line), Temporal fascia
Insertion	Apex and medial surface of coronoid process of mandible
Action	Anterior fibres: Elevates mandible Posterior part: Retracts mandible
Innervation	Deep temporal branches (of mandibular nerve (CN V3))



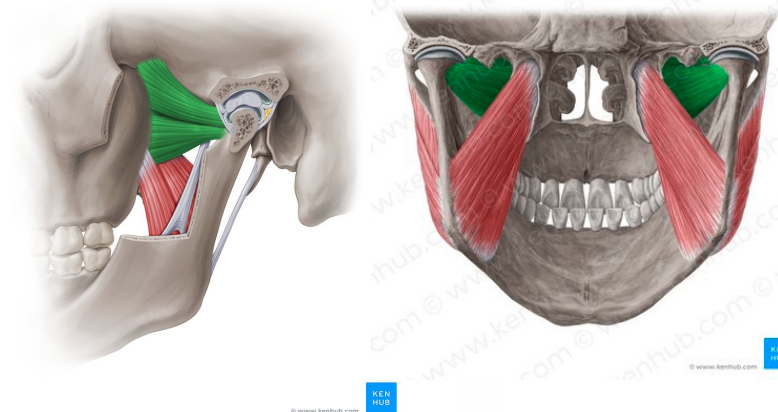
Masseter

Origin	Superficial part: maxillary process of zygomatic bone, Inferior border of zygomatic arch (anterior 2/3) Deep part: deep/inferior surface of zygomatic arch (posterior 1/3)
Insertion	Lateral surface of ramus and angle of mandible
Innervation	Masseteric nerve of mandibular nerve (CN V3)
Function	Elevates and protrudes mandible



Lateral pterygoid

Origin	Superior head: Infratemporal crest of greater wing of sphenoid bone Inferior head: Lateral surface of lateral pterygoid plate of sphenoid bone
Insertion	Superior head: Joint capsule of temporomandibular joint Inferior head: Pterygoid fovea on neck of condyloid process of mandible
Action	Bilateral contraction - Protrudes and depresses mandible, stabilizes condylar head during closure; Unilateral contraction - Medial movement (rotation) of mandible
Innervation	Lateral pterygoid nerve (of mandibular nerve (CN V3))



Muscles of mastication

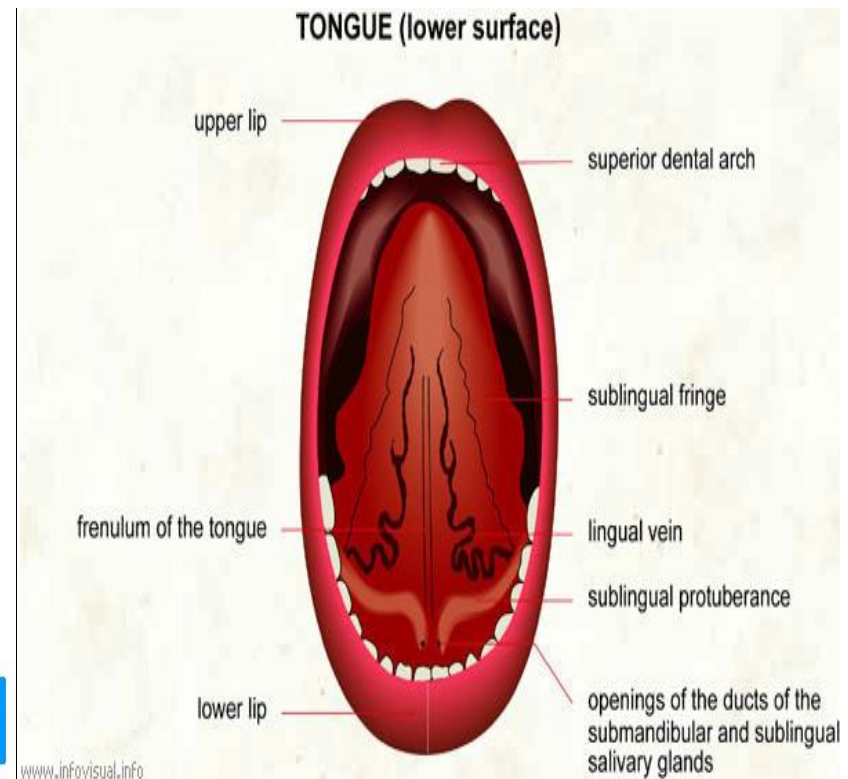
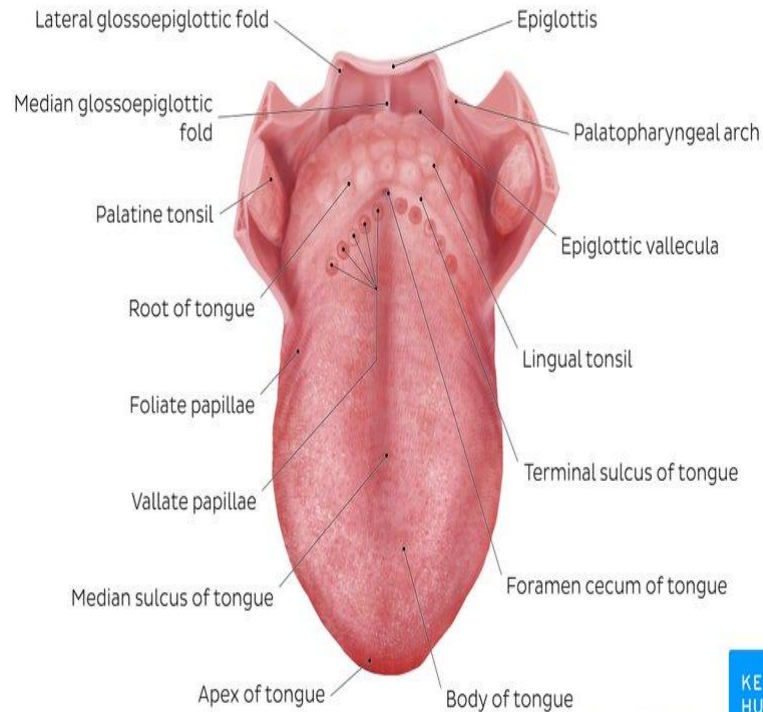
Medial pterygoid

Origin	Superficial part: Tuberosity of maxilla, Pyramidal process of palatine bone Deep part: Medial surface of lateral pterygoid plate of sphenoid bone
Insertion	Medial surface of ramus and angle of mandible
Action	Bilateral contraction - Elevates and protrudes mandible Unilateral contraction - Medial movement (rotation) of mandible
Innervation	Medial pterygoid nerve (of mandibular nerve (CN V3))



Subject four: the Tongue

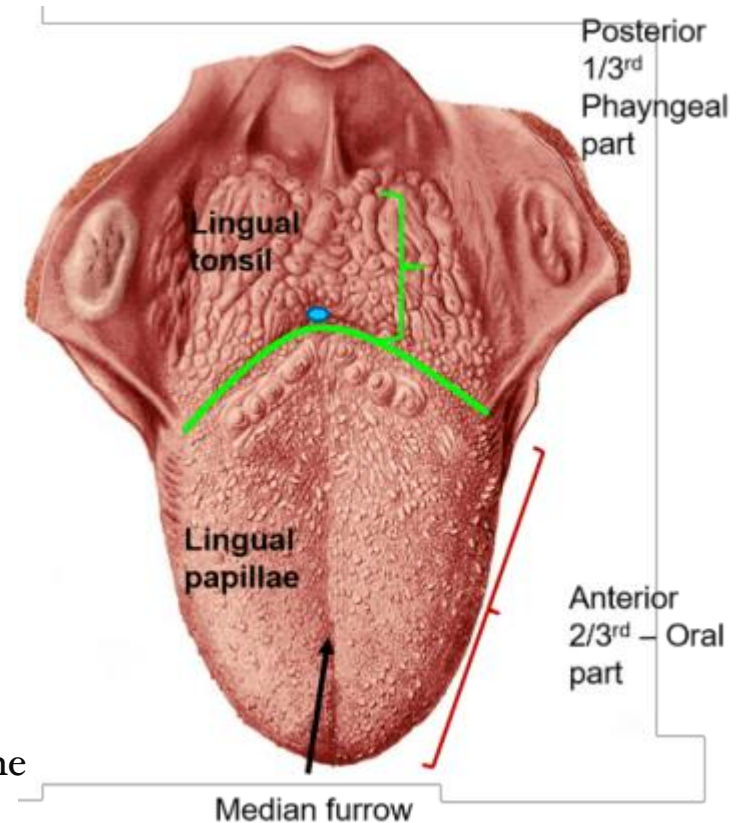
The student should differentiate in the tongue between the upper surface and lower surface and the between the anterior and posterior third of the tongue.



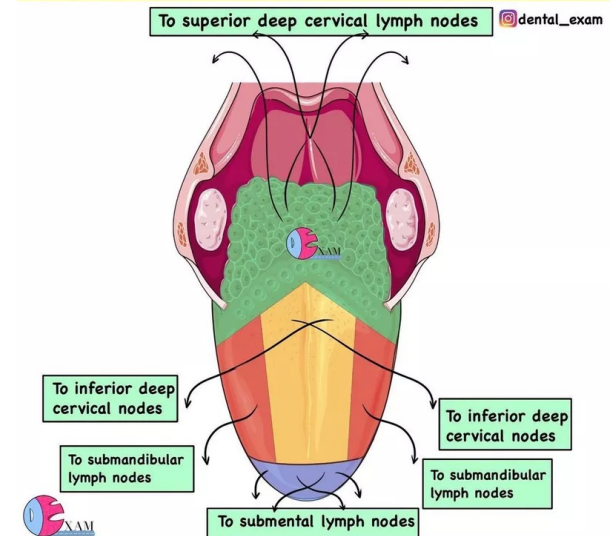
Point of differences

- 1- Origin of each part (embryo).
- 2- Innervations
- 3- Lymphatic
- 4- Taste buds
- 5- Blood supply

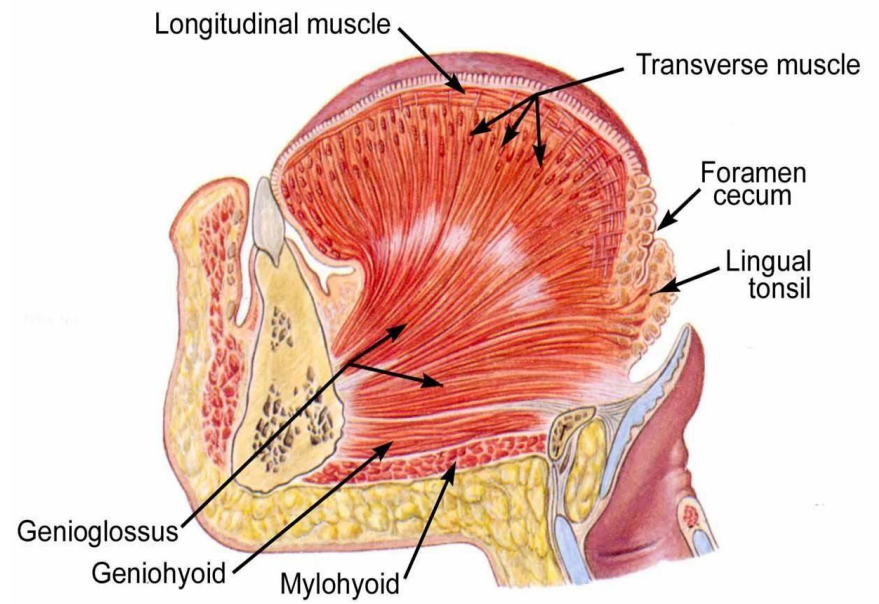
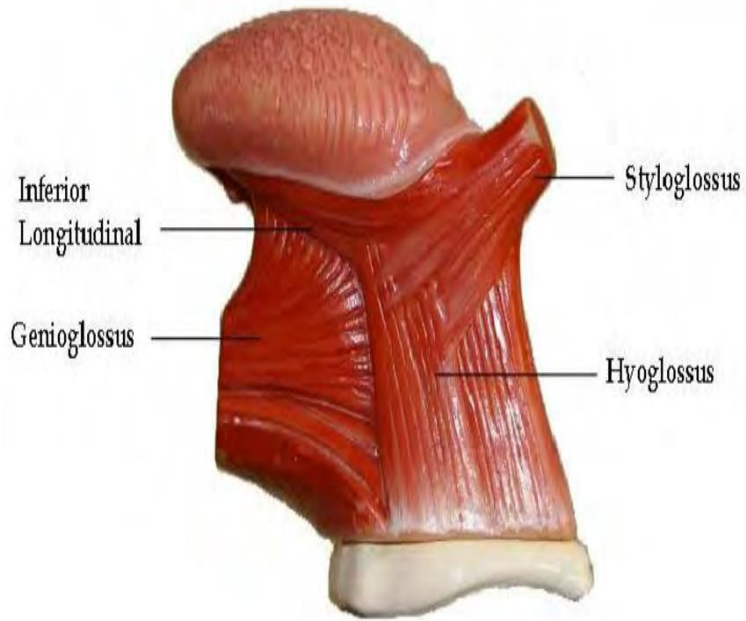
1. The anterior two-thirds of the tongue derive from the first pharyngeal arch, while the posterior third originates from the second and third pharyngeal arches.
2. (Explained previously)
4. Circumvallate papillae originate from posterior 1/3 and contain taste buds, fungiform papillae contain taste buds as well, both exist on the anterior 2/3
5. Anterior 2/3: lingual artery
Posterior 1/3: ascending pharyngeal and tonsillar branch of facial arteries



Lymphatic drainage of Tongue



The student should now know the muscles of the tongue (origin, insertion, nerve supply and action)



Muscles of the Tongue

The muscles of the tongue can be divided into:

1. intrinsic muscles: These muscles are confined to the tongue and are not attached to bone, they are responsible for the shape of the tongue. They consist of longitudinal, transverse, and vertical fibers.

Nerve supply: Hypoglossal nerve.

Action: Alter the shape of the tongue.

2. extrinsic muscles: muscles coming from outside the tongue and inserting in it. These muscles are attached to bones and the soft palate, they are responsible for the movement of the tongue.

The muscles attach from styloid process to the tongue (styloglossus), from the soft palate above (palatoglossus), from the mandible (genioglossus) and from the hyoid bone below (hyoglossus).

Origins:

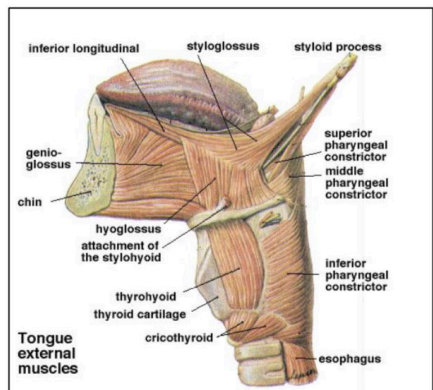
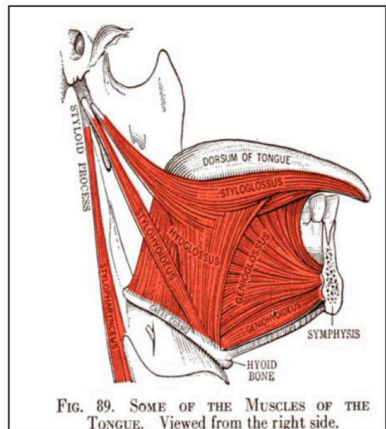
- 1. Genioglossus** originates from Superior genial spine of mandible.

Action: Protrudes apex of tongue straight through mouth.

This muscle is an important muscle, contraction of both muscles (right and left) protrudes the tongue straightly outside the mouth. While the rest of the muscles move it backwards, upwards, downwards.

⚠ So, Injury of the right hypoglossal nerve for example will cause paralysis of the right genioglossus muscle (and all muscles supplied by the right hypoglossal), resulting in right deviation of the tongue (the tongue will be deviated to the paralyzed side). "ممكن يجي عليه"
سؤال بالامتحان

Explanation: when only the left side protrudes the tongue (because the right side is paralyzed) the tongue will be pushed towards the paralyzed side because it is not functioning and doing its job (no resistance on the right side).



[Hypoglossal Nerve Palsy during Meningococcal Meningitis \(youtube.com\)](#)

2. Hyoglossus originates from Body and greater cornu of hyoid bone.

Action: Depresses tongue.

3. Styloglossus originates from Styloid process of temporal bone.

Action: Draws tongue upward and backward.

4. Palatoglossus originates from Palatine aponeurosis.

Action: Pulls roots of tongue upward and backward, narrows oropharyngeal isthmus.

Insertion (for the 4 muscles): Blends with each other, the palatoglossus inserts at Side of tongue.

Nerve supply: Hypoglossal nerve, except palatoglossus which is supplied by accessory with the vagus nerve.

Question:

Injury of the right hypoglossal nerve → (result)



The second practical Lab of the first week
tues 30/03

Subject One: hard and soft palate

The student should now the bones which form the hard palate

THE PALATE

- ❖ The palate forms the roof of the mouth and the floor of the nasal cavity.
- ❖ It is divided into two parts: the hard palate in front and the soft palate behind.

