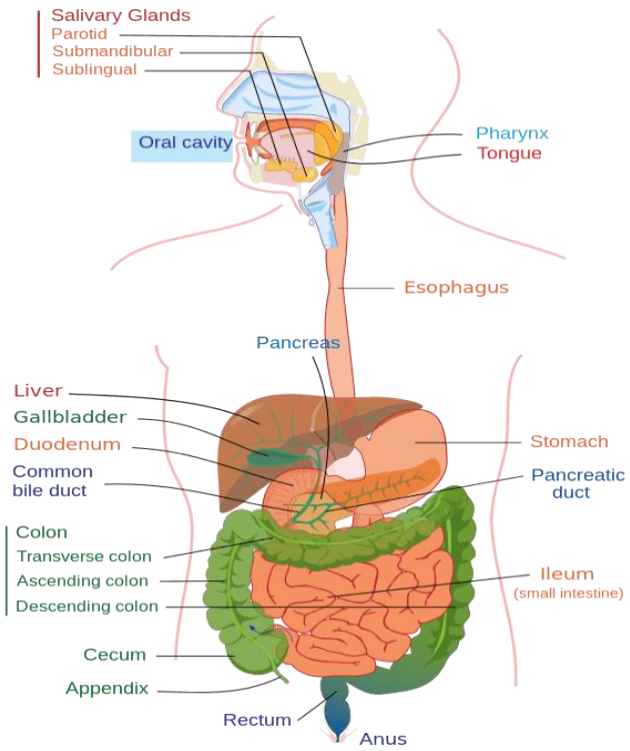
# The Digestive System in the Head and Neck

At its simplest, the digestive system is a tube running from mouth to anus. Its chief goal is to break down huge macromolecules (proteins, fats, and starch), which cannot be absorbed intact, into smaller molecules (amino acids, fatty acids, and glucose) that can be absorbed across the wall of the tube, and into the circulatory system for dissemination throughout the body.

The gastrointestinal system is divided into two main parts: the alimentary canal (also known as the digestive tract) and accessory organs.

A. The alimentary tract of the digestive system is composed of the mouth (the mouth has two openings, the anterior one is composed of the upper and lower lips and the posterior opening that opens in the oropharyngeal isthmus), pharynx, esophagus, stomach, small and large intestines, rectum, and anus.

B. Accessory organs: salivary glands, liver, gallbladder, and pancreas. All ducts open in the alimentary tract, so both are connected.




Writer: Yara Rawi Alyousef.

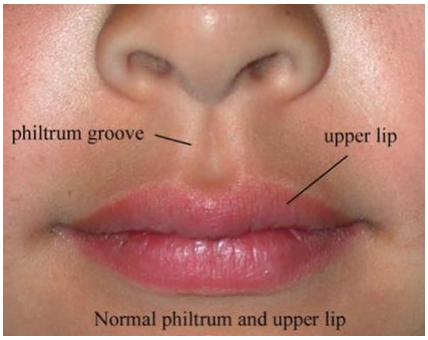
Note: **The common bile duct** is indeed a part of the gastrointestinal (GI) tract. It's a tube-like structure that carries bile from the liver and the gallbladder to the small intestine, specifically to the duodenum. Bile is essential for the digestion and absorption of fats in the small intestine. So, while the lips are not part of the GI tract, the common bile duct plays a crucial role in the digestive process.

## The mouth cavity:

The mouth cavity is part of the gastrointestinal (GI) tract. It's the first segment of the GI tract and serves as the entry point for food and drink. The mouth cavity includes structures such as the lips, teeth, tongue, palate, and cheeks (having buccinator muscle that helps in the eating process), and the initial breakdown of food into smaller particles.

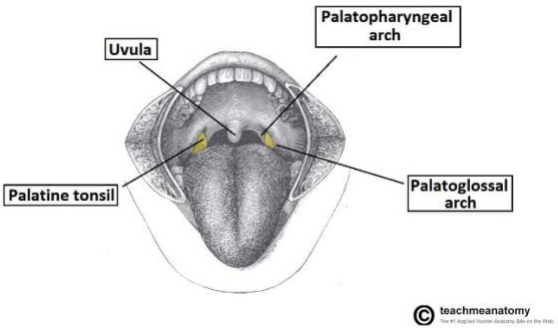
**Starting with the lips**, first we need to remember that it's the anterior opening of the mouth cavity and it's not part of the GI tract. The lips are two fleshy folds (foldable structure made of flesh or soft tissue) that surround the oral orifice (means opening). They are covered on the outside by skin (stratified squamous keratinized epithelium, It has hair follicles and glands) and are lined on the inside by mucous membrane (stratified squamous non-keratinized epithelium rich in labial glands that makes mucus). The substance of the lips (composition of the lips) is made up by the orbicularis oris (striated) muscle that surround the mouth and helps in closing the upper and lower lips together and the muscles that radiate from the lips into the face, also include The transitional zone (Vermilion zone): the reddish part of the lip, rich in blood vessels which makes it red and nerve terminals which makes it very sensitive, that's why they have more sensation than the surrounding areas, it's made up of modified squamous epithelium. (Para-keratinized epithelium) and it has no hair follicles, sebaceous glands or sweat glands. Labial blood vessels and nerves (refer to the network of blood vessels that supply blood to the lips).

**The philtrum** is the shallow vertical groove seen in the midline on the outer surface of the upper lip.




**Labial frenulum** it's a piece of tissue inside your upper lip that attaches to your gums is called a maxillary labial frenulum, or lip frenulum, it's made of mucous membrane and connective tissue.

**The oropharyngeal isthmus** is the posterior opening of the mouth cavity and it has boarders, anteriorly its bounded by the soft palate, posteriorly It is demarcated by the root of the tongue and the upper part of the pharynx, the roof having the soft palate and its extension the uvula and laterally It is bordered by the palatoglossal arches (folds) , which are folds of mucous membrane that extend from the sides of the soft palate to the base of the tongue.




interval between the two palatoglossal arches is called the oropharyngeal isthmus.

The palatine tonsils (found on the lateral wall of the oropharyngeal isthmus) lie between two folds at the two lateral sides of the Oropharyngeal Isthmus:

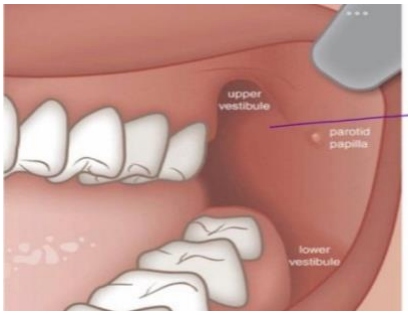
1) Anterior one called the palatoglossal fold, which contains the palatoglossus muscle, and it is connected to the tongue.

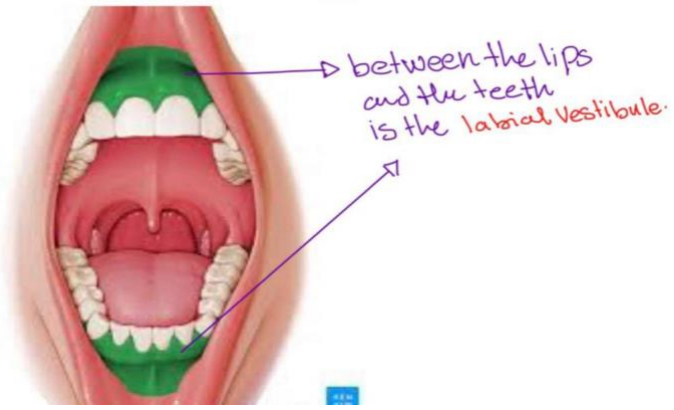
2) Posterior one called the palatopharyngeal fold, which contains the palatopharyngeal muscle, and it is connected to the pharynx.

**The mouth** extends from the lips to the pharynx (the journey from the lips to the pharynx is just the beginning of the complex process of digestion and nutrient absorption in the body), and it's divided into the *vestibule* and *the mouth cavity proper*.

