Oral cavity – Hard and soft palate

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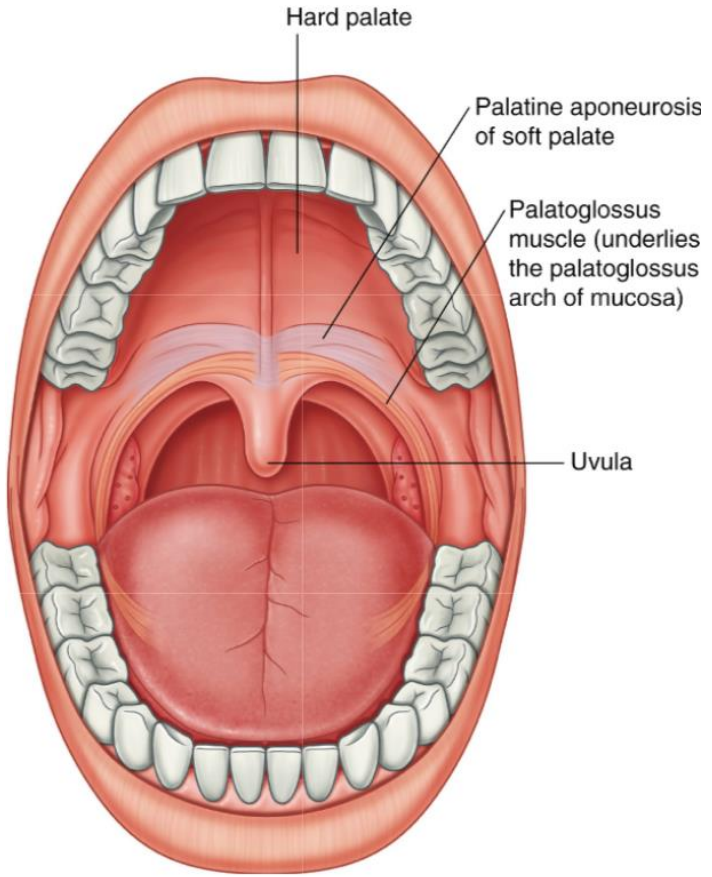
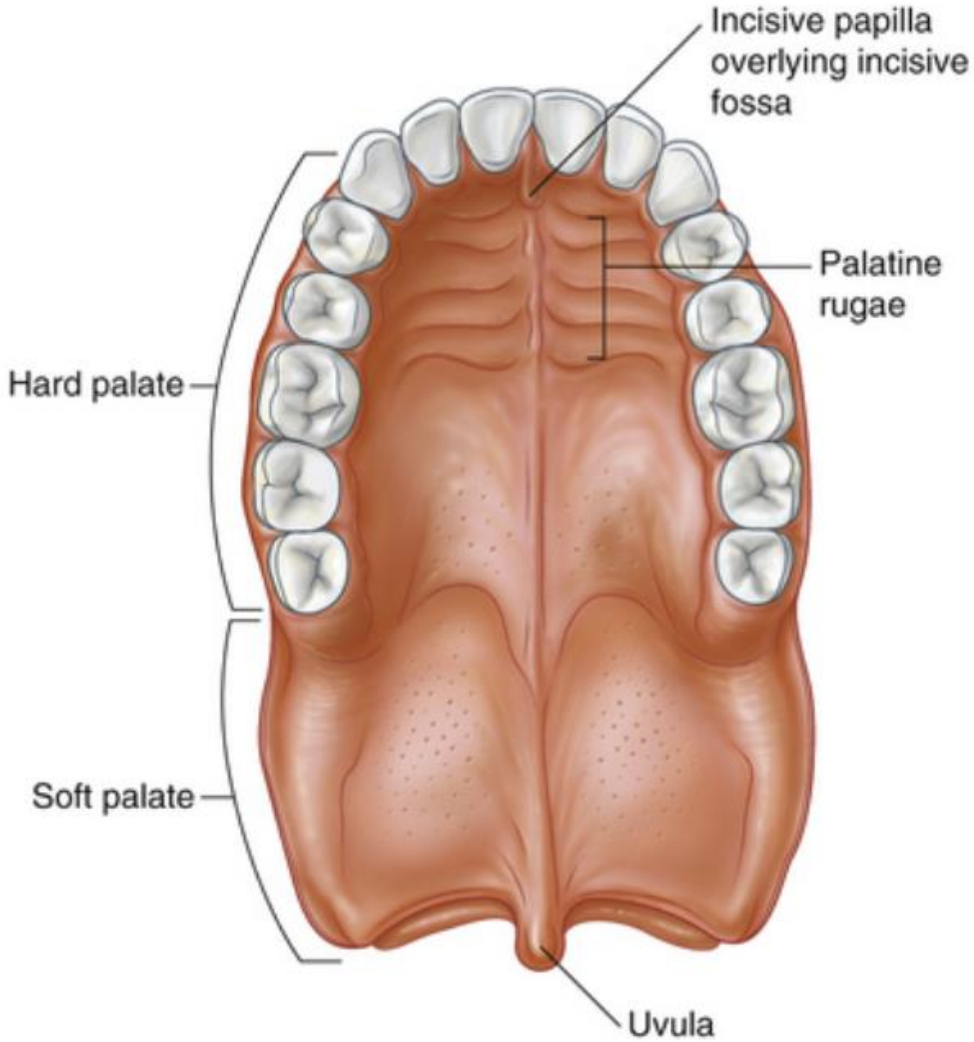
Oral cavity

Oral vestibule: The space bounded externally by lips and cheek, internally by teeth, gingiva and alveolar processes. It has a horseshoe shape.