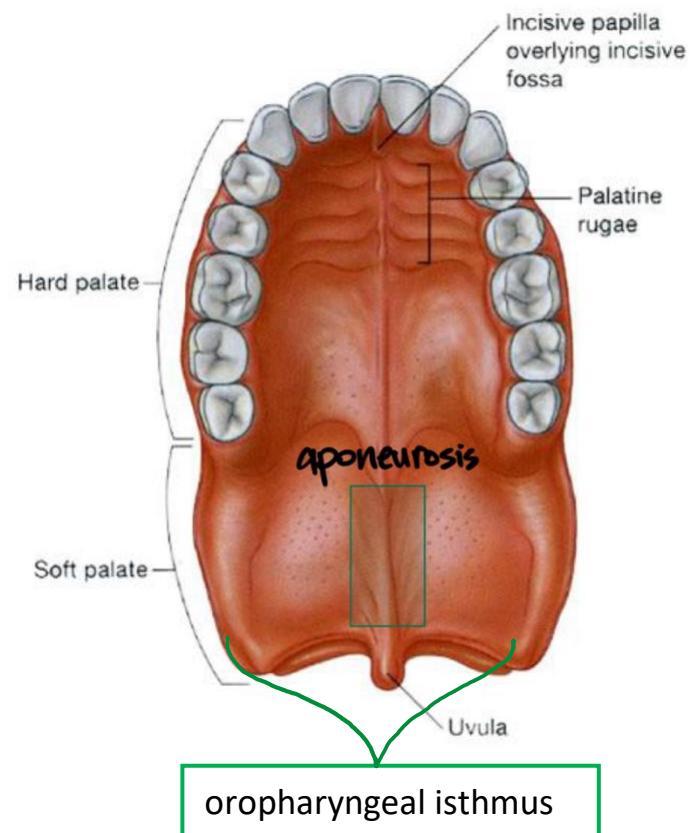
❖ Hard Palate

- The hard palate is formed by the palatine processes of the maxillae and the horizontal plates of the palatine bones

*remember greater and lesser palatine foramina (for the passage of greater and lesser palatine nerves and vessels)

- The hard palate has dense CT adhered tightly to periosteum (لازق في العظم)
- It is continuous behind with the soft palate.
- It has a foramen anteriorly: the incisive foramen that connects the hard palate with the nasal cavity. Nerves & arteries pass through this foramen.

At the posterior border of the hard palate there is a spine where the aponeurosis is attached forming the soft palate



❖ Soft Palate

It has loose CT

- Formed by **Palatine aponeurosis** which is the meeting point of the Tensor villi palatini muscles on the right & left side (we'll discuss the muscle soon)
- The soft palate is a mobile fold attached to the posterior border of the hard palate.
- Its free posterior border presents in the midline a conical projection called the uvula. That's seen on the roof of the oropharynx.
- The soft palate is continuous at the sides with the lateral wall of the pharynx
- It is a muscular structure .
By moving upward and backward it closes the nasopharynx , it moves downward during mastication to increase the pressure inside oral cavity, then upwards again during swallowing.

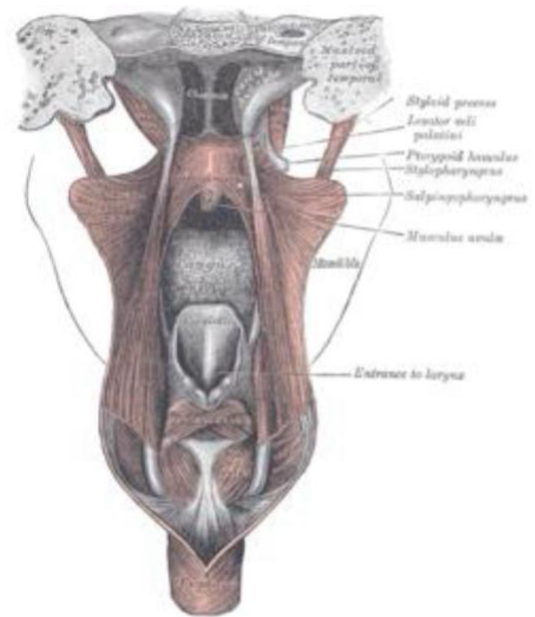
The soft palate is composed of :

1. mucous membrane: covers the upper and lower surfaces of the soft palate.
2. palatine aponeurosis: a fibrous sheet attached to the posterior border of the hard palatine. It is the expanded tendon of the tensor veli palatini muscle. (tensor: tenses)
3. muscles

MUSCLES OF THE SOFT PALATE

• The muscles of the soft palate are:

- 1) tensor veli palatine (tenses increasing the pressure)
- 2) levator veli palatine (elevates)
- 3) palatoglossus (around the palatine tonsils)
- 4) palatopharyngeus (around the palatine tonsils)
- 5) musculus uvulae (the uvula itself)



Now that we know the tensor veli palatini, it's time to understand how that palatine aponeurosis is formed exactly.

- The muscle fibers of the tensor veli palatini converge as they descend from their origin to form a narrow tendon, which turns medially around the pterygoid hamulus
- The tendon, 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.

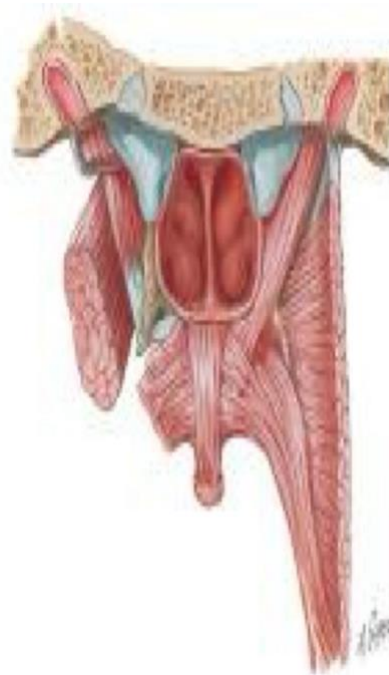
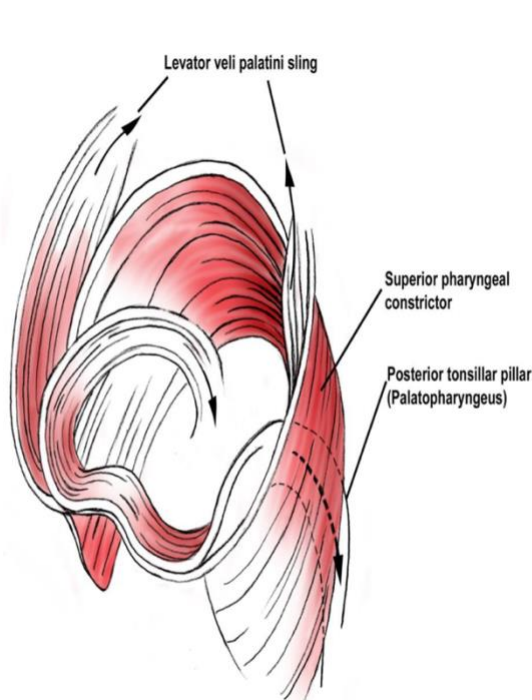
Muscle	Origin	Insertion	Action	Nerve supply
Levator veli palatini	Petrous part of temporal bone, auditory tube	Palatine aponeurosis	Raises soft palate	Pharyngeal plexus
Tensor veli palatini	Spine of sphenoid, auditory tube	With muscle of other side, forms palatine aponeurosis	Tenses soft palate	**Nerve to medial pterygoid from mandibular nerve
Palatopharyngeus	Palatine aponeurosis	Posterior border of thyroid cartilage	Elevates wall of pharynx, pulls palatopharyngeal folds medially	Pharyngeal plexus
Musculus uvulae	Posterior border of hard palate	Mucous membrane of uvula	Elevates uvula	Pharyngeal plexus

*All the muscles of the soft palate mentioned in the slides and their details have been written in this table.

*All of these muscles are innervated by pharyngeal plexus except Tensor Veli Palatini muscle

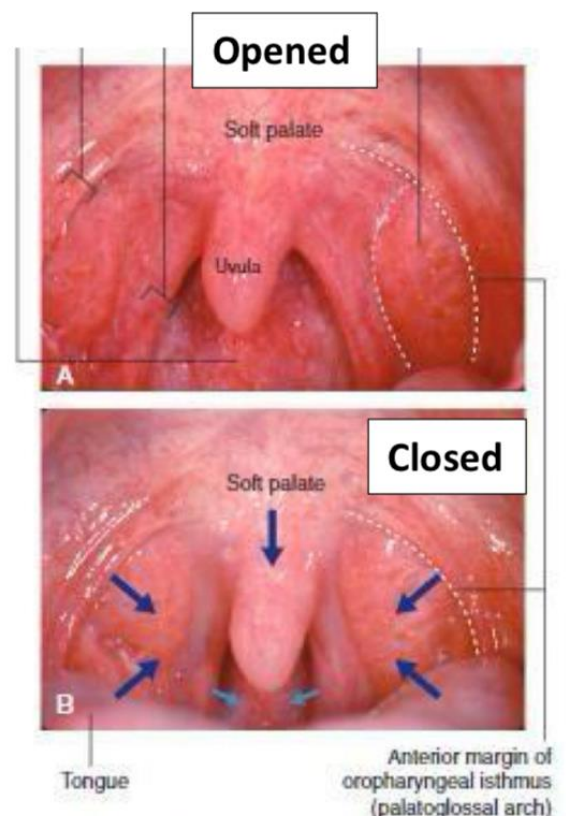
*The pharyngeal plexus is formed by : glossopharyngeal nerve and the vagus nerve with the cranial accessory nerve

*Recall from MSS embryo that cleft in the uvula can occur during embryonic development if the fusion of the maxillary processes fails forming a bifid uvula



MOVEMENTS OF THE SOFT PALATE

- Normally the soft palate is relaxed to maintain the space between the oropharynx & nasopharynx opened for air inhalation and articulation of vowels.
- **The pharyngeal isthmus (the communicating channel between the nasal and oral parts of the pharynx) is closed by raising the soft palate.**
- **Closure of the oral cavity occurs during the production of explosive consonants in speech (Like the voice /k/ in cat) and during mastication (pressure inside the oral cavity is needed)**

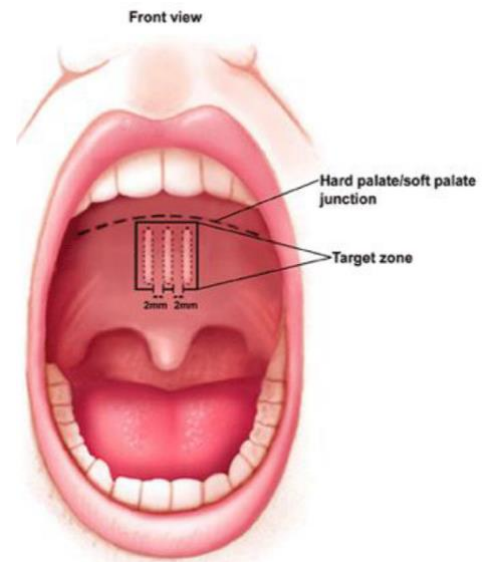


Closure of oropharyngeal isthmus

- Medial and downward movement of palatoglossal arches
- Medial and downward movement of palatopharyngeal arches
- Upward movement of tongue

- Closure of the nasal cavity is **important during vomiting** to prevent the vomit from going out of the nasal cavity and restrict its exit via the oral cavity.

- The soft palate is raised by the contraction of the levator veli palatini on each side.
- At the same time, the upper fibers of the superior constrictor muscle contract and pull the posterior pharyngeal wall forward
- The palatopharyngeus muscles on both sides also contract so that the palatopharyngeal arches are pulled medially, like side curtains
- By this means the nasal part of the pharynx is closed off from the oral part.



NERVE SUPPLY OF THE PALATE

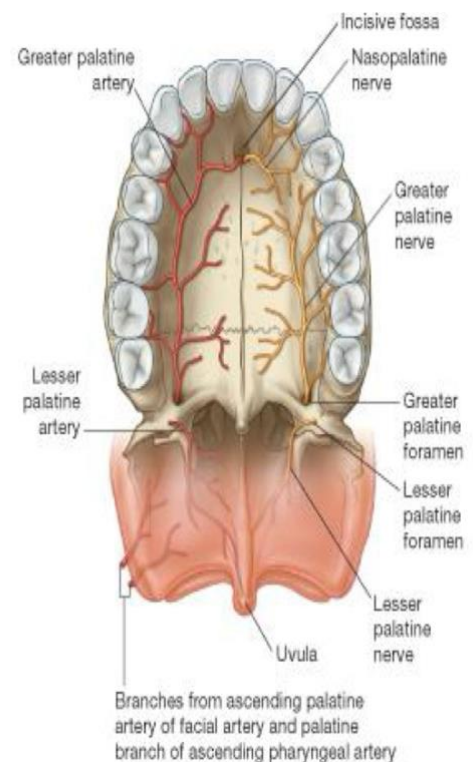
- The greater and lesser palatine nerves from the maxillary division of the trigeminal nerve enter the palate through the greater and lesser palatine foramina
- The nasopalatine nerve, also a branch of the maxillary nerve, enters the front of the hard palate through the incisive foramen.
- The glossopharyngeal nerve also supplies the soft palate

• BLOOD SUPPLY OF THE PALATE

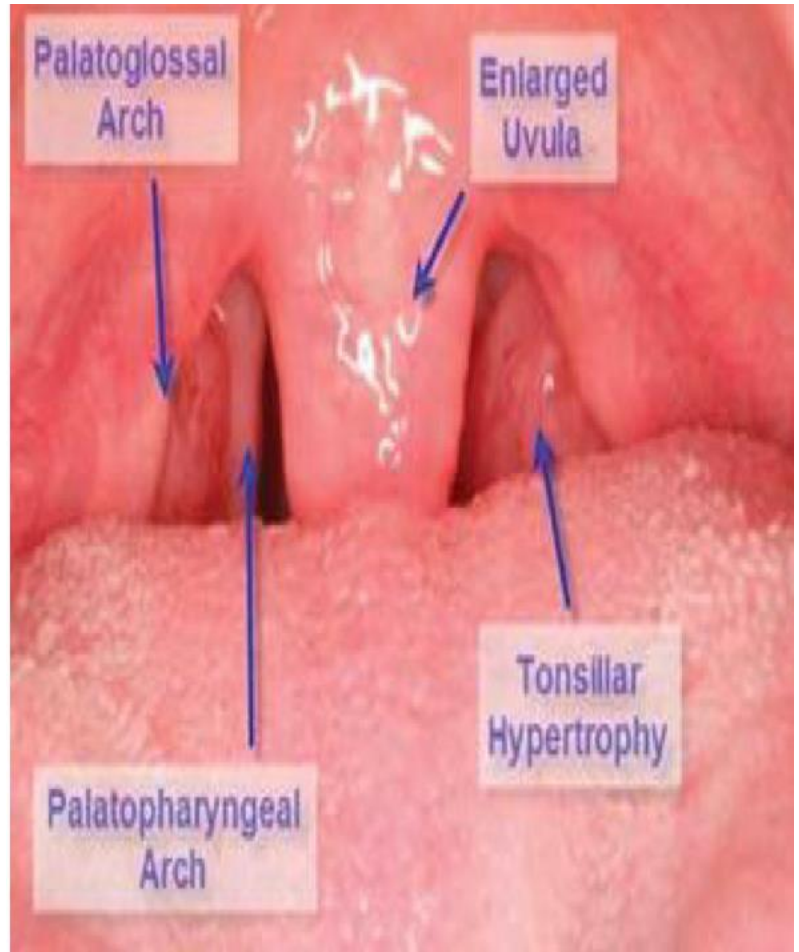
- The greater palatine branch of the maxillary artery, the ascending palatine branch of the facial artery, and the ascending pharyngeal artery

• LYMPH DRAINAGE OF THE PALATE

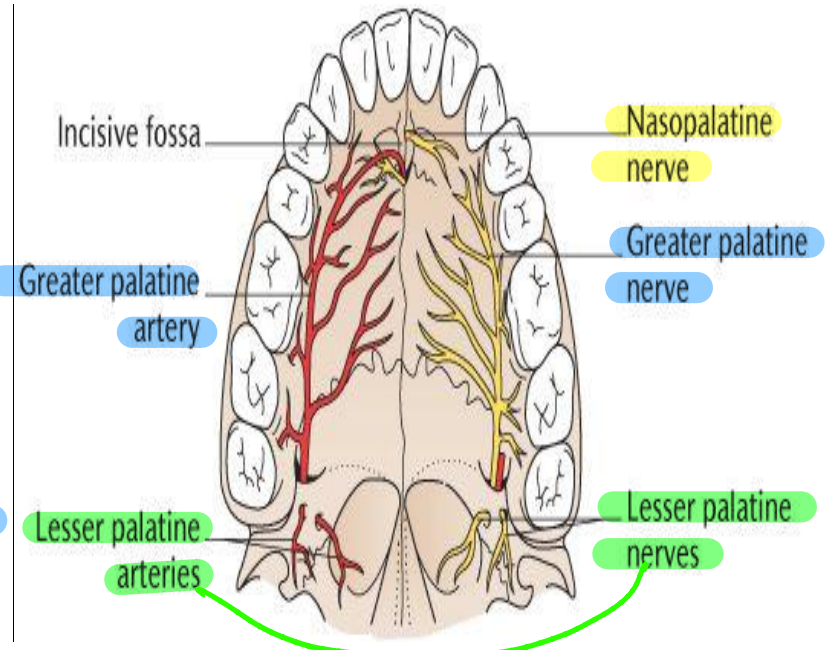
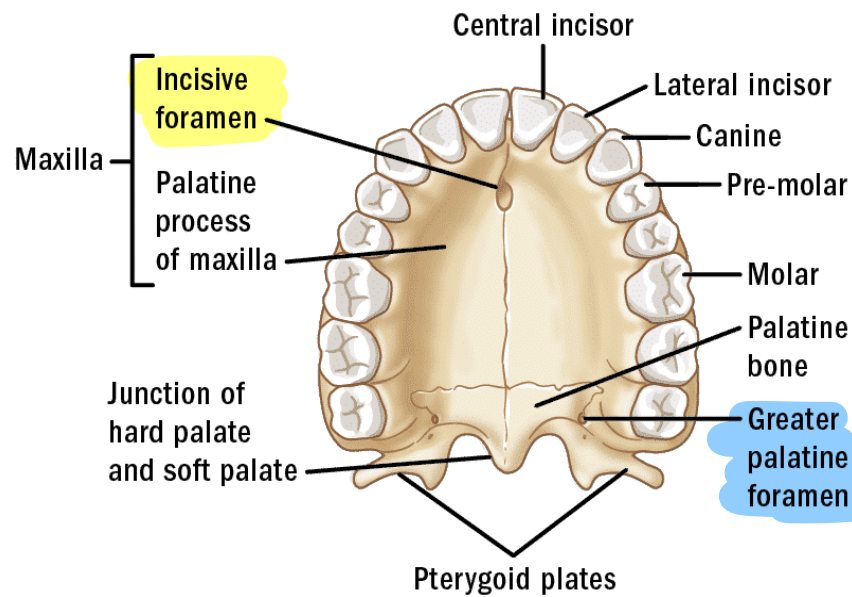
- Deep Cervical Lymph Nodes



- 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.
- The muscle contained within the fold is the palatopharyngeus muscle.
- The palatine tonsils, which are masses of lymphoid tissue, are located between the palatoglossal and palatopharyngeal arches



There are 5 structures between the mylohyoid and hypoglossus muscles: deep part of submandibular gland, submandibular duct, submandibular ganglia, lingual nerve, and hypoglossal nerve.