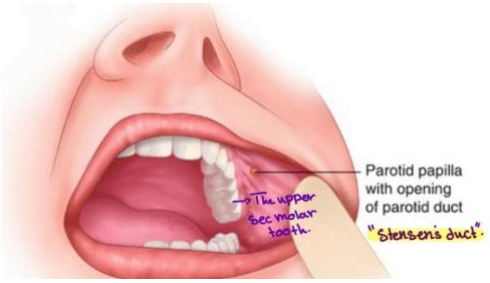
## A. The vestibule

is a general term used to describe the space within the oral cavity that is bounded externally by the lips and cheeks and internally by the teeth and gums. It encompasses both the buccal vestibule (between the cheeks and teeth) and the labial vestibule (between the lips and teeth). This slitlike (refers to a narrow or elongated gap or opening that has a shape resembling a slit) space communicates with the exterior through the oral fissure between the lips, when the jaws are closed, it communicates with the mouth proper behind the third molar (adults have a total of 12 molars in their permanent dentition) tooth on each side. The tone of the buccinator muscle (lined form the outside by skin (keratinized stratified squamous epithelium) and from the inside by mucous membrane (non-keratinized stratified squamous epithelium), and that of the muscles of the lips keeps the walls of the vestibule in contact with one another.






- The duct of the parotid salivary gland, known as Stensen's duct, indeed opens into the mouth. Specifically, it opens on a small elevation called a papilla located in the vestibule of the mouth, which is opposite the upper second molar tooth. This opening allows saliva produced by the parotid gland to enter the oral cavity.

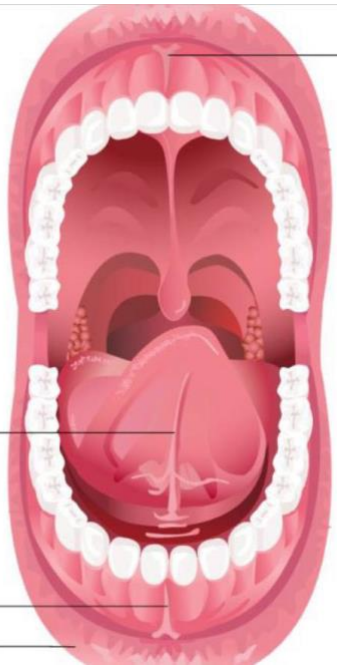


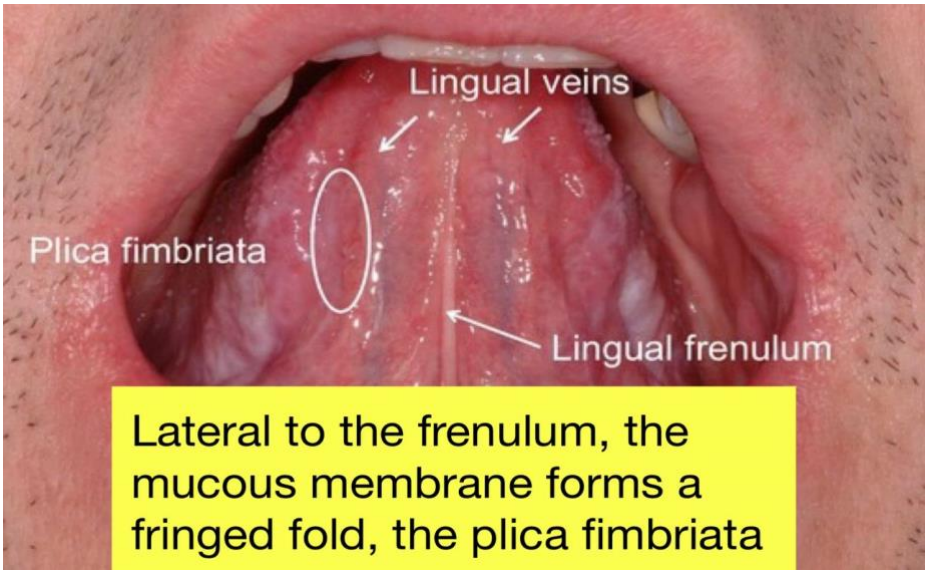

## B. The mouth proper is the cavity found inside the closed teeth.

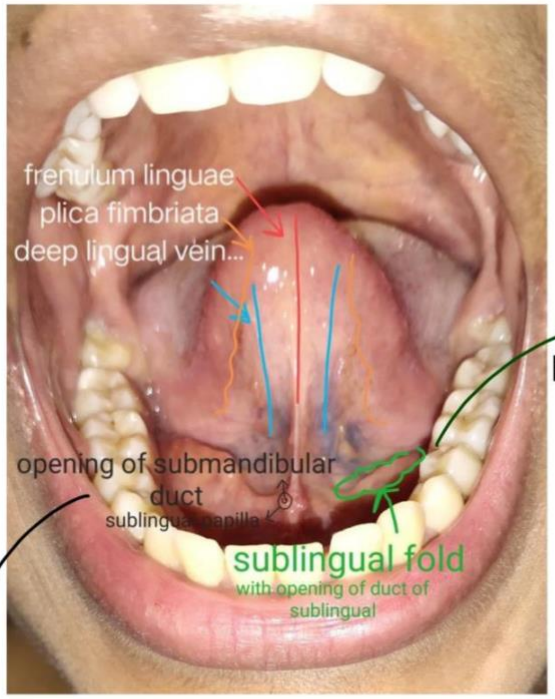
***Boundaries:***

1. The roof of the month is formed by the hard palate in front and the soft palate behind which ends with the uvula.
2. The floor is formed largely by the anterior two thirds of the tongue (dorsum aspect) and by the reflection of the mucous membrane from the sides of the tongue to the gum of the mandible.
3. Lateral sides: the teeth and cheeks (buccinator muscle lined by mucous membrane).
4. Posteriorly: Oropharyngeal isthmus with its folds and tonsils.

fold of mucous membrane called the frenulum of the tongue connects the undersurface of the tongue in the midline to the floor of the mouth






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).

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

## mucous membrane of the mouth

It's the same one as the inner mucous membrane of the inner surface of the buccinator muscle (stratified squamous non-keratinized epithelium). Rich in minor salivary glands), having elastic fibers in the submucosa (This layer lies beneath the mucosa and is composed of connective tissue, blood vessels, nerves, and lymphatic vessels). It provides structural support to the mucosa and helps to facilitate the transport of nutrients and waste products to and from the mucosal layer. The submucosa also contains glands that secrete fluids to aid in digestion and other functions). This prevents redundant folds of mucous membrane from being bitten between the teeth when the jaws are closed.

- The mucous membrane of the gingiva, or gum, is strongly attached to the alveolar periosteum. (Dense mucosa)

We have two types of mucosae in the oral cavity:

1. Hard mucosa is found over the hard palate and the gum.

2. Soft mucosa that is found over the soft palate, sublingual gland and the floor of the mouth covering the buccinator muscle and surrounding the tongue.

## Sensory Innervation of the Mouth

Roof: The greater palatine and nasopalatine nerves (that emerge from the incisive canal) from the maxillary division of the trigeminal nerve.

Floor: The lingual nerve (common sensation), a branch of the mandibular division of the trigeminal nerve. "Provides sensory innervation to the anterior two-thirds of the tongue, as well as the floor of the mouth and the mucous membrane lining the mandible".

The taste fibers travel in the chorda tympani nerve, a branch of the facial nerve. (special sensation)

Cheek: The buccal nerve, a branch of the mandibular division of the trigeminal nerve innervates the skin and mucous membrane of the cheek. (the buccinator muscle is innervated by the buccal branch of the facial nerve)

The mandibular nerve supplies the floor of the mouth and the cheeks.
The maxillary nerve supplies the roof of the mouth.