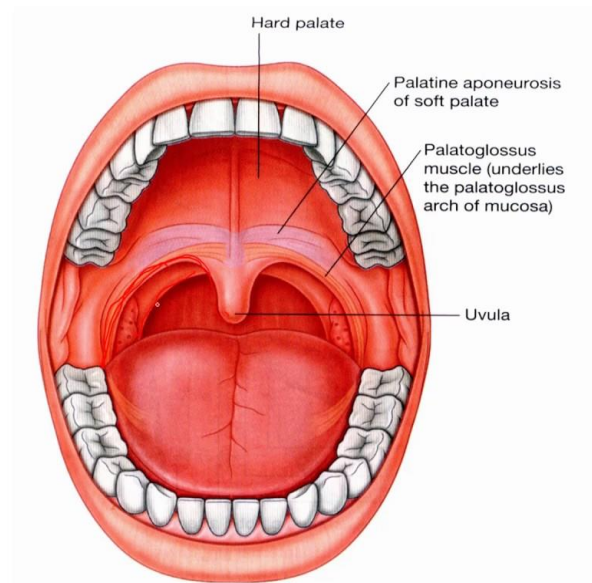
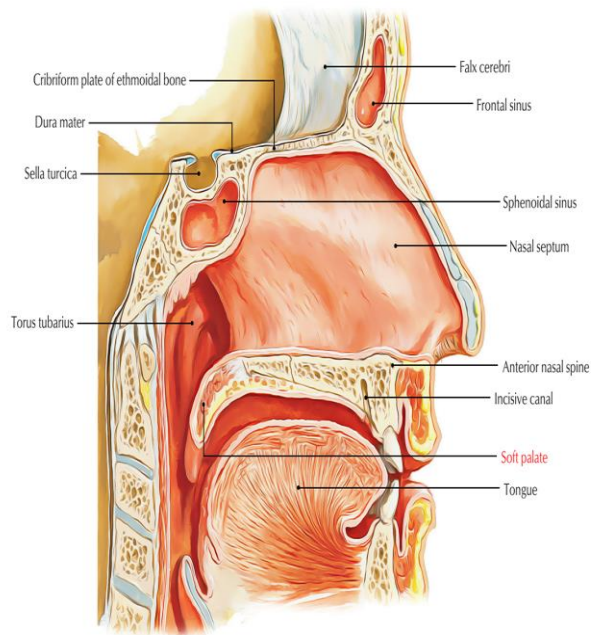
Note: identify the foramina of the hard palate

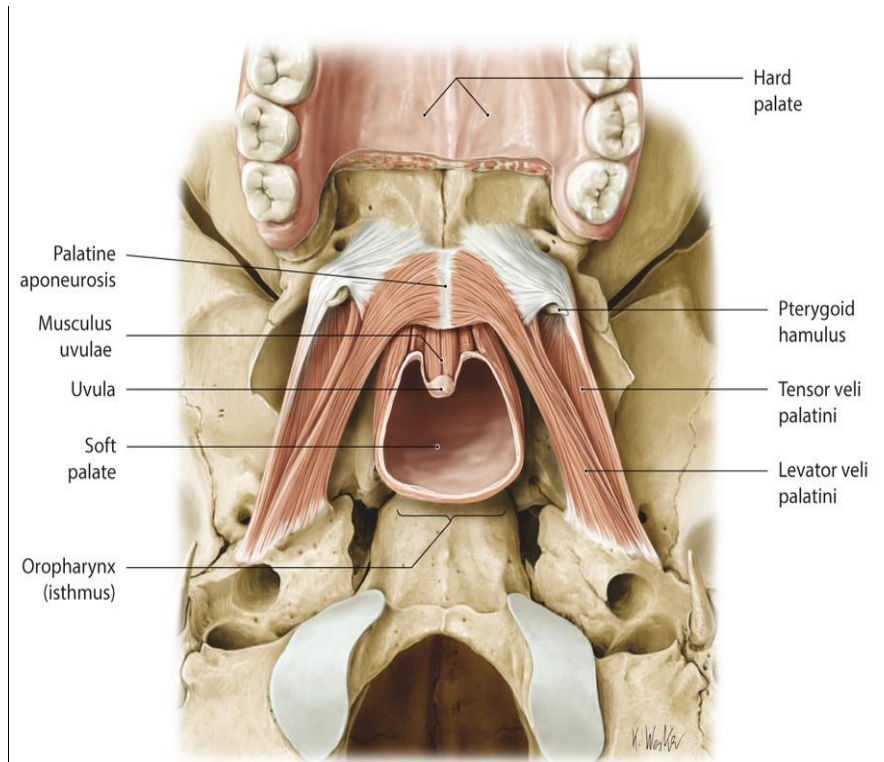
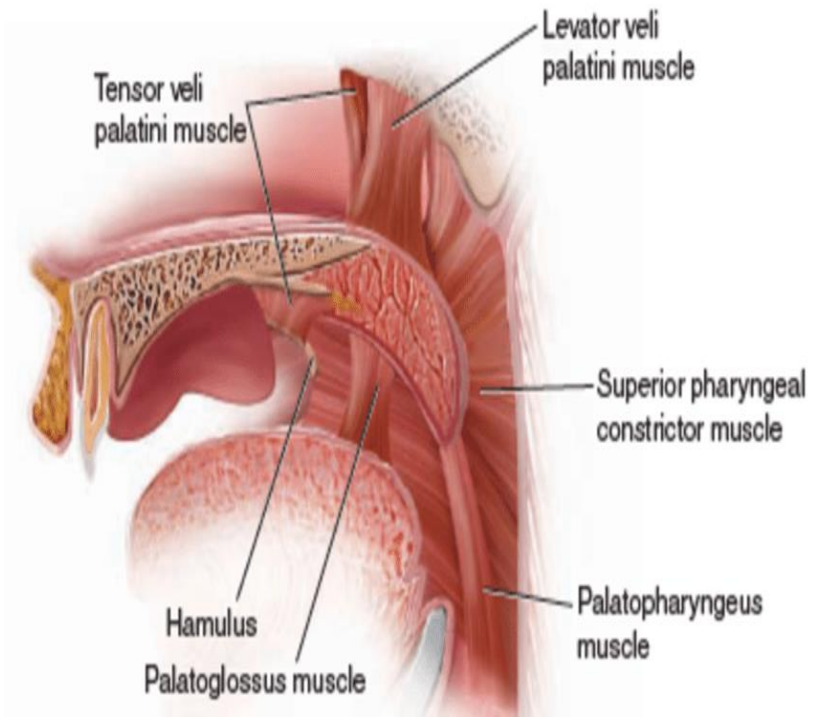
Q: identify nerves and blood vessels which pass through each foramin. *foramen*

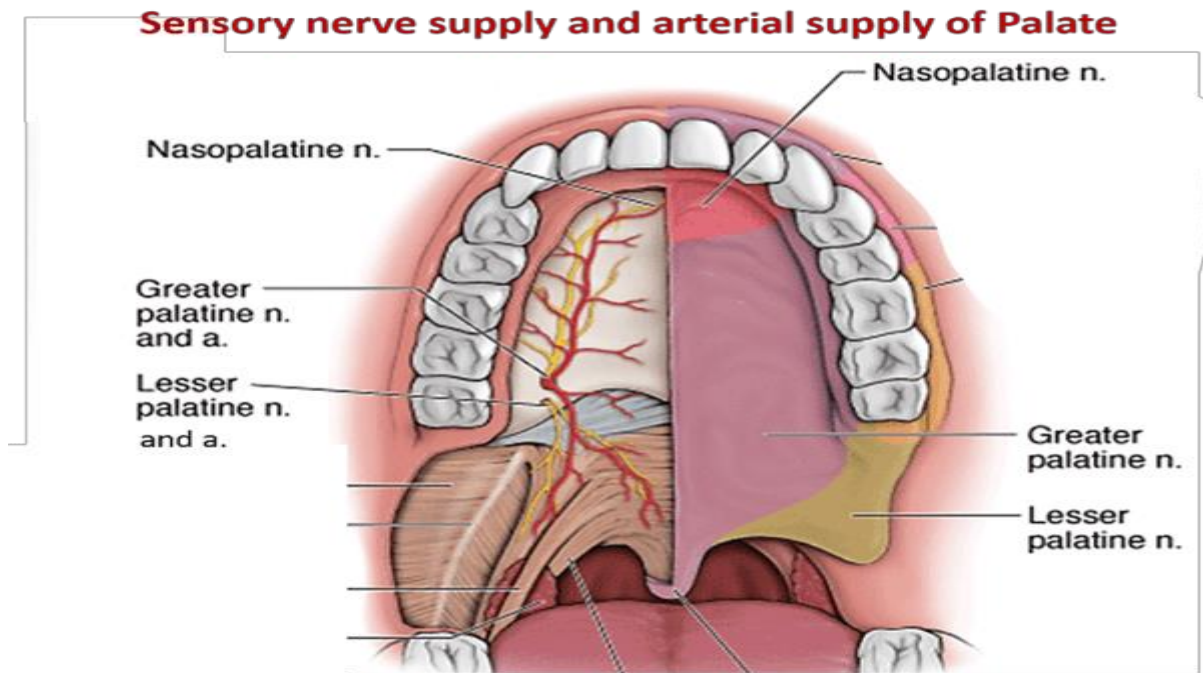
lesser palatine foramen

Subject Two: soft palate

The student should now know the function, innervations, blood supply of its muscles and their actions.







Note: The student should understand the action of soft palate and mechanism of swallowing.

Subject Three: Salivary glands

The student should study the three major salivary glands:

Parotid gland, submandibular and sublingual and concentrate on the following points:

- 1- Site
- 2- Type of secretion
- 3- Relation
- 4- Blood supply
- 5- Innervations and type of nerves

You might ask, why do we have taste sensation on the posterior third when it's devoid of any taste buds?

Because vallate papillae which is found in the anterior two thirds in front of sulcus terminalis originates embryonically from the posterior third. So, it is supplied by the nerve that innervated the posterior third (Glossopharyngeal nerve).

The doctor didn't talk about the below subjects:

1. Blood Supply

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.

2. Lymph Drainage

Tip: Submental lymph nodes

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

Posterior third: Deep cervical lymph nodes

The Palate "Will be covered in the online lectures"

The Salivary Glands last topic in this sheet 🤔

Salivary glands can be divided into major and minor salivary glands. Minor salivary glands include labial salivary glands, palatal salivary glands, lingual salivary glands and much more. They all secrete saliva.

Major (large) salivary glands include:

1. Parotid Gland: The parotid gland is the largest salivary gland and is composed mostly of serous acini.

***Location:** lies in a deep hollow below the external auditory meatus, behind the ramus of the mandible and in front of the sternocleidomastoid muscle

***Capsule:** it is the only gland surrounded by two capsules (made of connective tissue), dividing the gland into lobes and lobules.

***Secretion of the gland:** serous secretion.

***Content and relations:** the superficial temporal artery, auriculotemporal nerve and the temporal branch of the facial nerve all emerge from the upper boarder of the gland.

The parotid duct emerges from the anterior border of the gland and passes forward over the lateral surface of the masseter. The transverse facial artery and the buccal nerve also emerge from the anterior border.

The external carotid artery and the retro mandibular vein are located at the lower border of 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].

***Innervation of the gland:** each gland has 3 types of innervation.

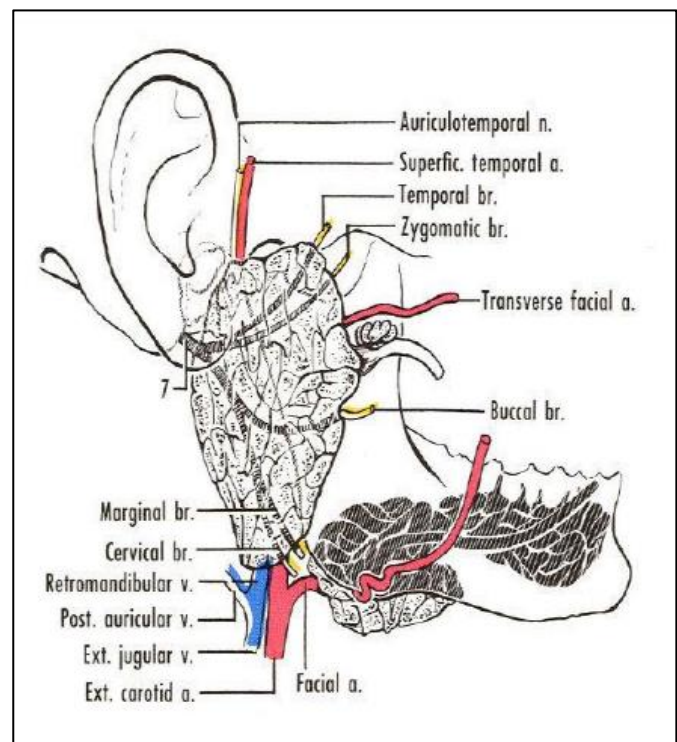
1.sensory: responsible for general sensations of the gland, for example: pain sensation when the gland is swollen.

The parotid gland is innervated by the auriculotemporal nerve.

2.sympathatic: the sympathetic innervation works on the blood vessels inside the gland (ext. carotid artery here), it causes vasoconstriction.

The postganglionic sympathetic fibers originate from the superior cervical ganglion and hitch-hike the external carotid artery to reach the gland.

3.parasympathatic: it is a secretomotor innervation, which means it is responsible for secretion.



Parasympathetic secretomotor supply arises from the glossopharyngeal nerve. The nerves reach the gland via the tympanic branch, the lesser petrosal nerve, the otic ganglion, and the auriculotemporal nerve.

The parasympathetic innervation of the parotid gland starts from the inferior salivary nucleus in the medulla oblongata, the glossopharyngeal nerve emerges from it carrying preganglionic parasympathetic fibers, it then gives a branch called the tympanic nerve which also branches into the lesser petrosal nerve just around the tympanic drum.

The lesser petrosal nerve which is carrying preganglionic parasympathetic fibers synapses at the otic ganglion just below foramen ovale.

The postganglionic parasympathetic fibers emerge from this ganglion carried by the auriculotemporal nerve. After that, the auriculotemporal nerve supplies the parotid gland with the sensory and parasympathetic innervation.

Q: which of the following nerves is secretomotor or sensory to the parotid?
Auriculotemporal.

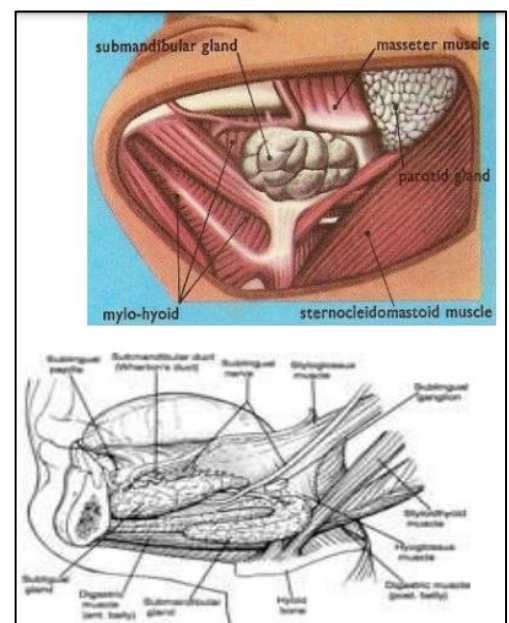
The doctor didn't talk about the below subjects:

***Opening:** The parotid duct passes anteriorly across the external surface of the masseter muscle and then turns medially to penetrate the buccinator muscle of the cheek and open into the oral cavity adjacent to the crown of the second upper molar tooth.

It enters the vestibule of the mouth upon a small papilla opposite the upper second molar tooth.

The parotid gland lies in the parotid bed that is formed by the sternocleidomastoid muscle behind, the ramus of mandible in front. superiorly, the base of the trench is formed by the external acoustic meatus and the posterior aspect of the zygomatic arch.

The facial nerve divides the gland into superficial and deep lobes.



2. Submandibular Gland

***Location:** It lies beneath the lower border of the body of the mandible.

divided into superficial and deep parts by the mylohyoid muscle.

The superficial part can actually be felt just below the mandible.

The deep part of the gland lies beneath the mucous membrane of the mouth on the side of the tongue. It is located between the mylohyoid and the hyoglossus muscles.

***Capsule:** surrounded by one capsule.

***Secretion:** The submandibular gland consists of a mixture of serous and mucous acini. (mixed)

content and relations: The submandibular duct emerges from the anterior end of the deep part of the gland and runs forward beneath the mucous membrane of the mouth.

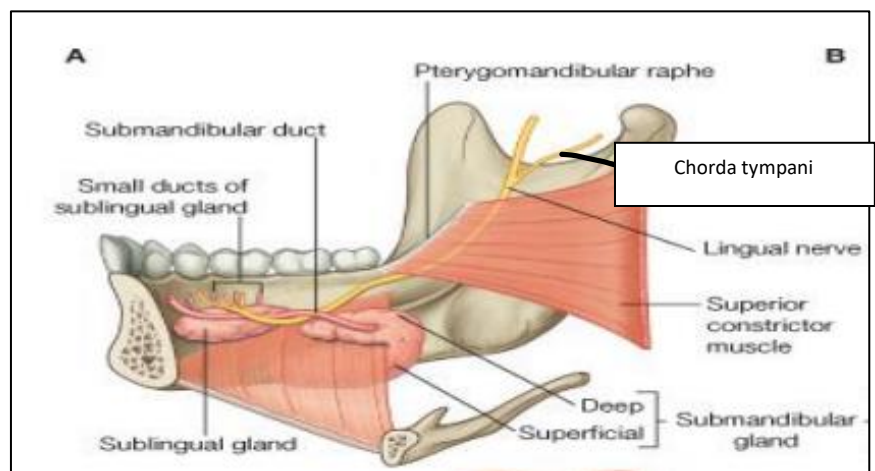
The lingual nerve loops under the submandibular duct,

crossing first the lateral side and then the medial side of the duct, as the nerve descends anteromedially through the floor of the oral cavity and then ascends into the tongue. The lingual nerve begins lateral to the submandibular duct then below it and finally medial to it. (triple relation between the lingual nerve and the submandibular duct).

***Innervation:** Parasympathetic secretomotor supply is from the facial nerve via the chorda tympani, and the submandibular ganglion

The facial nerve emerges from the superior salivary nucleus in the medulla oblongata carrying preganglionic parasympathetic fibers, it gives the branch chorda tympani which joins the lingual nerve and then synapses at the submandibular ganglion (it is located between the mylohyoid and the hyoglossus muscles), the postganglionic parasympathetic fibers can innervate a gland directly or can be carried with the lingual nerve.

In regard to submandibular gland, the postganglionic fibers pass directly to the gland.

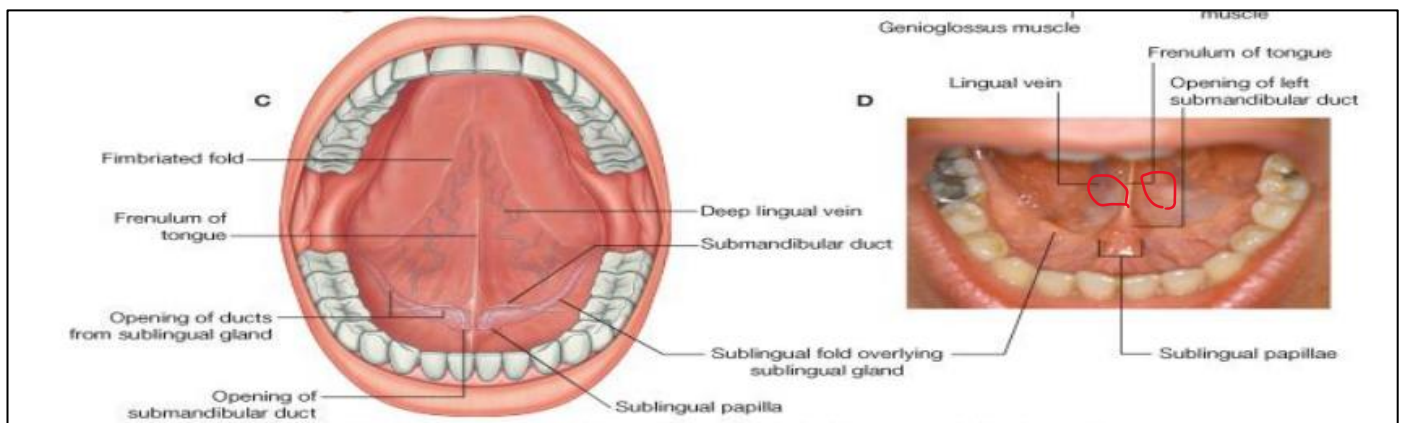


***Opening:** It opens into the mouth on a small papilla called the submandibular papillae, they are two in number located at the two ends of the two submandibular ducts, they are situated at the side of the frenulum of the tongue.

The doctor didn't talk about the below subjects:

the larger arm of the hook (or the superficial part) is directed forward in the horizontal plane below the mylohyoid muscle and is therefore outside the boundaries of the oral cavity-this larger superficial part of the gland is directly against a shallow impression on the medial side of the mandible (submandibular fossa) inferior to the mylohyoid line.

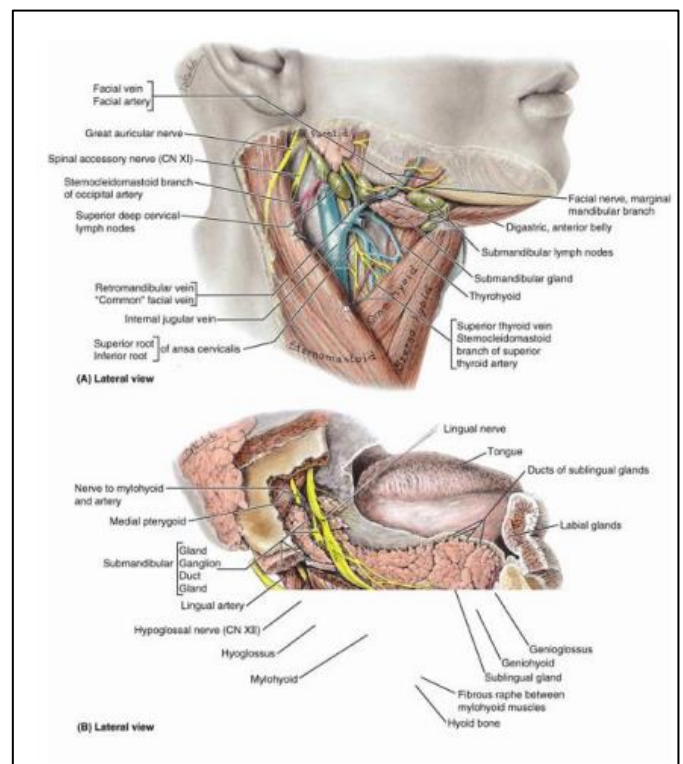
the smaller arm of the hook (or deep part) of the gland loops around the posterior margin of the mylohyoid muscle to enter and lie within the floor of the oral cavity where it is lateral to the root of the tongue on the lateral surface of the hyoglossus muscle.



3. Sublingual Gland

***Location:** the sublingual gland lies beneath the mucous membrane (sublingual fold) of the floor of the mouth, close to the frenulum of the tongue. It is located just below the tongue.

***Secretion:** It has both serous and mucous acini, with the latter predominating. (mostly mucous and very little serous).

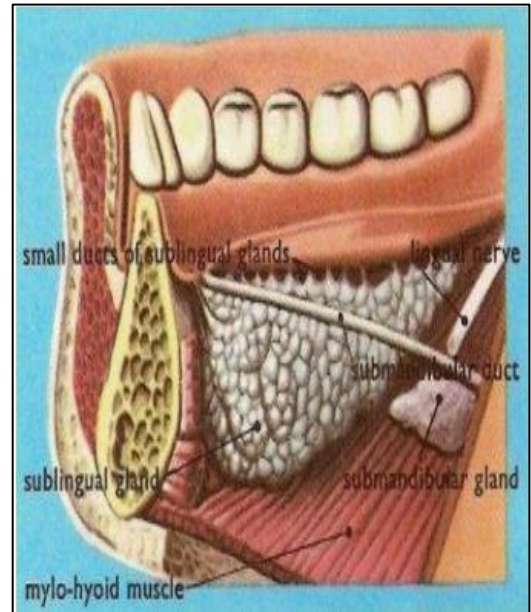


***Capsule:** surrounded by one capsule.

***Innervation** ركزوا عليه (same as submandibular gland): from the superior salivary nucleus in medulla oblongata. **Parasympathetic secretomotor supply is from the facial nerve via the chorda tympani**, which synapses with the lingual nerve in the infratemporal fossa forming an acute angle into the **submandibular ganglion** (between mylohyoid and hyoglossus). **While the postganglionic fibers pass either directly to the gland or through the lingual nerve.**

So, chorda tympani serves for both taste (mentioned previously) and for parasympathetic preganglionic innervations

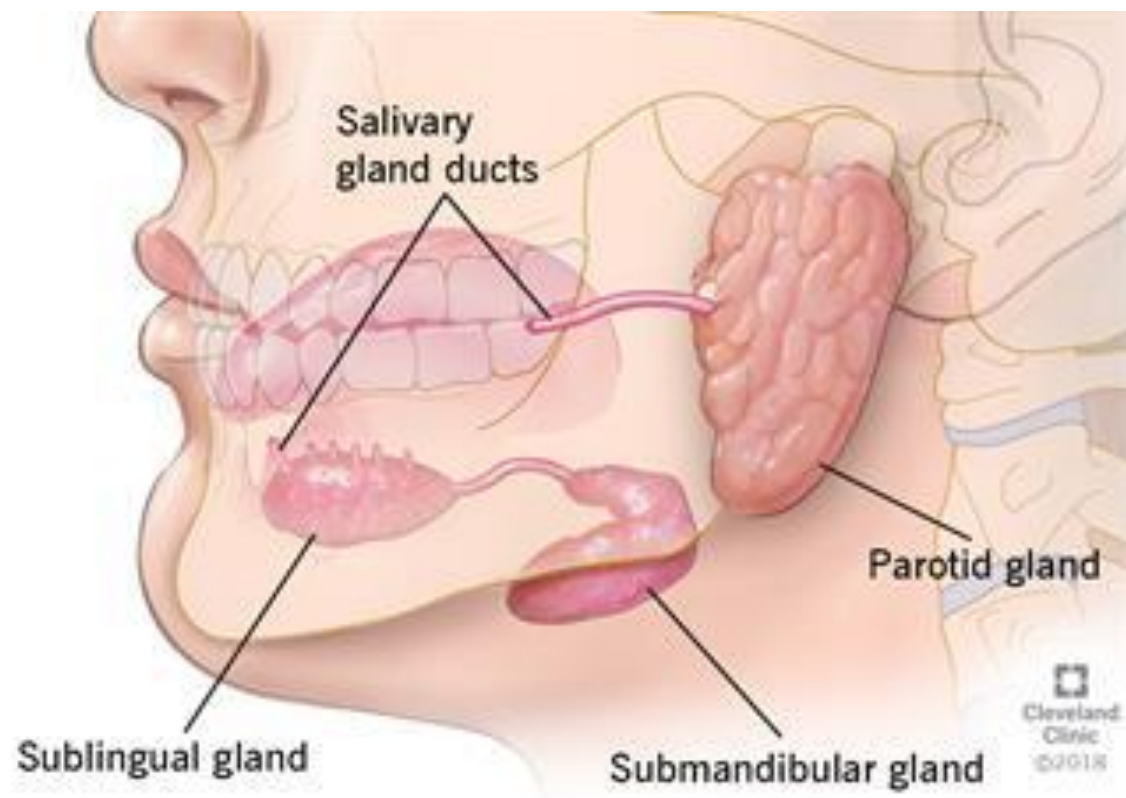
Opening: The sublingual ducts (8 to 20 in number) open into the mouth on the summit of the sublingual fold or it can open into the submandibular gland.



Thank you!

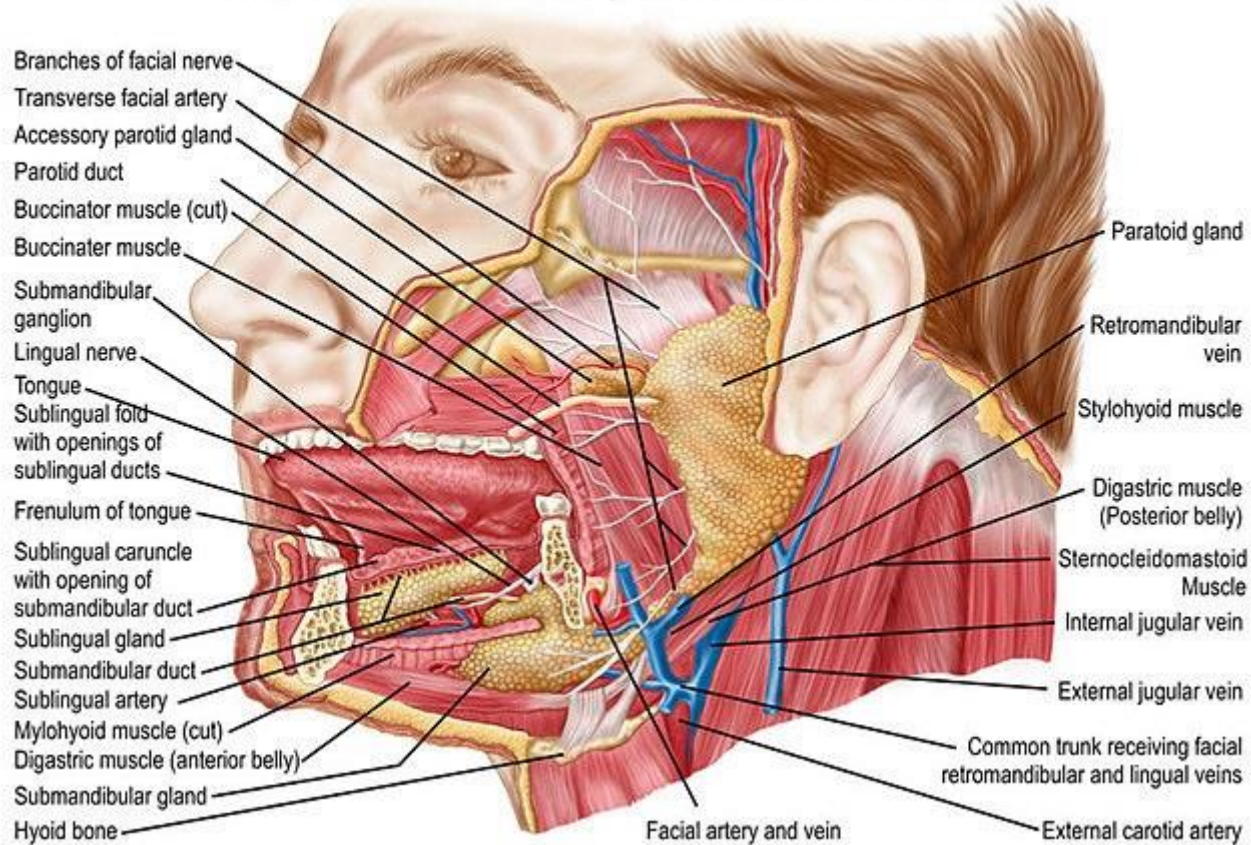


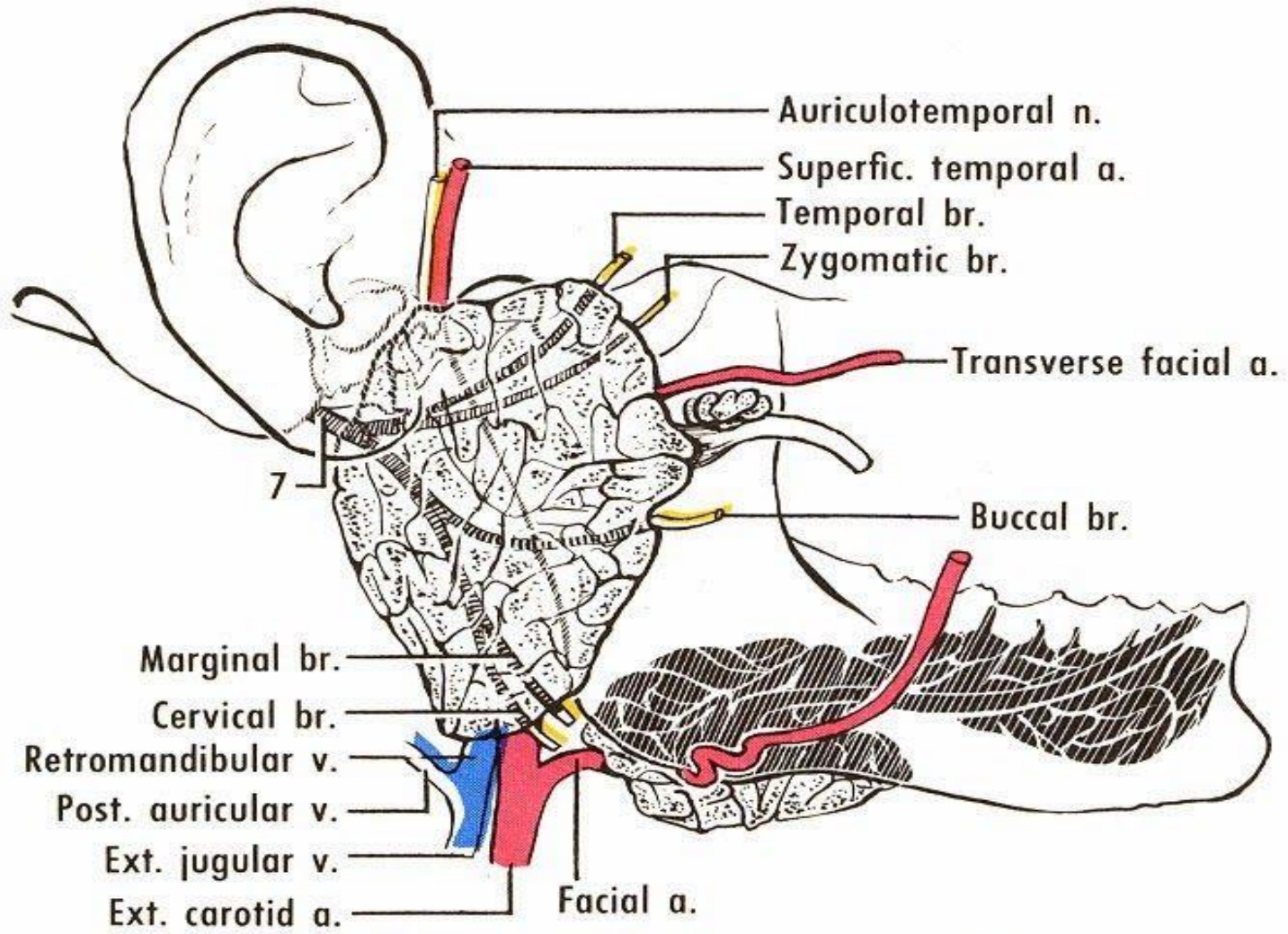
V2 → page 13 (Artery instel of Nerve)