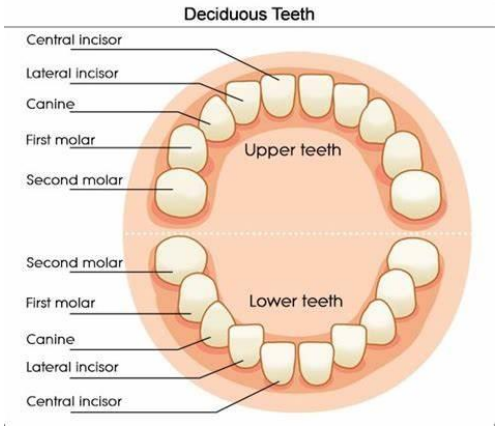
## The Teeth

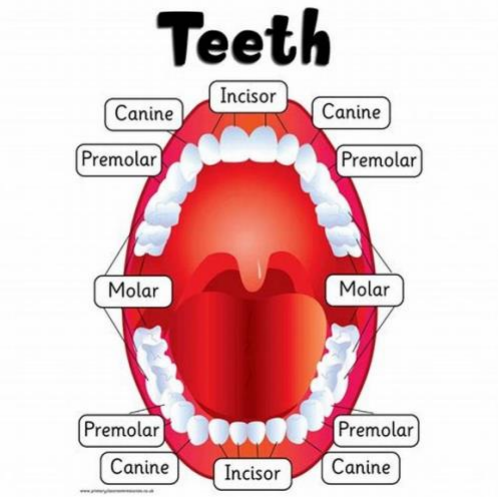
The gingivae (gums) are specialized regions of the oral mucosa that surround the teeth and cover adjacent regions of the alveolar bone.

1. **Deciduous Teeth (Baby Teeth)**: These are the first set of teeth that begin to erupt around six months of age and have all erupted by the end of 2 years, although the timing can vary. There are usually a total of 20 deciduous teeth, consisting of 10 teeth in each dental arch (upper and lower). The deciduous teeth include four incisors, two canine, and four molars in each jaw.

2. **Permanent Teeth**: As a child grows, the deciduous teeth are gradually replaced by permanent teeth. They begin to erupt at 6 years of age and the last tooth to erupt is the third molar, which may happen between the ages of 17 and 30. The permanent teeth include a total of 32 teeth, consisting of 16 teeth in each dental arch. This set of teeth includes four incisors, two canines, four premolars, and six molars in each jaw.

Note: The teeth of the lower jaw usually appear before those of the upper jaw.




## The Tongue

The tongue is a mass of striated muscle covered with mucous membrane.

Structure:

1. Mucus membrane
2. Muscles

Muscles:

1. Extrinsic muscles: 4
2. Intrinsic muscles: 4

Divisions: 2 parts

1. Oral part: body (anterior 2/3) “taste buds”
2. Pharyngeal: root (posterior 1/3) “lymphoid structure”

## Compare Between Oral & Pharyngeal Part

| | ORAL | PHARYNGEAL |
|---|---|---|
| SIZE | Anterior 2/3 | Posterior 1/3 |
| POSITION | In the oral cavity | In the pharynx |
| Mucous Membrane | Rough due to presence of papillae | Smooth due to absence of papillae |
| Lymphoid Follicles | Absent | Present & the surface is nodular. Called lingual tonsil |
| Nerve Supply | Lingual & chorda tympani | Glossopharyngeal nerve |
| Development | 1st arch | 3rd arch |
| Arterial Supply | Deep lingual artery | Dorsal lingual arteries |

The tongue has an upper surface (the dorsum) and a lower surface (mucous membrane on the inferior surface of the tongue is reflected from the tongue to the floor of the mouth), both are stratified squamous non-keratinized epithelium.

The mucous membrane of the upper surface of the tongue is divided into anterior two thirds & posterior third divided by sulcus terminalis (inverted V-shaped sulcus).

The mucous membrane of the anterior 2/3 has lingual papillae (small structures on the surface of the tongue that contain taste buds and play a role in the sensation of taste, there are four types of lingual papillae). Unlike the posterior part that don't have lingual papillae, but it has lingual tonsils that made the surface irregular.

Median fibrous septum in the tongue refers to a thin fibrous band of tissue that divides the tongue into right and left halves.

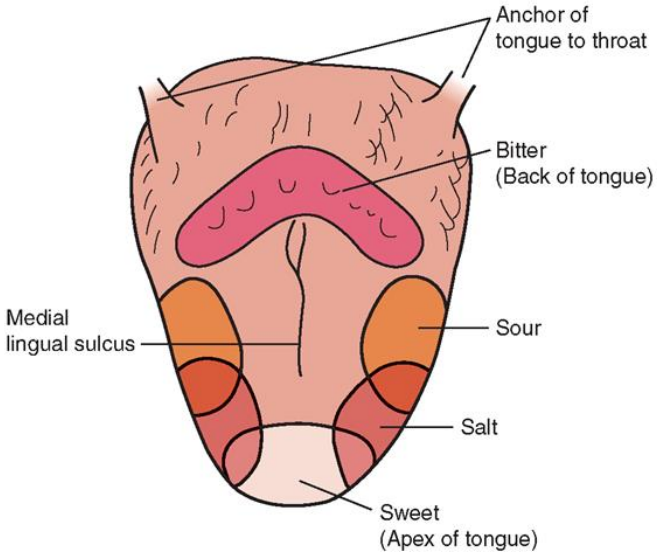
The foramen cecum is a small depression or pit located at the posterior end of the terminal sulcus, which is the V-shaped groove on the dorsal surface of the tongue that separates the anterior two-thirds from the posterior one-third.

The foramen cecum is considered an embryological remnant and marks the point where the thyroglossal duct, a structure present during fetal development, used to extend from the developing thyroid gland to the tongue.

| **Posterior third** (lymphoid structure) | **Anterior 2/3rds** |
|---|---|
| - Leads to the pharynx so it can't be seen from the anterior opening.<br>- Has an irregular surface caused by the presence of underlying lymph.<br>- Made of **lymphoid tissue** - lingual tonsils (lymphatic nodules), devoid of papillae.<br>- <u>Stratified squamous non-keratinized epithelium (like the floor of the mouth)</u><br>- Empryologically: is formed from 3rd pharyngeal arch.<br>- It is innervated by glossopharyngeal | - Has the four taste buds (lingual papillae)<br>- Epithelium stratified squamous para-keratinized<br>**para-keratinized** →it was keratinized but certain injuries induce changes, and it doesn't go back to its original state after repair)<br>-Embryologically: is formed from 1st pharyngeal arch.<br>- It is innervated by chorda tympani |

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

1. filiform papillae: most abundant
2. fungiform papillae: mushroom shape
3. vallate papillae: 12 -18 Circumvallate papillae in front of the sulcus terminalis. It contains bitter taste buds (for Bitter taste), so if you want to avoid the bitter taste, eat with the tip of your tongue.



# Muscles of the tongue

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

Intrinsic Muscles: These muscles are confined to the tongue and are not attached to bone.

They consist of longitudinal, transverse, and vertical fibers.

Nerve supply: Hypoglossal nerve

Action: Alter the shape of the tongue

Extrinsic Muscles: These muscles are attached to bones and the soft palate.

Nerve supply: ALL muscles of the tongue (intrinsic & extrinsic) are supplied by the Hypoglossal, except the palatoglossus muscle (accessory nerve).

All extrinsic muscles have the same insertion in the tongue, they blend with each other, except Palatoglossus it is inserted into the side of the tongue.