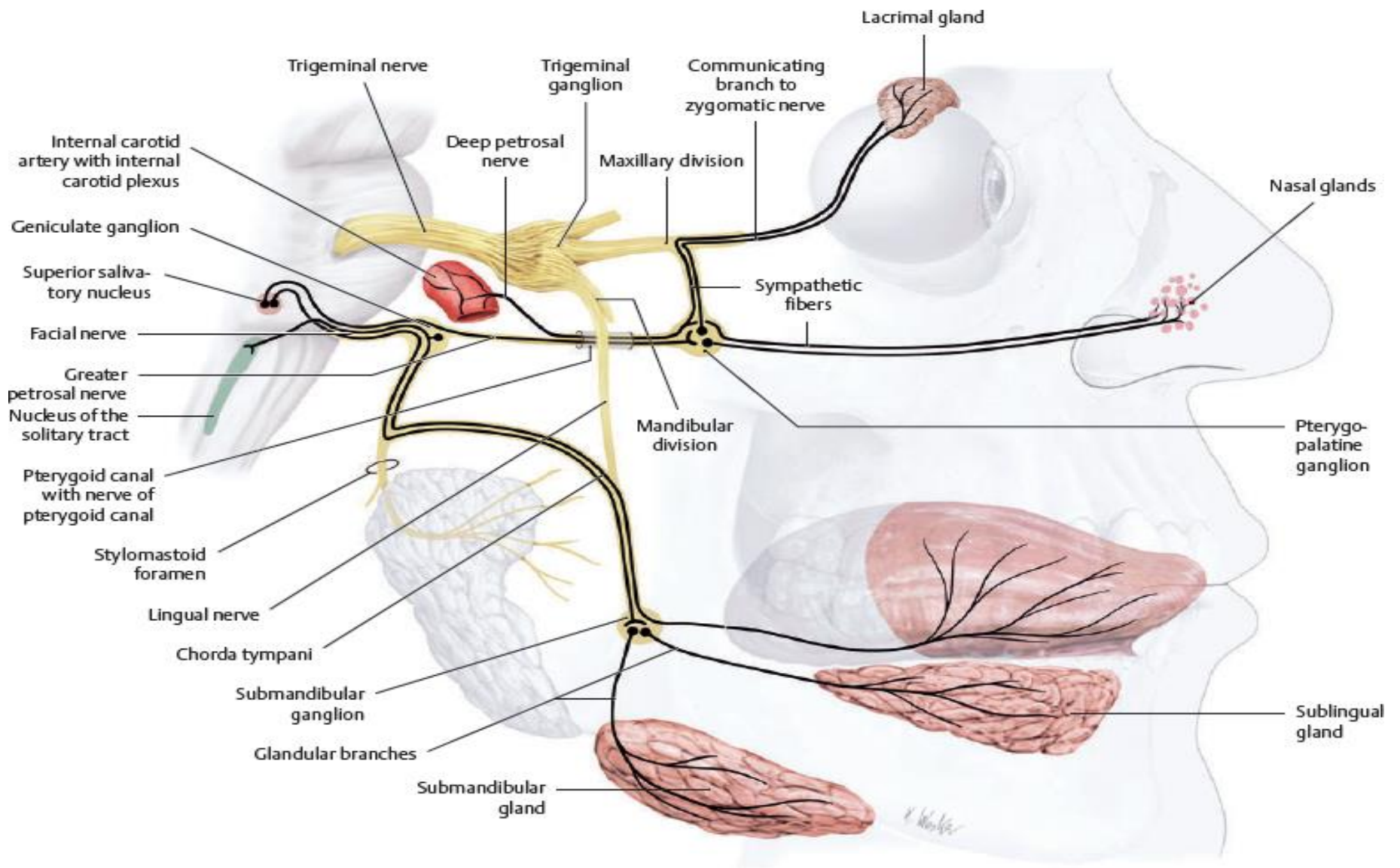
Salivary Glands

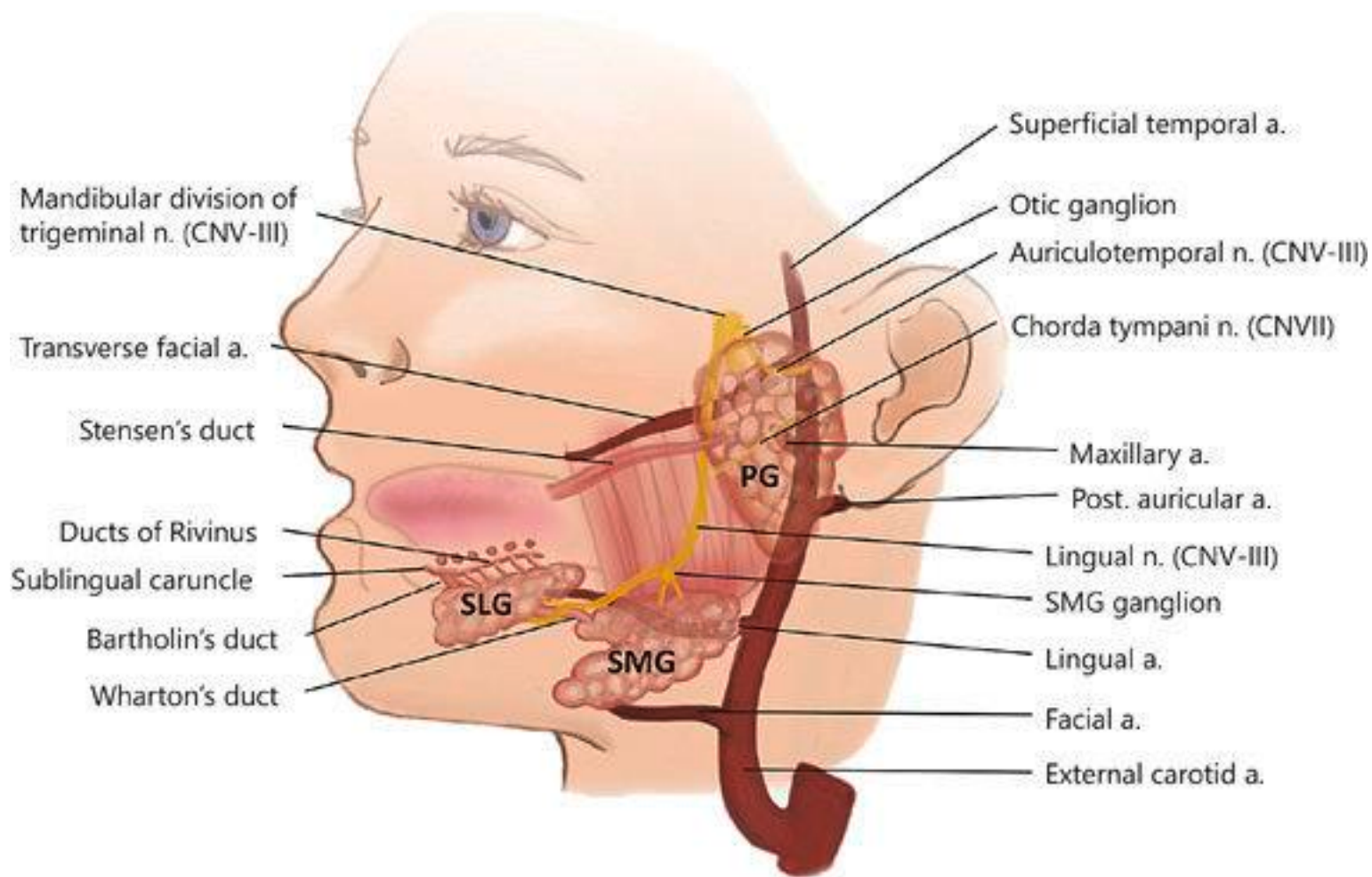
Superficial temporal artery and vein auriculotemporal





c





Mandibular division of trigeminal n. (CNV-III)

Transverse facial a.

Stensen's duct

Ducts of Rivinus

Sublingual caruncle

Bartholin's duct

Wharton's duct

SLG

SMG

PG

Superficial temporal a.

Otic ganglion

Auriculotemporal n. (CNV-III)

Chorda tympani n. (CNVII)

Maxillary a.

Post. auricular a.

Lingual n. (CNV-III)

SMG ganglion

Lingual a.

Facial a.

External carotid a.

Subject four: The Pharynx

The student should study the following points on the pharynx

1- Site and length

2- Parts

3- Its ends

4- The muscles of the pharynx (origin, insertion, nerve supply and action)

5- Blood supply

6- Nerve supply

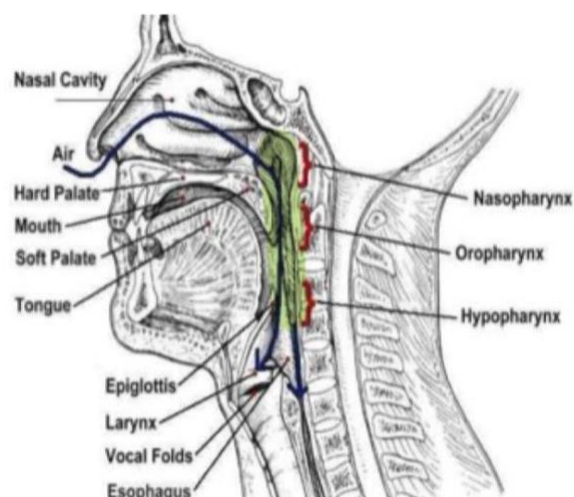
The Pharynx, Tonsils and Palate

THE PHARYNX

It begins at the base of the skull and ends at the 6th cervical vertebra and continues as the esophagus.

It's situated behind the nasal cavities, the mouth, and the larynx and may be divided into: nasal, oral and laryngeal parts.

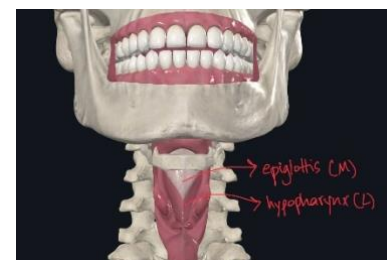
On the inside, it is covered with mucosa (stratified squamous non-keratinized) just like that of the esophagus. Then areolar CT, layer of constrictor muscles, CT. Thereby, we describe the pharynx and its wall to be Musculo-membranous.



The Pharynx is funnel shaped (upper part is wide, low part is narrow). **Its upper wider end lying under the skull and its lower, narrow end becoming continuous with the esophagus opposite the sixth cervical vertebra.**

The pharynx has a Musculo-membranous wall which is deficient (open) anteriorly. Here it is replaced by:

- 1) The posterior openings into the nose (choanae) into the nasopharynx**
- 2) The opening into the mouth (oropharyngeal isthmus) into the oropharynx**
- 3) The inlet of the larynx into the laryngopharynx (or hypopharynx), bounded by the epiglottis (check additional pic on the right)**



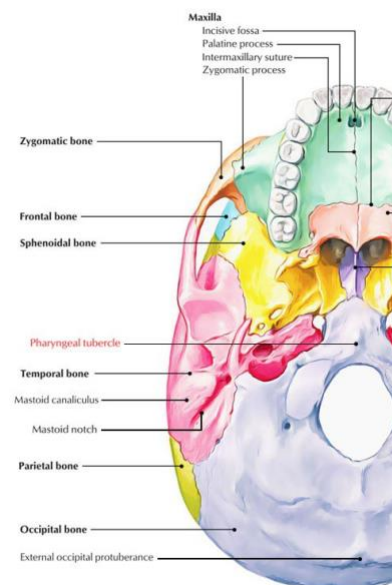
*Each part of the pharynx takes its name from the cavity it's behind.

By means of the auditory tube, the mucous membrane is also continuous with that of the tympanic cavity.

MUSCLES OF THE PHARYNX

The muscles in the wall of the pharynx consist of the superior, middle, and inferior constrictor. Their fibers run in a somewhat circular direction, and the stylopharyngeus and salpingopharyngeus muscles, whose fibers run more obliquely in a somewhat longitudinal direction. (5 muscles in total: 3 circular constrictors & 2 oblique muscles)

The three constrictor muscles contract to help the peristaltic movement in descending the bolus. They extend around the pharyngeal wall to be inserted into a fibrous band or raphe (pharyngeal raphe) that extends from the pharyngeal tubercle on the basilar part of the occipital bone of the skull down to esophagus. (Check additional pic on the right)

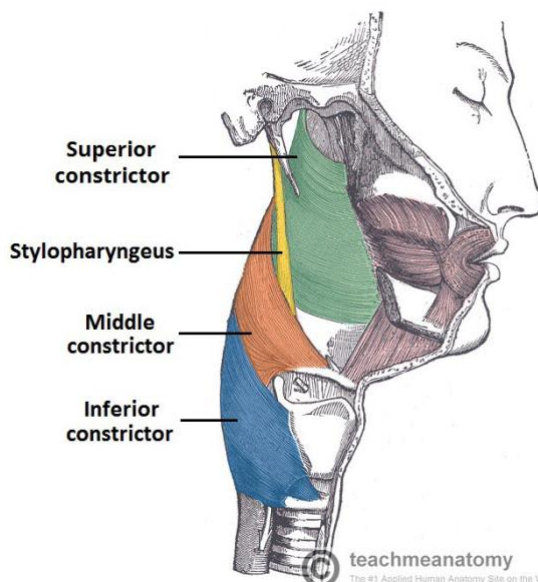


The three constrictor muscles overlap each other so that the middle constrictor lies on the outside of the lower part of the superior constrictor and the inferior constrictor lies outside the lower part of the middle constrictor.

There are three constrictor muscles whose fibers are circular:

- 1) superior constrictor of the pharynx
- 2) middle constrictor of the pharynx
- 3) inferior constrictor of the pharynx

(Superior constrictor of the pharynx ~~inside~~ ^{outside} the middle, and the middle ~~inside~~ ^{outside} the inferior)
 (Check additional pic on the right) → outside



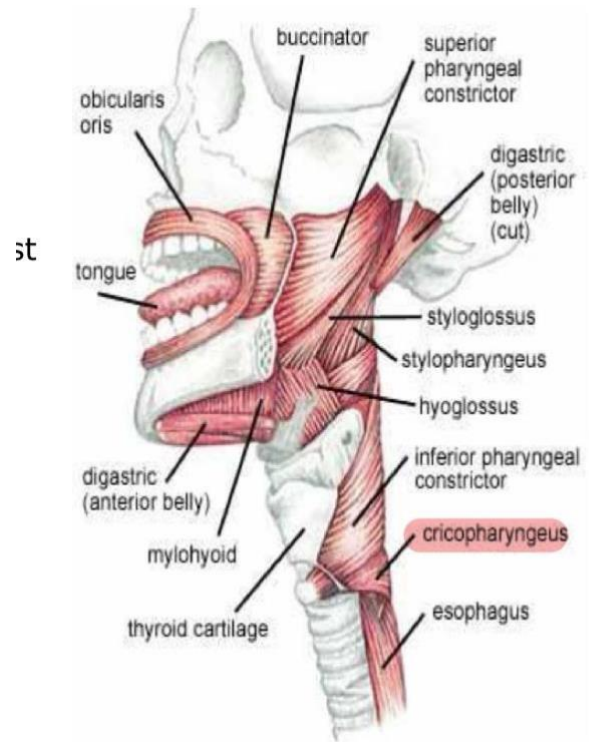
You need to know the origin, insertion, nerve supply and action of each muscle.