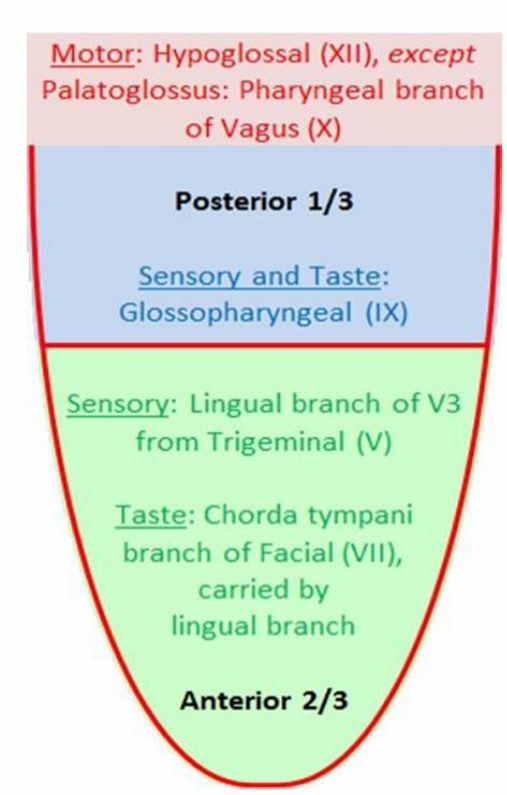
| muscles | origin | action |
|---|---|---|
| genioglossus | Superior genial spine of mandible | Protrudes apex of tongue through mouth |
| hyoglossus | (Body and greater corn of hyoid bone | Depresses tongue, Retraction |
| styloglossus | Styloid process of temporal bone | Draws tongue upward and backward, Retraction |
| palatoglossus | Palatine aponeurosis | Pulls roots of tongue upward and backward, narrows oropharyngeal isthmus |

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.




Glossopharyngeal nerve (general sensation and taste for Circumvallate papillae

Circumvallate papillae in development it's related to the posterior part that's why it's supplied by IX.

motor innervation is by Hypoglossal & pharyngeal branch of vagus nerve for palatoglossus ONLY.

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.

Lymph Drainage

Tip: Submental lymph nodes

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

Posterior third: Deep cervical lymph nodes

1. The nerve supply of circumvallates papillae is?
    a. Chorda tympani
    b. Lingual nerve
    c. Hypoglossal nerve
    d. Glossopharyngeal nerve

    D : circumvallate is innervated by glossopharyngeal nerve although it is found in the anterior two thirds but it follows the posterior third in development

2. You asked the patient to bring his tongue out, but it was diverted to the right side, the problem is in which nerve?
    a. Lingual nerve
    b. Hyoglossus nerve
    c. Glossopharyngeal nerve
    d. Facial nerve

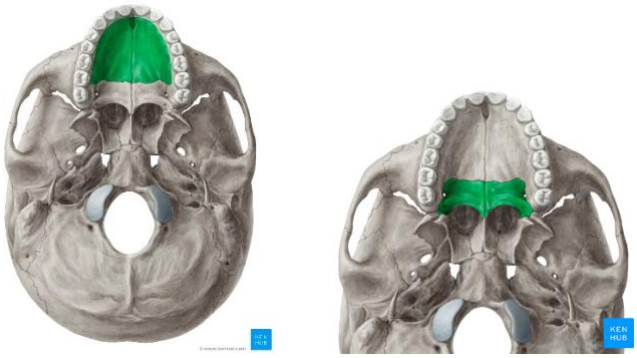
    B : the tongue will not be straight, it will move lateral to the side of the injured muscle.

# 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 the front and the soft palate behind.

## Hard Palate:

The hard palate is the part that is made of bones covered by dense connective tissue attached to periosteum. It is formed by the palatine process of the maxillae and the horizontal plates of the palatine bones. It's continuous behind with the soft palate. It has incisive foramen that connect the hard palate with the nasal cavity it also has lesser and greater palatine foramen.



## Soft Palate:

The soft palate is made up of loose connective tissue, it's formed from the extension from the hard palate which called the palatine tendon, it's muscular structure composed of five muscles covered by mucosa, the most important function of it is either moving upward backward (close the nasopharynx seen in vomiting) or moves downward during mastication to increase the pressure inside oral cavity .

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. The soft palate is continuous at the sides with the lateral wall of the pharynx. The soft palate is composed of mucous membrane that covers the upper and lower surface of the palate, 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.), and muscles.

# Muscles of the Soft Palate

| 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 |

# Movements of the Soft Palate

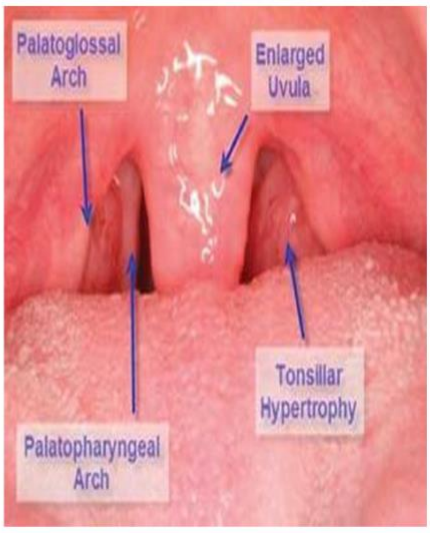
- The pharyngeal isthmus (the communicating channel between the nasal and oral parts of the pharynx) is closed by raising the soft palate.
- Closure occurs during the production of explosive consonants in speech.
- The soft palate is raised by the contraction of the levator veli palatini on each side.
- 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 and blood 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 nerve came from the nasal cavity to the palatine that's why it's named naso-palatine.

- 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



# The Major Salivary Glands

Keeping the mouth moist is important for protection from infection and it will make the eating process easier, so having these salivary glands is very important.

Each gland has 3 types of innervations, 1. Sensory 2. Parasympathetic(secretion) 3. Sympathetic (affects vasoconstriction only, via superior cervical sympathetic ganglia hitch hiking the External carotid artery). " secrets 1.5L daily"

## 1. Parotid gland:

It's the largest salivary gland.

Secretion: mostly serous section that is rich in enzymes and proteins.

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

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

The duct: the parotid duct emerges from the anterior border of the gland and passes forward over the lateral surface of the masseter and it pierces the buccinator muscle. It enters the vestibule of the mouth upon a small papilla opposite the upper second molar tooth.

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 gland is surrounded by two capsules.

Disadvantage of the capsules: infections like mumps (viral) to the gland can cause it to swell and the capsules prevent expansion leading to severe pain in the gland.

Anatomical relations:
The parotid gland lies in the parotid bed that is formed by:
behind: the sternocleidomastoid muscle and the posterior belly of digastric.
front: the ramus of mandible.
superiorly: the external acoustic meatus and the posterior aspect of the zygomatic arch.


## 2. Submandibular gland:

Secretion: mixture of serous and mucous acini

Location: It lies beneath the lower border of the body of the mandible divided into superficial and deep parts by the mylohyoid muscle. The deep part of the gland lies beneath the mucous membrane of the mouth on the side of the tongue.

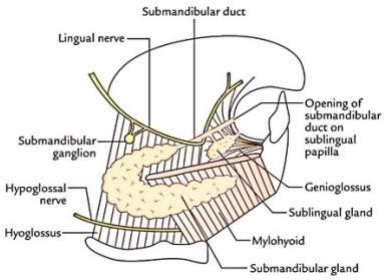
Duct: The submandibular duct emerges from the anterior end of the deep part of the gland and runs forward beneath the mucous membrane of the mouth. It opens into the mouth on a small papilla, which is situated at the side of the frenulum of the tongue. “The submandibular duct leaves the deep part of the gland and it is the most medial of all structures next to it like lingual nerve .”

Nerve supply: Parasympathetic secretomotor supply is from the facial nerve via the chorda tympani, and the submandibular ganglion. The postganglionic fibers pass directly to the gland.

As we mentioned before the gland is separated into two parts by the mylohyoid muscle into superficial and deep parts.

The superficial part of the submandibular gland:

It is the portion of the gland that lies closer to the surface of the skin, it's the part that you can feel it, it's the larger arm of the hook and it's 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 deep part of the submandibular gland:

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.

Anatomical relation between the lingual nerve and the submandibular duct.

## 3. Sublingual gland:

Secretion: It has both serous and mucous acini, with the latter predominating.

Location: The sublingual gland lies beneath the mucous membrane (sublingual fold) of the floor of the mouth, close to the frenulum of the tongue.

Ducts: The sublingual ducts (8 to 20 in number) open into the mouth on the summit of the sublingual fold.

Nerve supply: Parasympathetic secretomotor supply is from the facial nerve via the chorda tympani, and the submandibular ganglion. Postganglionic fibers pass directly to the gland. Same as submandibular gland

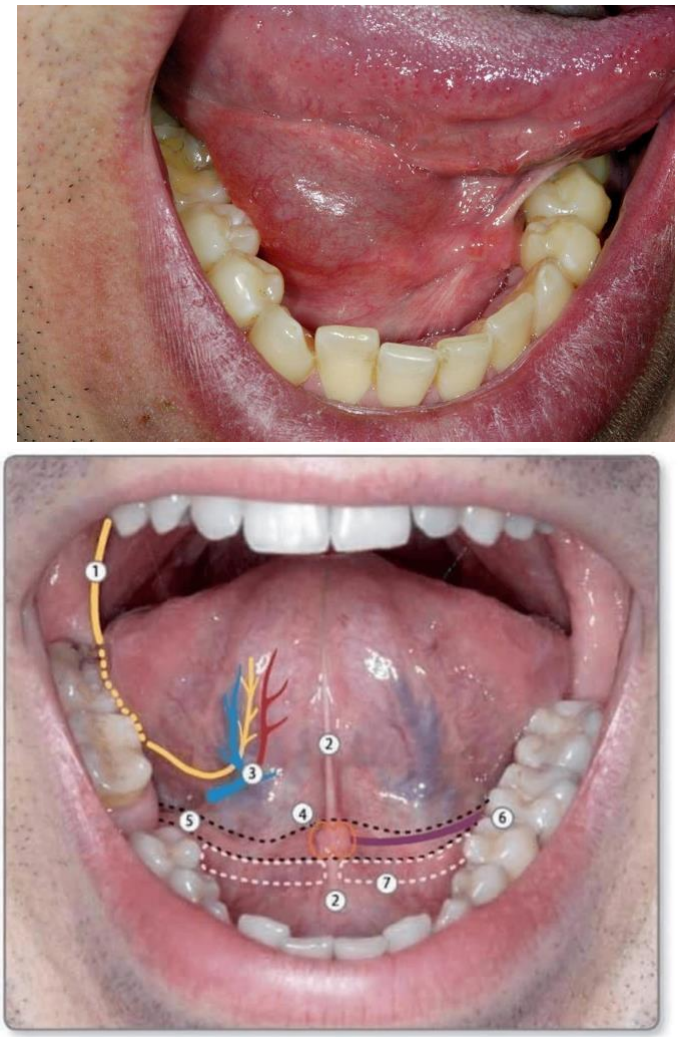
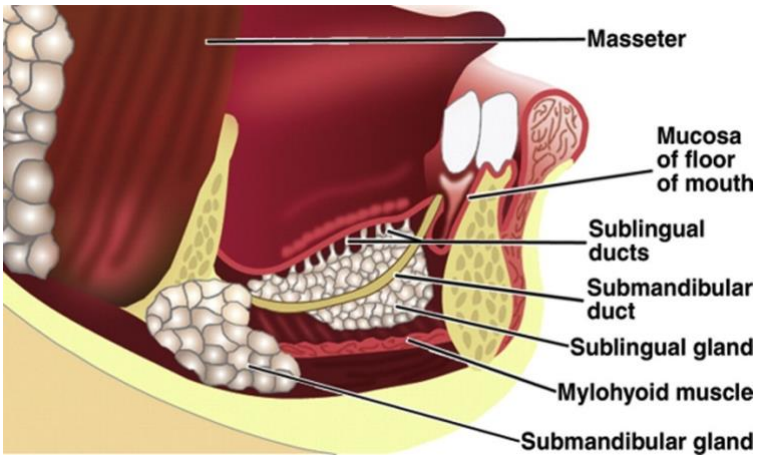



Figure 8.27 Floor of the mouth and ventral tongue. (1) Lingual nerve, (2) lingual frenulum, (3) deep lingual artery and vein, (4) sublingual caruncle with opening of submandibular duct (orange border), (5) sublingual folds (black border), (6) sublingual duct, (7) sublingual glands (pink border).




Notes:

"Mylohyoid muscle also separates sublingual from submandibular".

There are 5 structures between hyoglossus muscle and mylohyoid muscle:

1. Deep part of the submandibular gland
2. Submandibular duct
3. Lingual nerve
4. Hypoglossal nerve

## The pharynx

The next step after the oral cavity is the pharynx then continues as the esophagus. It's Located in front of the upper 6 cervical vertebrae, extent from the base of the skull to C6 (lower border of the cricoid cartilage to continue as the esophagus).

The relations: anterior we have 3 cavities (nasal, oral cavities and the larynx)
Posterior: upper 6 cervical vertebrae

The length is about 5 inches long that is composed of 3 parts:

1. Nasopharynx: starts from the base of the skull, it is connected to the nasal cavity (the border between them called choanae) and the middle ear by the auditory tube (so both have the same mucous membrane) and it's above the soft palate. We have two tonsils in this part (tubal and pharyngeal tonsils that are found at the roof of the nasopharynx).
2. Oropharynx: it is at the level of C3-C4, boarded by the soft palate and the epiglottis, and connected to the oral cavity by the oropharyngeal isthmus.

3. Laryngopharynx: it is at the level of C5-C6, it continues into the larynx by the opening by the epiglottis.

- The piriform fossa (between the pharynx and larynx) is a depression in the mucous membrane on each side of the laryngeal inlet.

| |
|---|
| The pharynx is funnel shaped (U shaped) because its anterior surface is open, its upper part is wider and its lying under the skull and its lower, narrow end becoming continuous with the esophagus after the sixth cervical vertebra. |

## Layers of the pharyngeal wall:

We have 4 layers:

1. Tunica mucosa: lines the inner cavity, it has epithelia that difference depends on the location.

Nasopharynges have pseudostratified epithelium with cilia and goblet cells like the respiratory epithelium.

The rest of the pharynx is made up of stratified squamous epithelium non keratinized, that helps to deal with the pressure of food and protect.