- The insertion for all the constrictor muscles (3) is Pharyngeal raphe.
- You can tell the origin of each muscle from its name.
- Nerve supply: all of them are supplied by the pharyngeal plexus except one.
 *Reminder: pharyngeal plexus is made of 3 nerves (vagus, accessory, glossopharyngeal nerves) on the posterior wall of the pharynx
- Action: helping in the peristaltic movements and thereby helping the bolus to descend downwards to the esophagus.

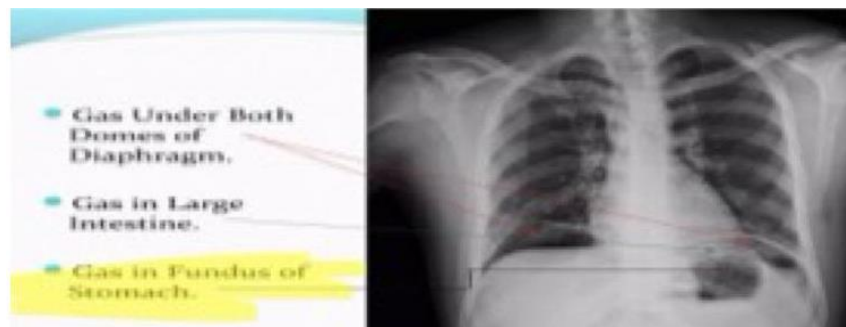
Muscle	Origin	Insertion	Innervation	Action
Superior constrictor	Medial pterygoid plate, pterygoid hamulus, pterygomandibular ligament, mylohyoid line of mandible	Pharyngeal tubercle of occipital bone, raphe in midline posteriorly	Pharyngeal plexus	Aids soft palate in closing off nasal pharynx, propels bolus downward
Middle constrictor	Lower part of stylohyoid ligament, lesser and greater cornu of hyoid bone	Pharyngeal raphe	Pharyngeal plexus	Propels bolus downward
Inferior constrictor	Lamina of thyroid cartilage, cricoid cartilage	Pharyngeal raphe	Pharyngeal plexus	Propels bolus downward
Cricopharyngeus (lowest fibers of inferior constrictor muscle)	Sphincter at lower end of pharynx			
Stylopharyngeus	Styloid process of temporal bone	Posterior border of thyroid cartilage	Glossopharyngeal nerve	Elevates larynx & pharynx during swallowing
Salpingopharyngeus	Auditory tube	Blends with palatopharyngeus	Pharyngeal plexus	Elevates pharynx
Palatopharyngeus	Palatine aponeurosis	Posterior border of thyroid cartilage	Pharyngeal plexus	Elevates wall of pharynx, pulls palatopharyngeal arch medially

Notes regarding the previous table:

- Palatopharyngeal fold is formed by palatopharyngeus muscle and its mucous membrane, it helps separate the oral cavity from oropharynx (will be discussed later in detail) .
- **The fibers of the lower part of the inferior constrictor, the cricopharyngeus muscle pass horizontally around the lowest and narrowest part of the pharynx and act as a sphincter.** -to constrict the lower portion of the pharynx, preventing passage of air. This means that it is always contracting (closed) unless (1) a bolus reaches it, stimulates it, causes it to relax and open OR (2) when vomiting, the intra-abdominal pressure causes it to open.
- Some air can still enter despite the presence of the cricopharyngeus to the pharynx -> esophagus -> stomach -> goes upwards to the upper portion of the stomach called Fundus.

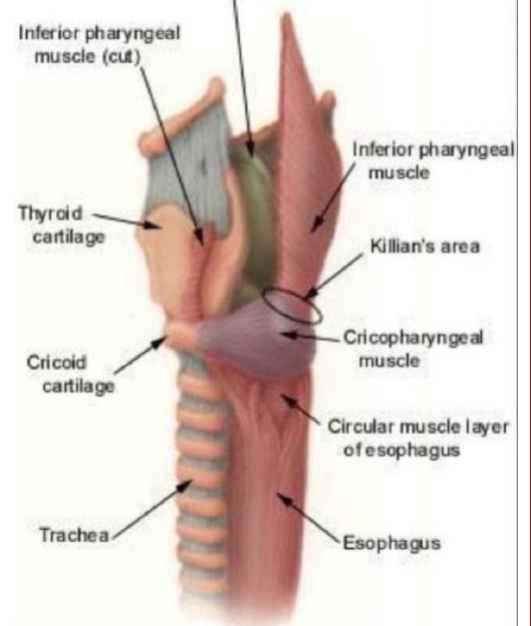


Dr mentioned the presence of gas in the fundus of the stomach displayed as black dots in X - ray imaging of the abdomen ([check additional pic below](#))



- **Killian's dehiscence is the area on the posterior pharyngeal wall between the upper propulsive part of the inferior constrictor and the lower sphincteric part, the cricopharyngeus.**

It is very sensitive, so any stimulation causes the muscles to contract -> make us cough/vomit



INTERIOR OF THE PHARYNX

Pics below show a coronal section Posteriorly.

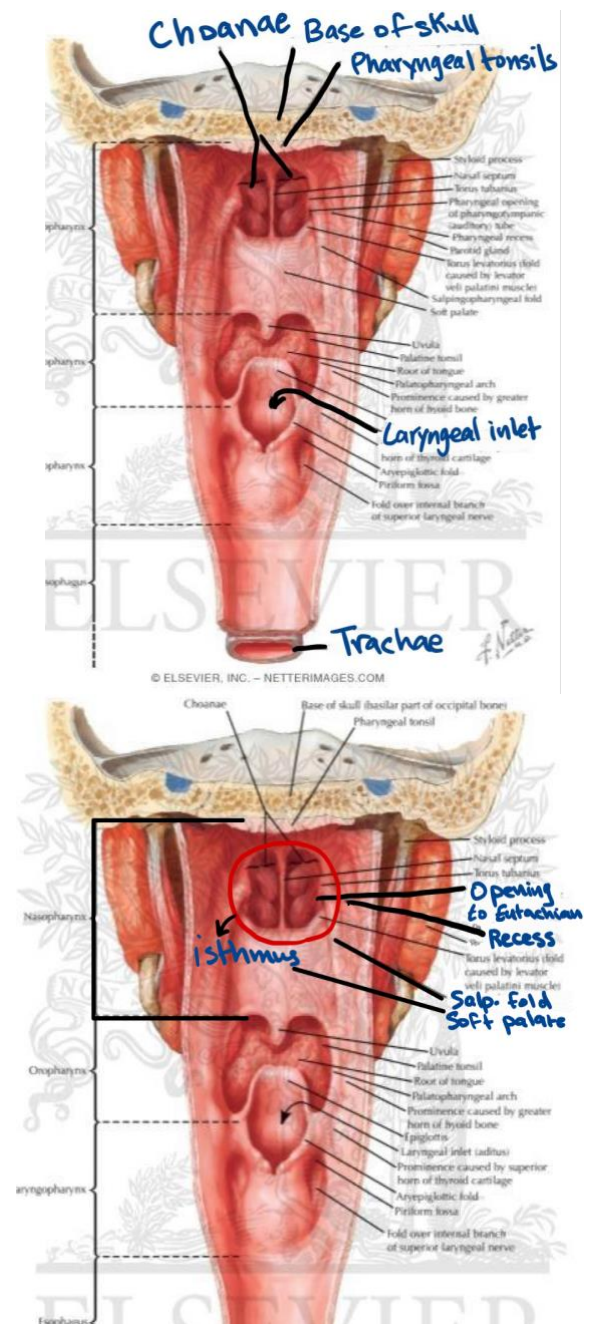
- The pharynx (function: passage of air: it enters from the choanae to inlet and then from the larynx to trachea, bronchi, and fills the lungs) **is divided into three parts: the nasal pharynx, the oral pharynx, and the laryngeal pharynx**

1. Nasal Pharynx (Choanae)

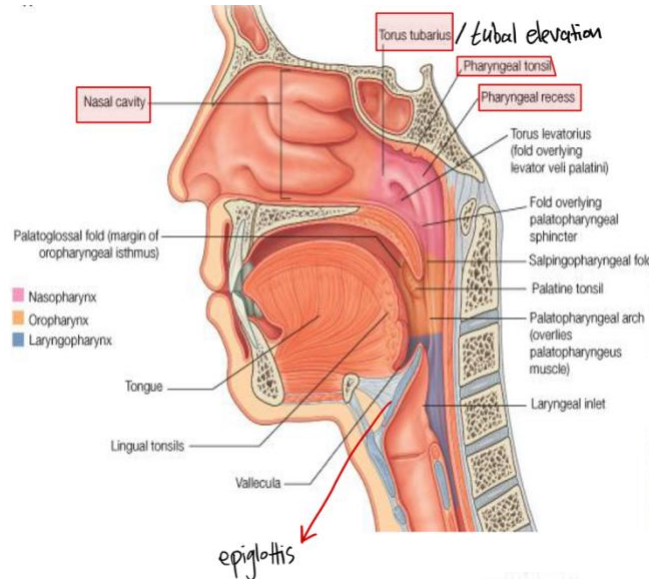
- This lies between base of the skull and the soft palate, behind the nasal cavities
- In the submucosa of the roof is a collection of lymphoid tissue called the pharyngeal tonsils
- Very important clinically: Pharyngeal tonsil (adenoid) enlargement causes block to nasopharynx, so child starts breathing via mouth rather than nose, needs removal by surgery

- The pharyngeal isthmus (function is swallowing the bolus, we'll discuss later how) **It is the opening in the floor between the soft palate and the posterior pharyngeal wall**
- On the lateral wall is the opening of the auditory tube, the elevated ridge of which is called the tubal elevation
- The pharyngeal recess is a depression in the pharyngeal wall behind the tubal elevation
- The salpingopharyngeal fold is a vertical fold of mucous membrane covering the salpingopharyngeus muscle.

- Clinical note: On the lateral wall of nasopharynx is the opening of the auditory tube (Eustachian) it delivers air to the middle ear and balance pressure to tympanic membrane. The disadvantage is that it can spread infection from the nasal cavity to the middle ear and cause otitis media... that is especially the case when a child vomits in supine position

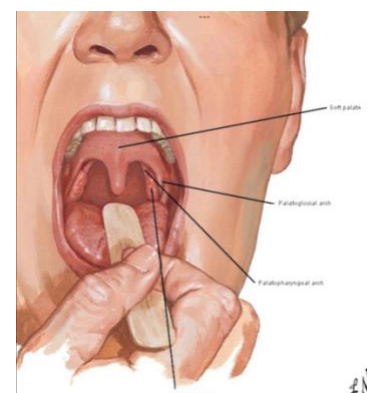
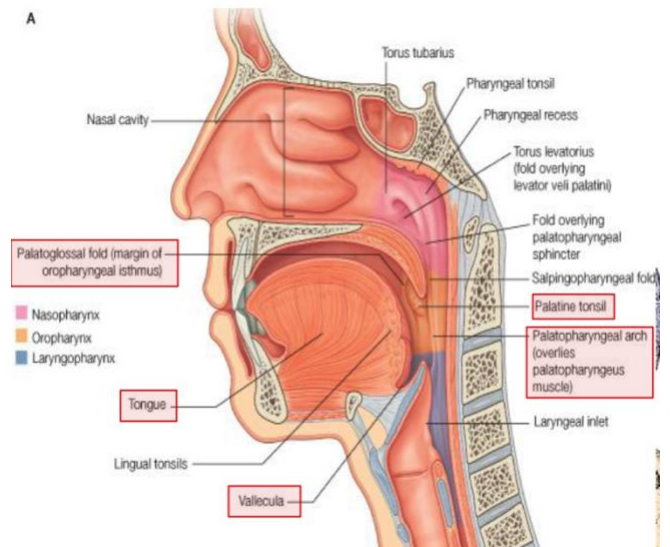
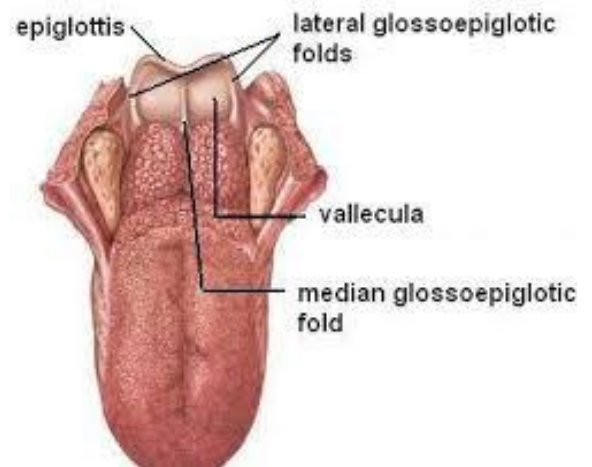


Dr focused on the following structures in this Sagittal section.



2. Oropharynx

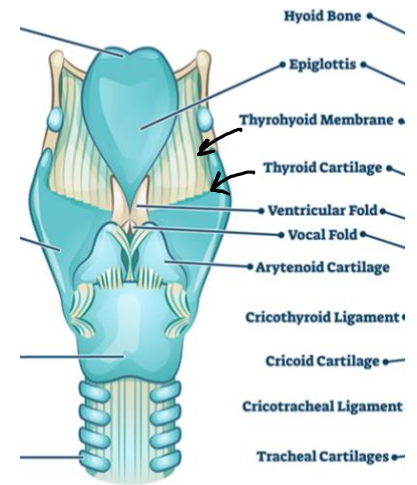
- This lies behind the oral cavity
- The floor is formed by the posterior one third of the tongue and the interval (connection) between the tongue and epiglottis (recall previous lecture from the pic on the right)
- In the midline is the median glossoepiglottic fold and on each side the lateral glossoepiglottic fold (also called aryepiglottic folds)
- The depression on each side of the median glossoepiglottic fold is called the vallecula (a space filled with saliva)
- On the lateral wall on each side are the palatoglossal and the palatopharyngeal arches or folds (formed by palatoglossus & palatopharyngeus respectively) and the palatine tonsils between them
- interval between the two palatoglossal arches is called the oropharyngeal isthmus and marks the boundary between the mouth and pharynx.



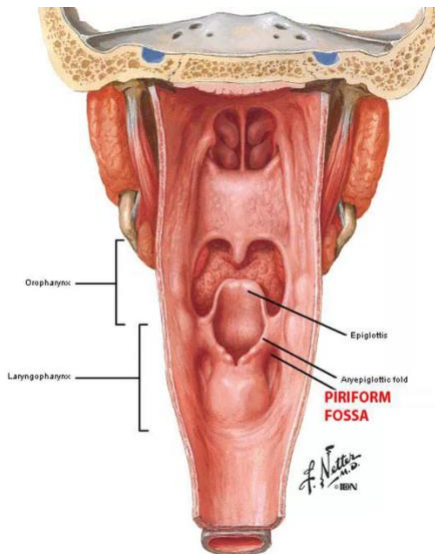
3. Laryngeal Pharynx

- **This lies behind the opening into the larynx**
- **The lateral wall is formed by the thyroid cartilage and the thyrohyoid membrane (see pic on the right)**
This is the posterior view of the larynx.. so the laryngeopharynx is right behind the shown structure. Try to imagine how the lateral walls of the pharynx are continuous with the thyroid cartilage and thyrohyoid membrane of the larynx
- **The piriform fossa is a depression in the mucous membrane on each side of the laryngeal inlet.** So It is
- in between the pharynx and the larynx.
(see pic below)

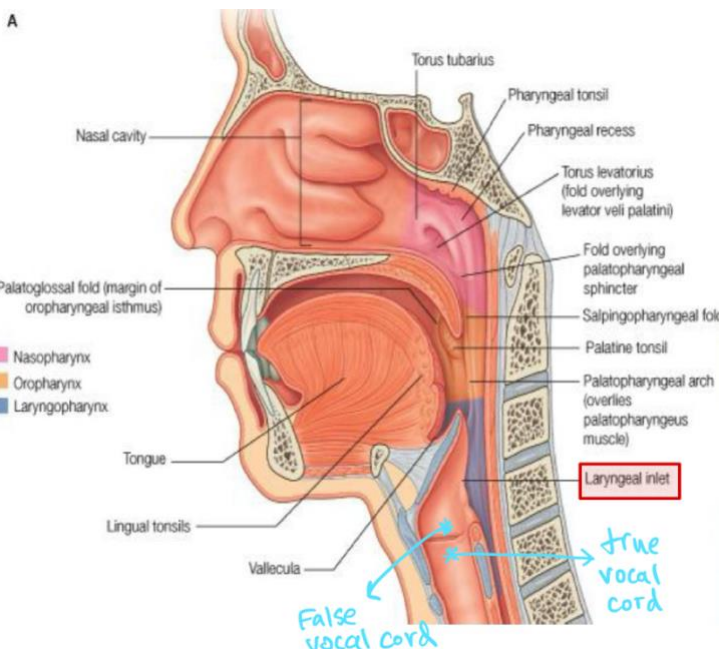
Larynx



POSTERIOR VIEW



Piriform fossa, a depression, antero-lateral to laryngopharynx. It is a common site for the lodge of foreign bodies such as fish bones.



Vocal cords are not within our scope, so this is supposed to be extra info... but the doctor mentioned them and pointed at the true and false cords. He said true cords are always below, and they are the ones responsible for speech.