2. Tela submucosa: loose connective tissue having vessels, glands, and lymph.

3. Tunica muscularis: we have internal circular and external longitudinal. “That helps with the peristalsis.”

4. Tunica adventitia: connective tissue covers the outer layer of the pharynx.

## Muscles of the pharynx:

**Pharyngeal constrictors**

Superior/Medial/Inferior

Pharyngeal constrictor muscles

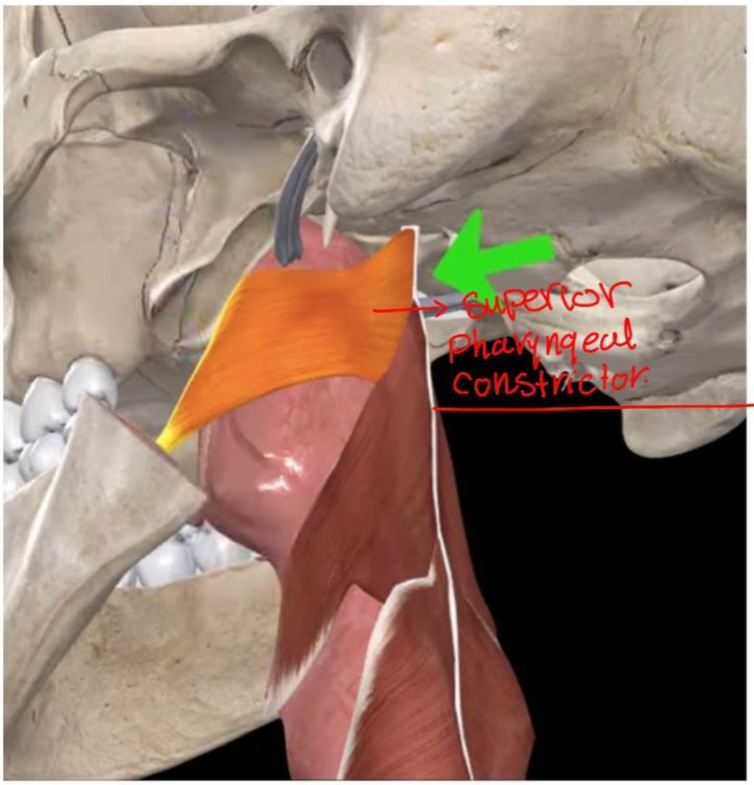
**Pharyngeal elevator**

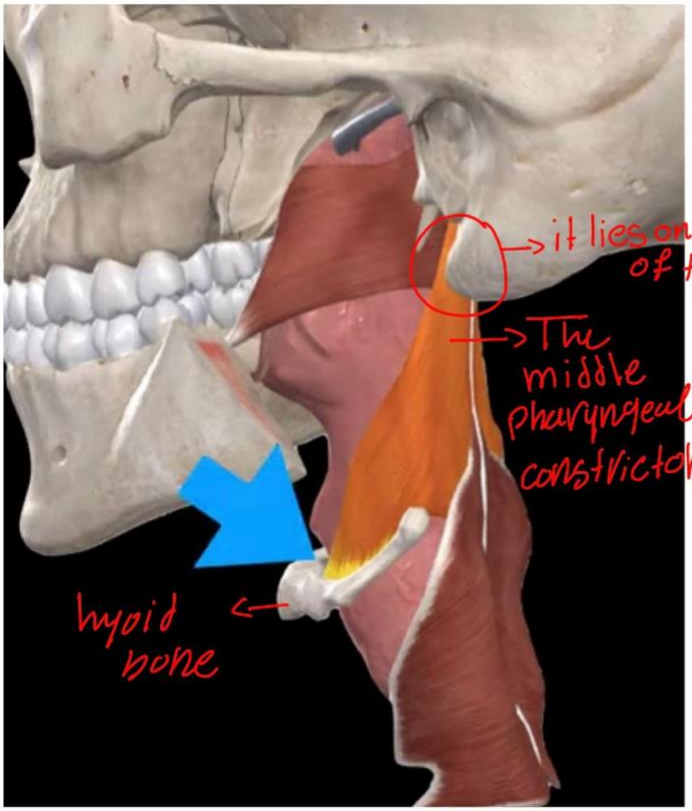
M. stylopharyngeus

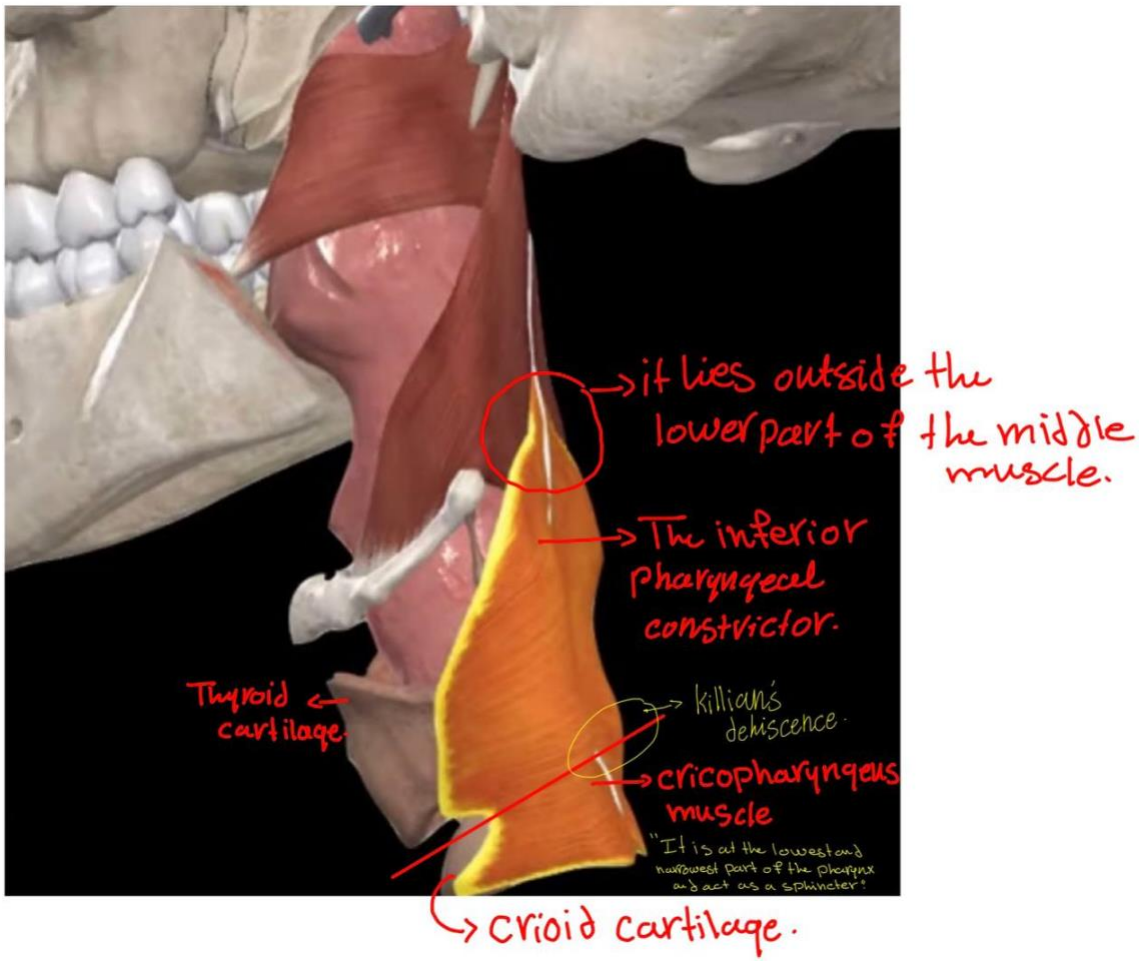
M. palatopharyngeus

M. salpingopharyngeus

The three constrictor muscles extend around the pharyngeal wall to be inserted into a fibrous band or raphe that extends from the pharyngeal tubercle on the basilar part of the occipital bone of the skull down to the esophagus.


Superior pharyngeal constrictor
This white line is the raphe


it lies on the outside of the lower part of the superior muscle.
The middle pharyngeal constrictor.
hyoid bone

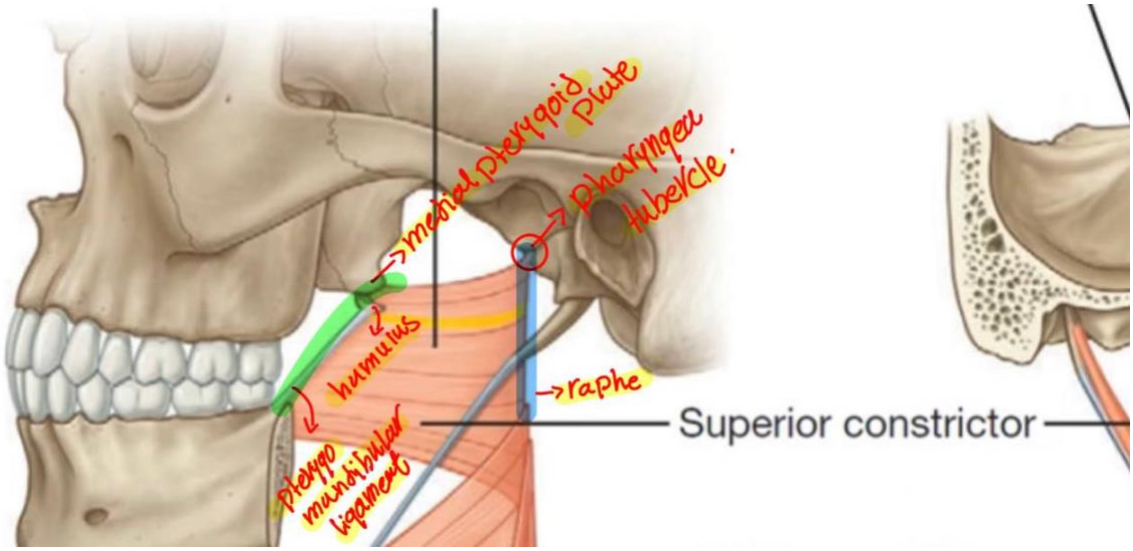



The three constrictor muscles overlap each other so that the middle constrictor lies on the outside of the lower part of the superior constrictor and the inferior constrictor lies outside the lower part of the middle constrictor, as shown in the pics above.