Nasal septum

Pharyngeal
opening of
auditory tube

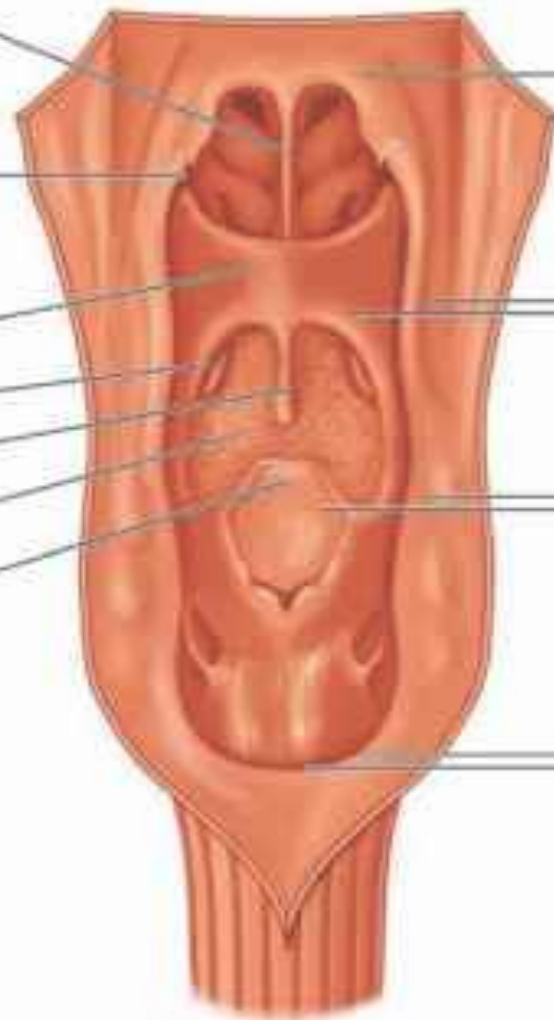
Soft palate

Tonsils

Uvula

Tongue

Epiglottis

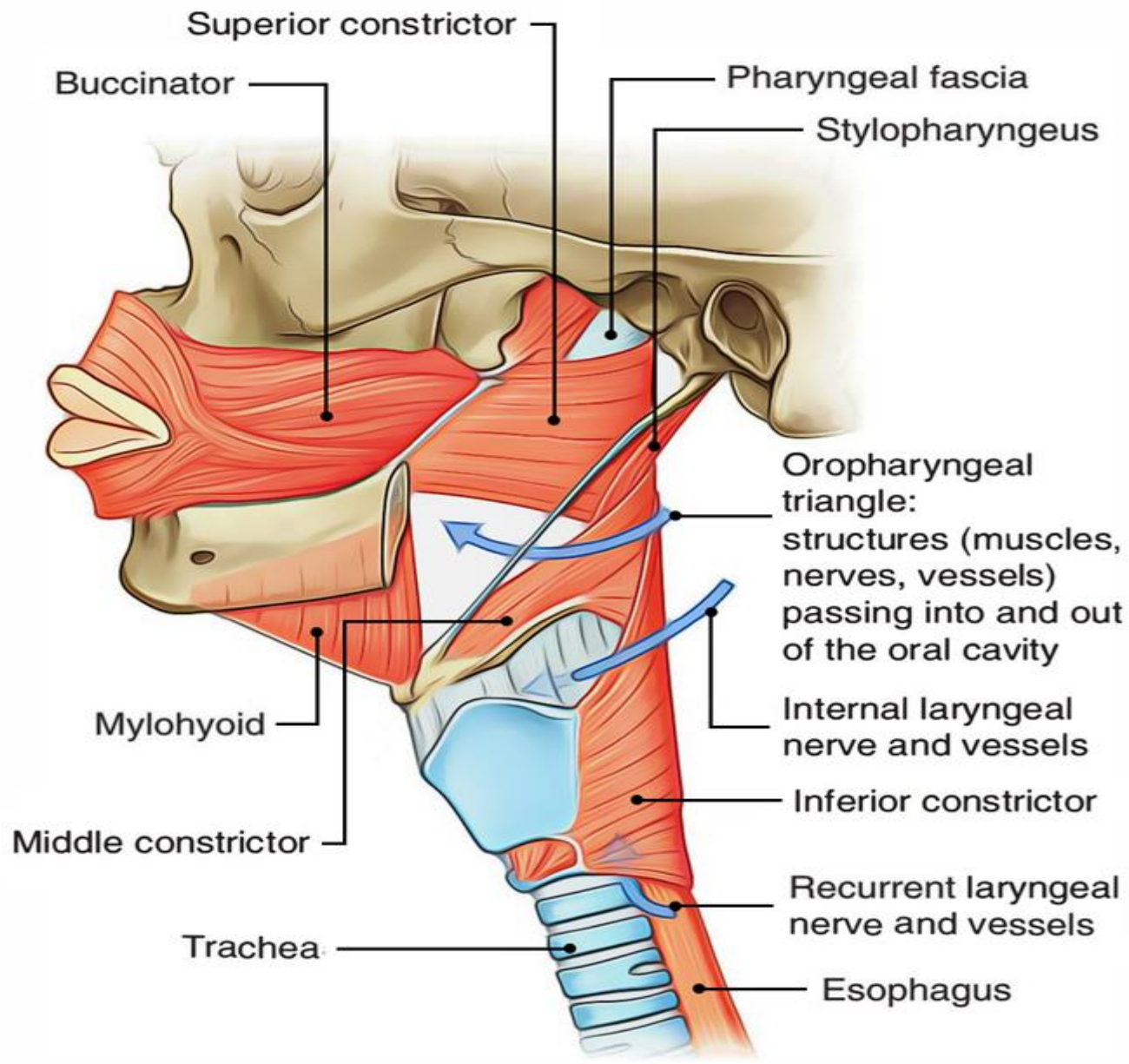


Nasopharynx

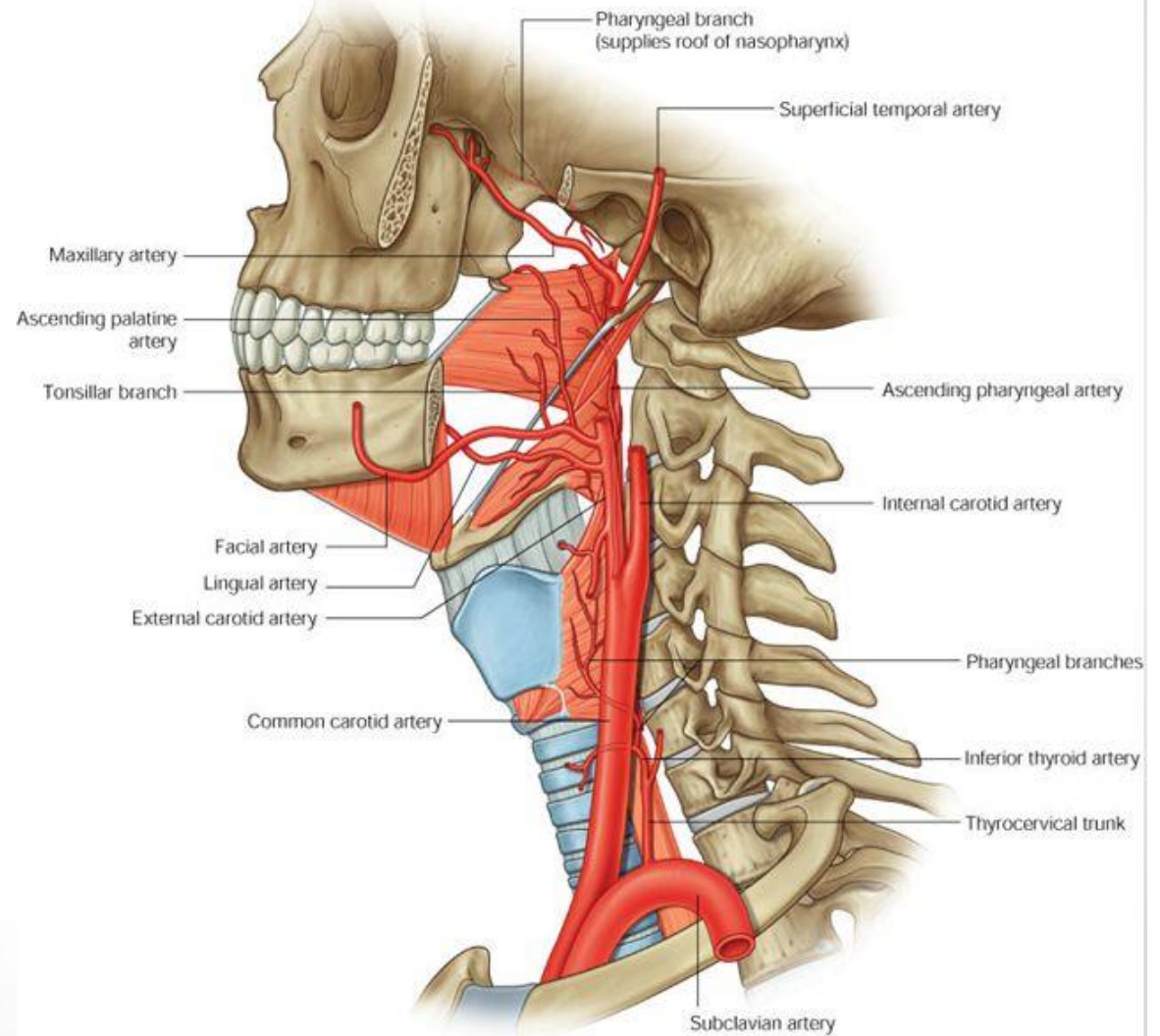
Oropharynx

Hypopharynx

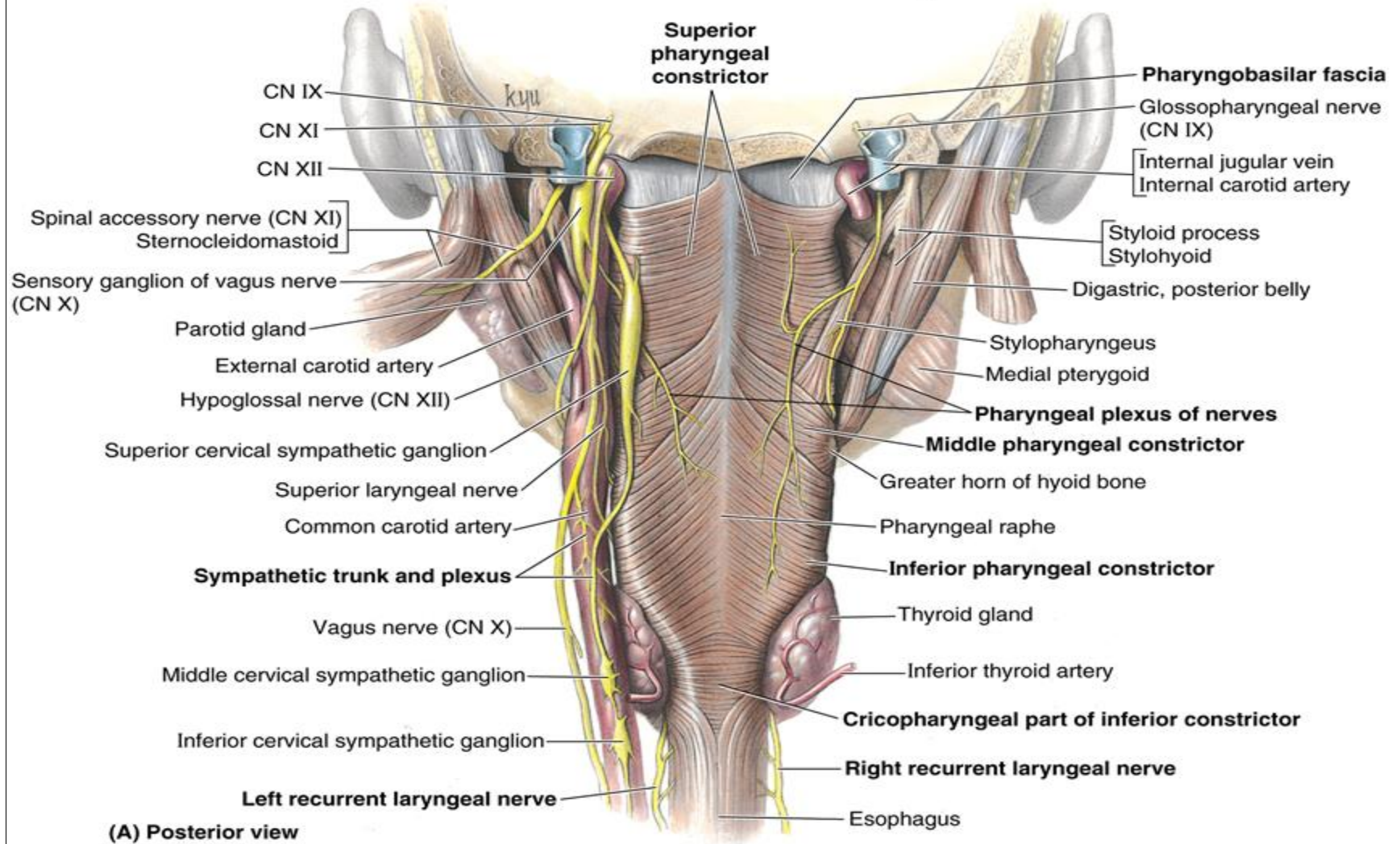
Esophagus



Blood supply



Posterior Pharynx



Subject Five: Palatine tonsils

The student should study the following points on the palatine tonsils:

1- Site

2- Capsule

3- important in children

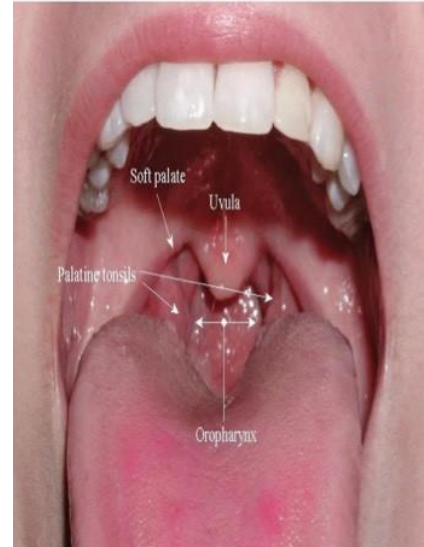
4- Relation

5- Blood supply

6- Nerve supply

PALATINE TONSILS

- ❖ **The palatine tonsils are two masses of lymphoid tissue**, each located in the depression on the lateral wall of the oral part of the pharynx between the palatoglossal and palatopharyngeal arches
- ❖ Each tonsil is covered by mucous membrane, and its free medial surface projects into the pharynx
- ❖ The surface is **pitted** medially by numerous small openings that lead into the tonsillar crypts. (Those crypts initiate the first step of adaptive immune response)
- ❖ The tonsil is covered on its lateral surface by a fibrous capsule (loose CT)
- ❖ The capsule is separated from the superior constrictor muscle by loose areolar tissue and the external palatine vein descends from the soft palate in this tissue to join the pharyngeal venous plexus
It is not supplied by the plexus, rather by the tonsillar branch of facial artery, which is close to the Common Carotid Artery.
- ❖ **Lateral to the superior constrictor muscle lie the styloglossus muscle, the loop of the facial artery, and the internal carotid artery.**

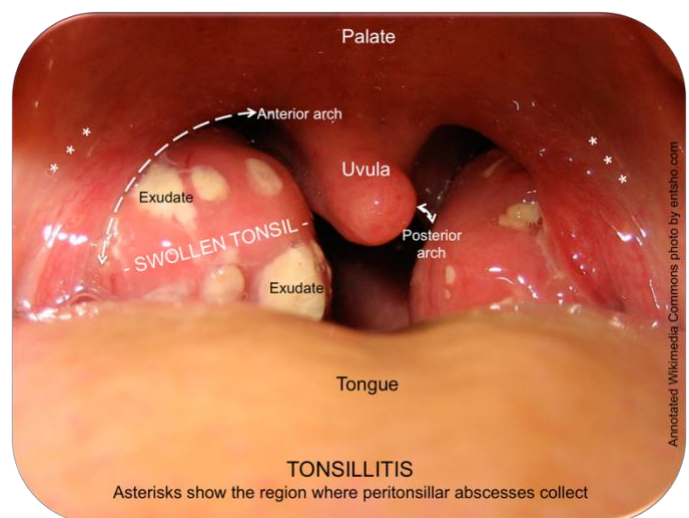


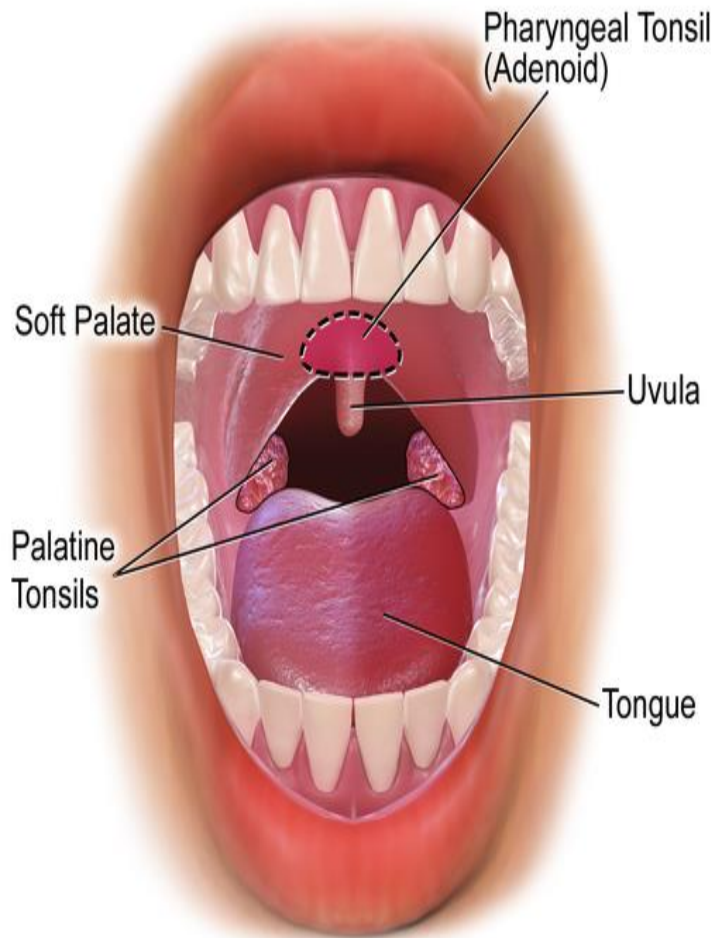
Tonsils are very important for immunity. Palatine tonsils are responsible for filtration of foreign bodies and pathogens (especially in children). Why children? Because **The tonsil reaches its maximum size during early childhood, but after puberty it diminishes considerably in size.**