The lower part of the inferior constrictor, which arises from the cricoid cartilage, is called the cricopharyngeus muscle, the fibers of the cricopharyngeus pass horizontally around the lowest and narrowest part of the pharynx and function as a sphincter.

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

# Pharyngeal constrictors muscles:



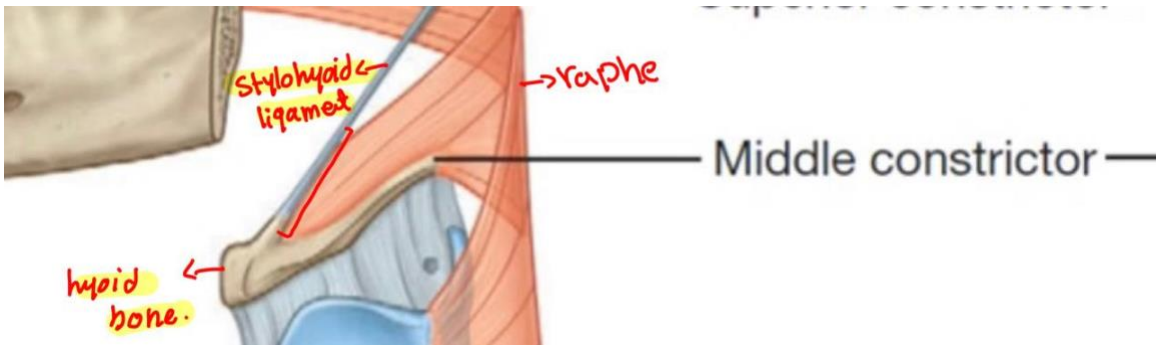

Superior constrictor:

Origin: Medial pterygoid plate, pterygoid hamulus, pterygomandibular ligament, mylohyoid line of mandible.

Insertion: Pharyngeal tubercle of occipital bone, raphe in midline posteriorly.

Nerve supply: Pharyngeal plexus

Function: Aids soft palate in closing off nasal pharynx, propels bolus downward.



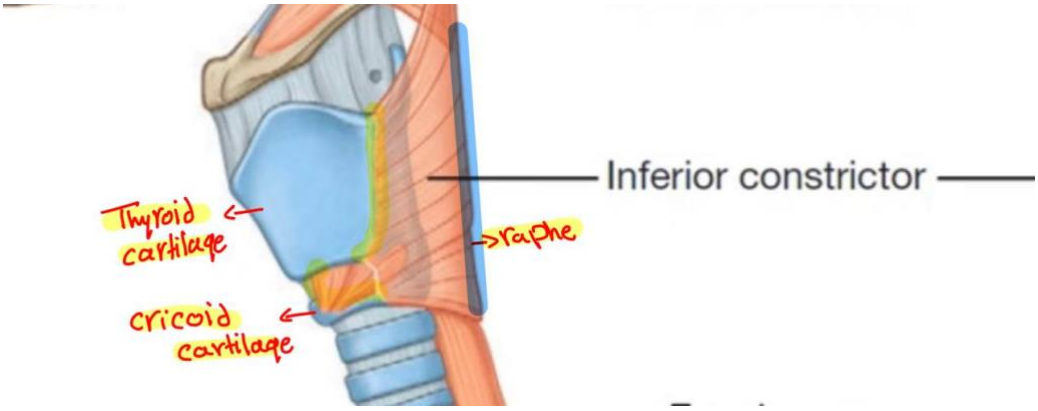

Middle constrictor:

Origin: Lower part of stylohyoid ligament, lesser and greater cornu of hyoid bone.

Insertion: Pharyngeal raphe.

Nerve supply: Pharyngeal plexus

Function: Propels bolus downward.




Inferior constrictor:

Origin: Lamina of thyroid cartilage, cricoid cartilage

Insertion: Pharyngeal raphe

Nerve supply: Pharyngeal plexus

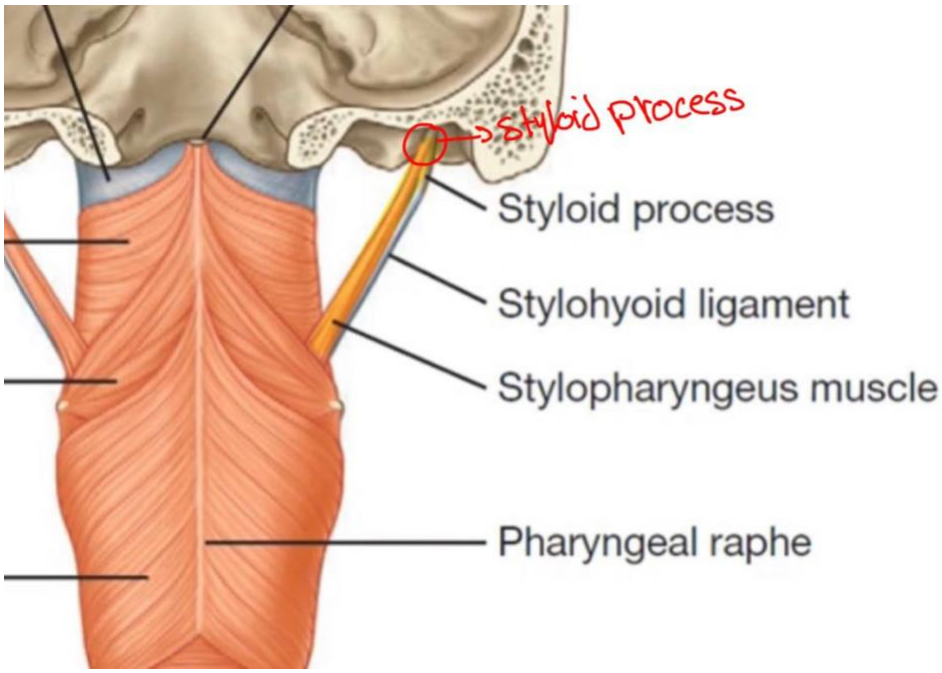
Function: Propels bolus downward

Cricopharyngeus:

Lowest fibers of inferior constrictor muscle

Sphincter at lower end of pharynx

# Pharyngeal elevator muscles:

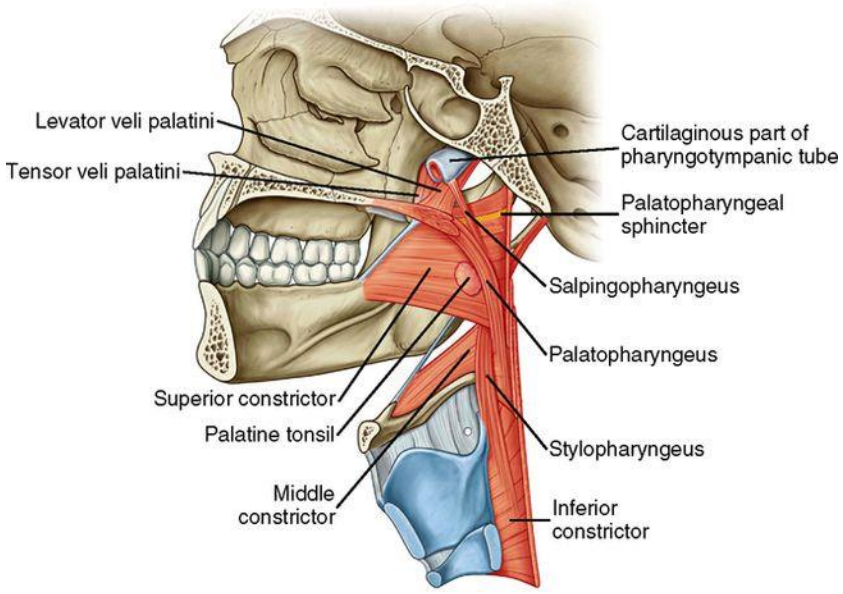



Stylopharyngeus:

Origin: Styloid process of temporal bone

Insertion: Posterior border of thyroid cartilage

Nerve supply: Glossopharyngeal nerve Function: Elevates larynx during swallowing.