Tonsillitis: (see pic on the right) occurs occasionally in children due to putting foreign objects inside their mouth, causing bacterial and viral infections

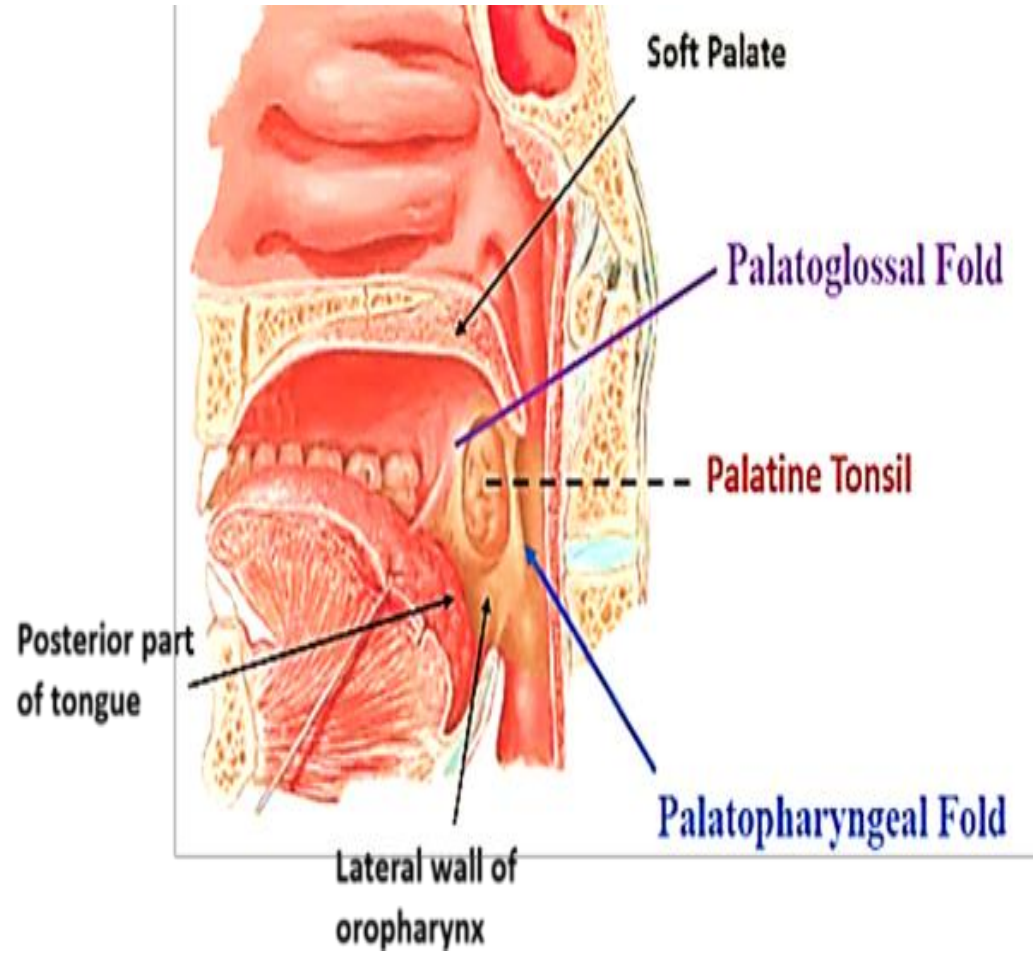
If the infection happened more than 4 times a year, we need to remove the tonsils surgically (Tonsillectomy) as a precaution to prevent streptococcus (main pathogen in tonsillitis) from spreading to the heart, kidney, and joints, causing severe complications.

Tonsillectomy doesn't cause any harm because we have plenty of lymph nodes.





Tonsils



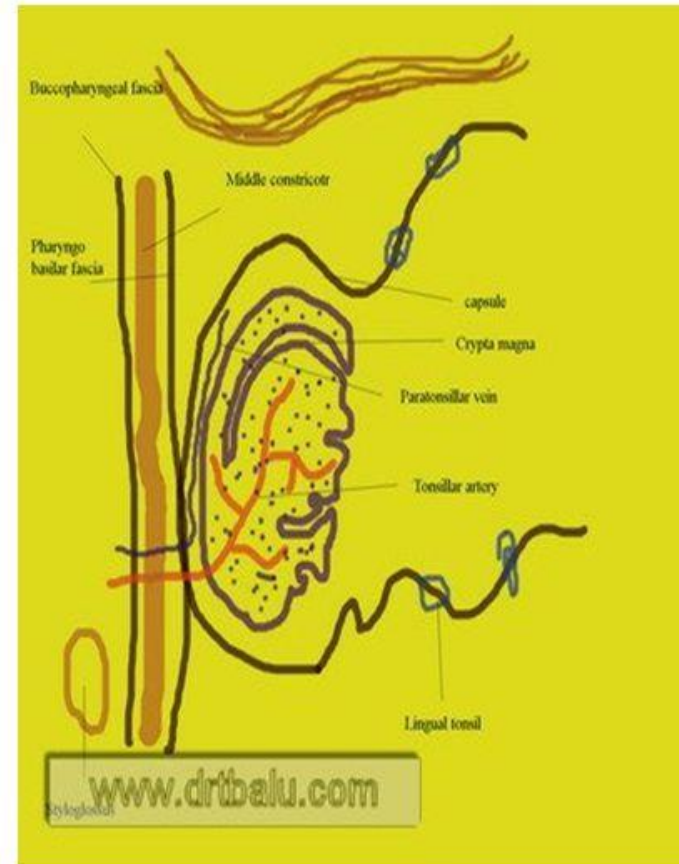
Venous drainage :

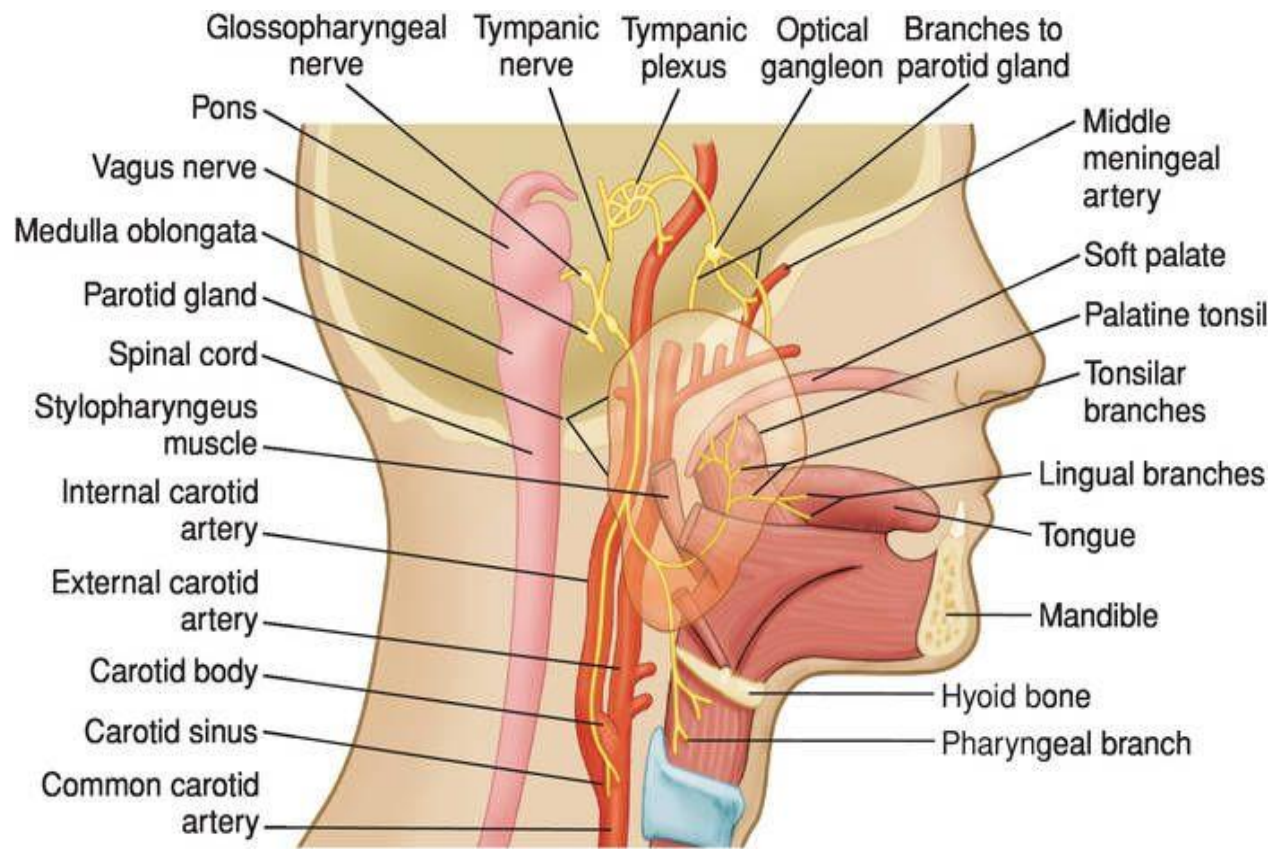
occurs through the **Paratonsillar vein**, and the vessels also pass through to the pharyngeal plexus or facial vein after piercing the superior constrictor.

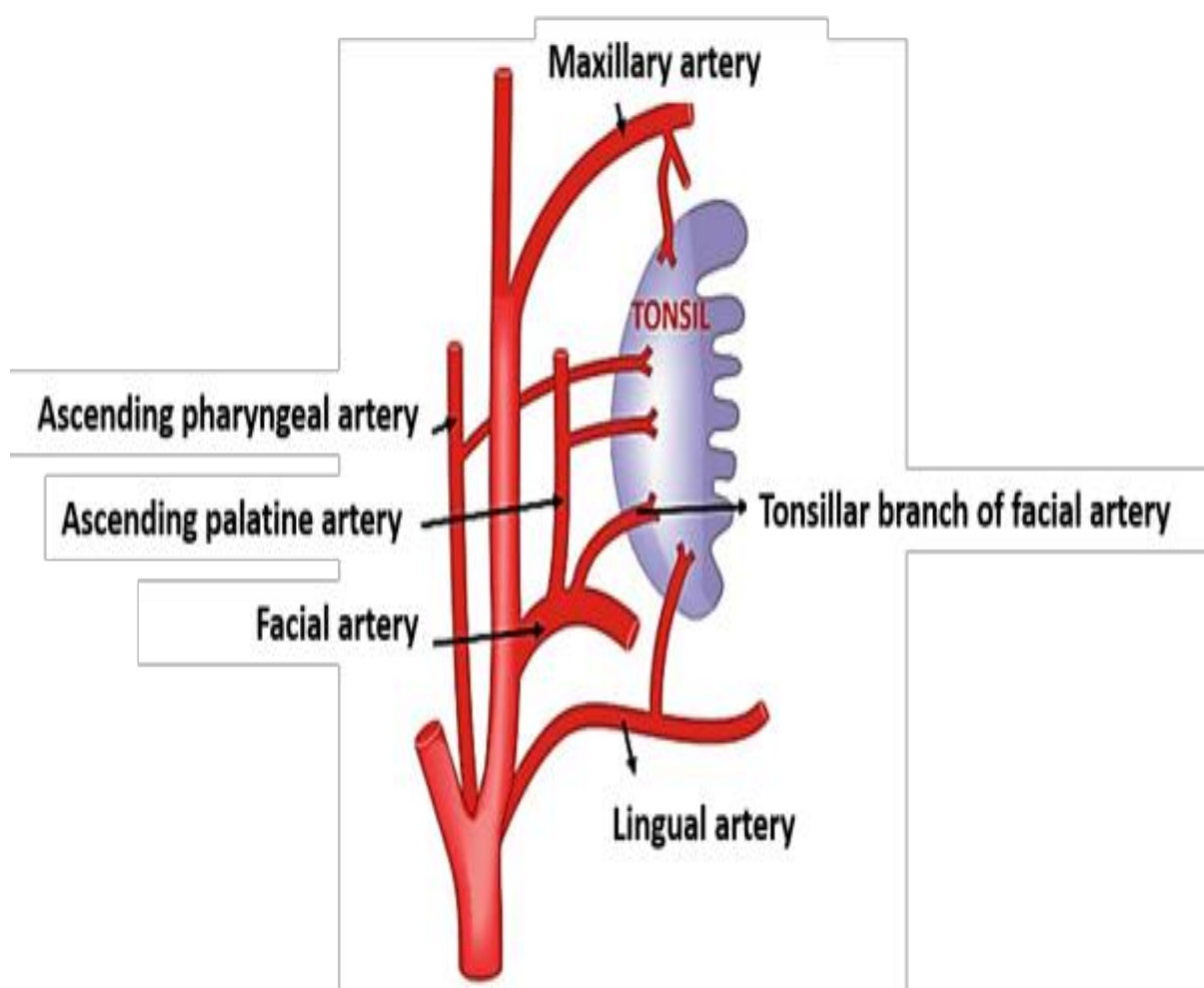
Nerve supply :

to the tonsil is from the **glossopharyngeal nerve**.

Tonsillar tumors or infections may result in ear pain due to referred pain conducted by **cranial nerve IX: Glossopharyngeal nerve**.







Typically, tonsillectomy is done through the oral cavity by extending an index to the lateral surface. Using the scalpel, the surgeon opens the lateral capsules to have better access to the tonsils and removes them. Cutting then ligating both the tonsillar artery and vein are done to prevent any postoperative bleeding.

**bear in mind that the Dr only related bleeding to the vein... so if you were asked to choose between them, it's the ~~tonsillar vein~~, although both are correct in real life.

External Palatine vein

After tonsillectomy we enroll the patient for 24 hours in the hospital for further supervision. If any bleeding took place, it would probably be caused by the previously mentioned vessels, why? because they pierce the constrictor muscle, and the contraction of this muscle can cause the release of the ligation of the vessel, causing bleeding.

Remember:

- Enlargement in pharyngeal tonsil can cause blockage in the nasopharynx
- Enlargement in palatine tonsils leads to difficulty in swallowing

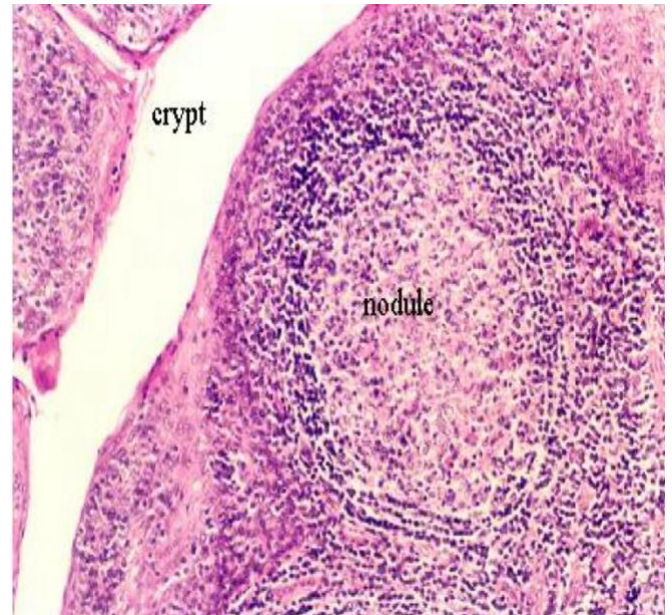
Blood Supply

- The tonsillar branch of the facial artery. The veins pierce the superior constrictor muscle and join the external palatine, the pharyngeal, or the facial veins.

Lymph Drainage of the Tonsil

- The upper deep cervical lymph nodes, just below and behind the angle of the mandible

Dr didn't add any comment regarding the pic above



WALDEYER'S RING OF LYMPHOID TISSUE

(function: filtration of bacteria and viruses)

- The lymphoid tissue that surrounds the opening into the respiratory and digestive systems forms a ring
- **The lateral part of the ring is formed by the palatine tonsils and tubal tonsils (lymphoid tissue around the opening of the auditory tube in the lateral wall of the nasopharynx)**

The pharyngeal tonsil in the roof of the nasopharynx forms the upper part, and the lingual tonsil on the posterior third of the tongue forms the lower part.