Palatopharyngeus:

Origin: Palatine aponeurosis
Insertion: Posterior border of thyroid cartilage

Nerve supply: Pharyngeal plexus
Function: Elevates wall of pharynx, pulls palatopharyngeal arch medially.

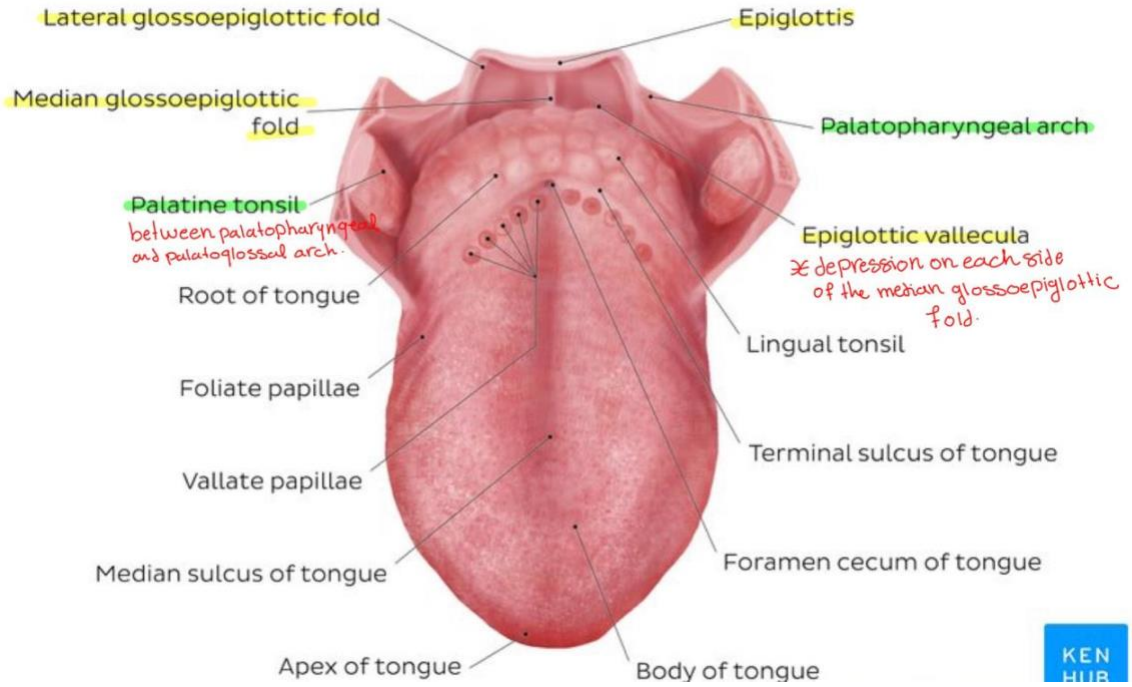
Salpingopharyngeus:

Origin: Auditory tube

Insertion: Blends with palatopharyngeus

Nerve supply: Pharyngeal plexus Function: Elevates pharynx.

It's covered by a vertical fold of mucous membrane called salpingopharyngeal fold.




## Sensory Nerve Supply of the Pharyngeal Mucous Membrane

Nasal pharynx: The maxillary nerve (V2)

Oral pharynx: The glossopharyngeal nerve

Laryngeal pharynx (around the entrance into the larynx): The internal laryngeal branch of the vagus nerve

## Blood Supply of the Pharynx

Ascending pharyngeal, tonsillar branches of facial arteries, and branches of maxillary and lingual arteries

# Lymph Drainage of the Pharynx

Directly into the deep cervical lymph nodes

Indirectly via the retropharyngeal or paratracheal nodes into the deep cervical nodes

Notes:

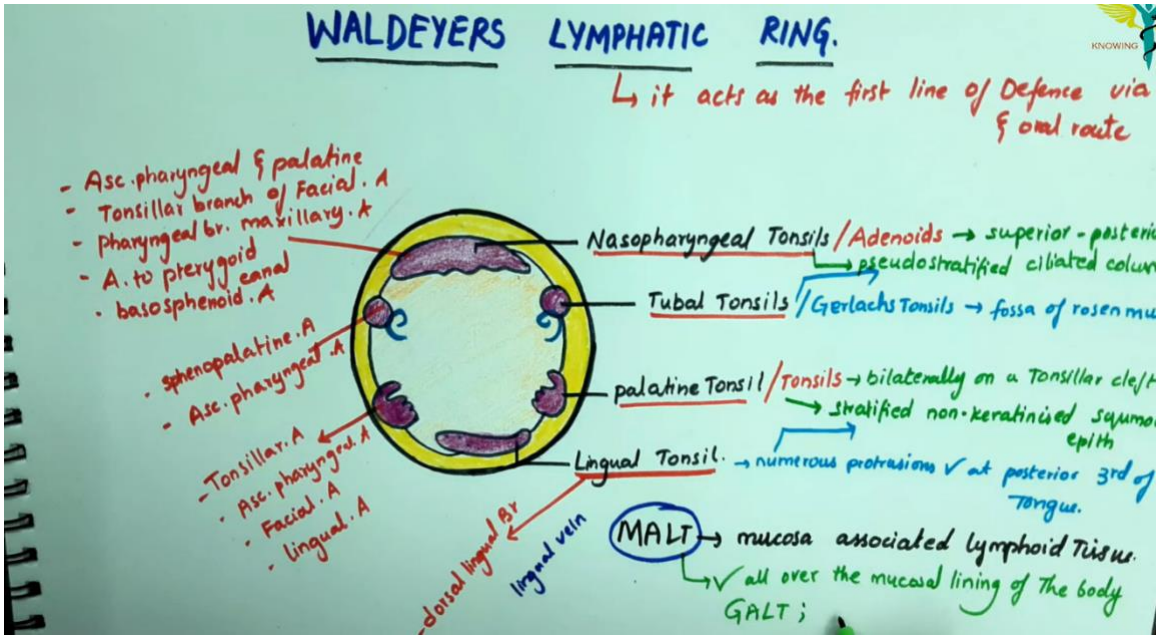
The muscular layer in the pharynx is between two connective tissues.

The cricopharyngeus muscle is mostly closed to prevent the air from accumulating in the stomach specially the fundus of the stomach, which is the upper part of it (the air in this area appears black dot in X- RAY).

pharyngeal plexus is made of 3 nerves (vagus, accessory, and glossopharyngeal nerves) on the posterior wall of the pharynx.

Adenoid is an enlargement of the pharyngeal tonsils that is in the upper surface of the nasopharynx.

The connection between the epiglottic and the tongue is called glossoepiglottic fold.


WALDEYERS LYMPHATIC RING.
↳ it acts as the first line of Defence via & oral route
- Asc. pharyngeal & palatine
- Tonsillar branch of Facial. A
- pharyngeal br. maxillary. A
- A. to pterygoid canal
- basosphenoid. A
- sphenopalatine. A
- Asc. pharyngeal. A
- Tonsillar. A
- Asc. pharyngeal. A
- Facial. A
- lingual. A
Nasopharyngeal Tonsils / Adenoids → superior - poster
→ pseudostratified ciliated colum
Tubal Tonsils / Gerlachs Tonsils → fossa of rosen mu
palatine Tonsil / Tonsils → bilaterally on a Tonsillar cle/
→ stratified non-keratinised squamo epith
Lingual Tonsil. → numerous protrusions ✓ at posterior 3rd of Tongue.
MALT → mucosa associated lymphoid Tissue.
↳ ✓ all over the mucosal lining of the body
GALT;
dorsal lingual Br
lingual vein