Oral cavity proper: is bounded at the sides and in front by the alveolar process (containing the teeth) and at the back by the isthmus of the fauces. Its roof is formed by the hard palate at the front, and the soft palate at the back. The floor is formed by the mylohyoid muscles.



The palate forms the roof of the oral cavity and the floor of the nasal cavity. It is divided into a bony hard palate and a muscular soft palate.



Hard palate

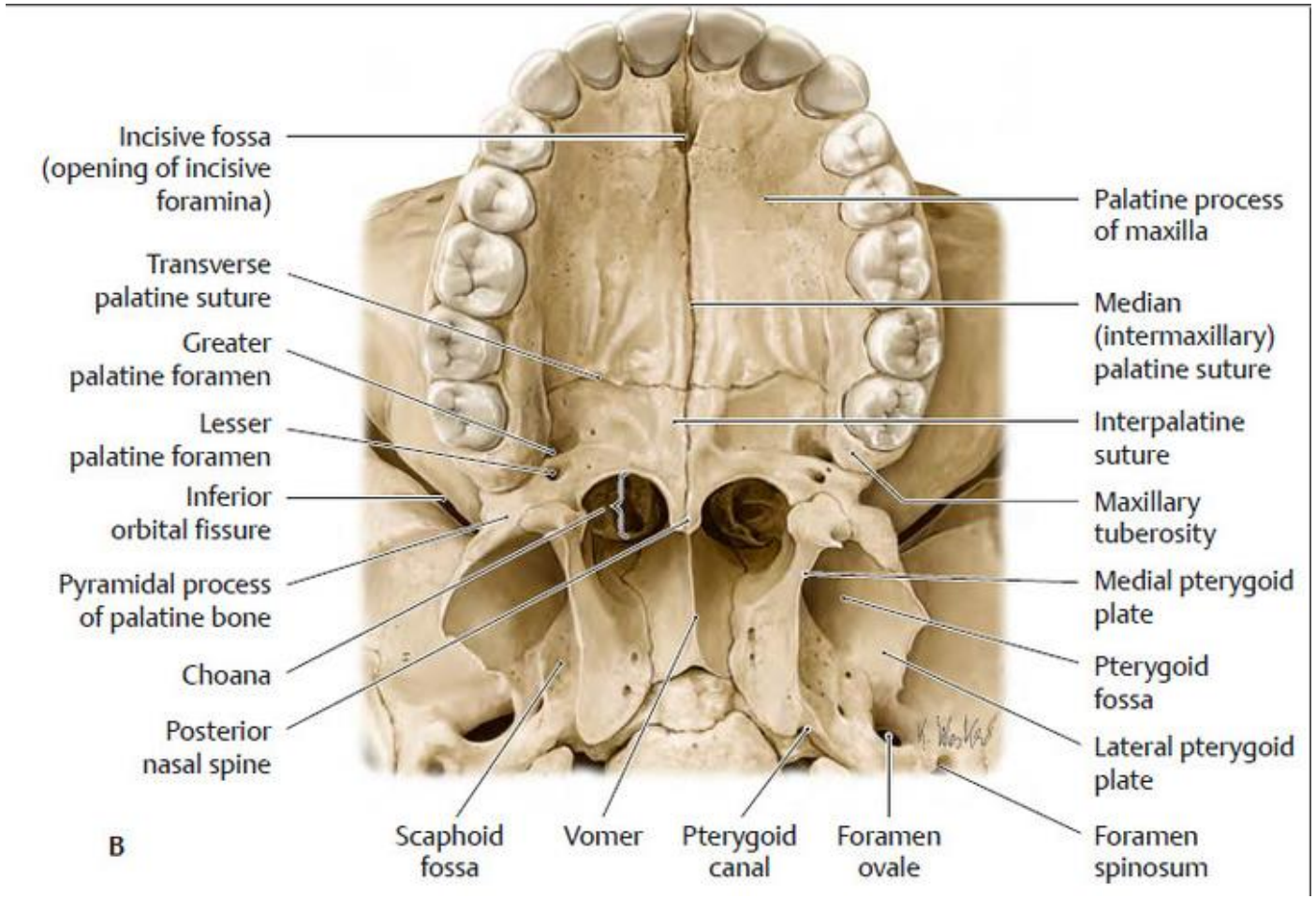
The palatine processes of the maxillae form the anterior three-quarters of the hard palate. The horizontal plates of the palatine bones form the posterior one-quarter. In the oral cavity, the upper alveolar arch borders the hard palate anteriorly and laterally. Posteriorly, the hard palate is continuous with the soft palate.

Foramen incisivum located 8-10 mm behind the central incisors

It consists of a bony plate covered above and below by mucosa:

- Above, it is covered by respiratory mucosa and forms the floor of the nasal cavities.
- Below, it is covered by a tightly bound layer of oral mucosa.

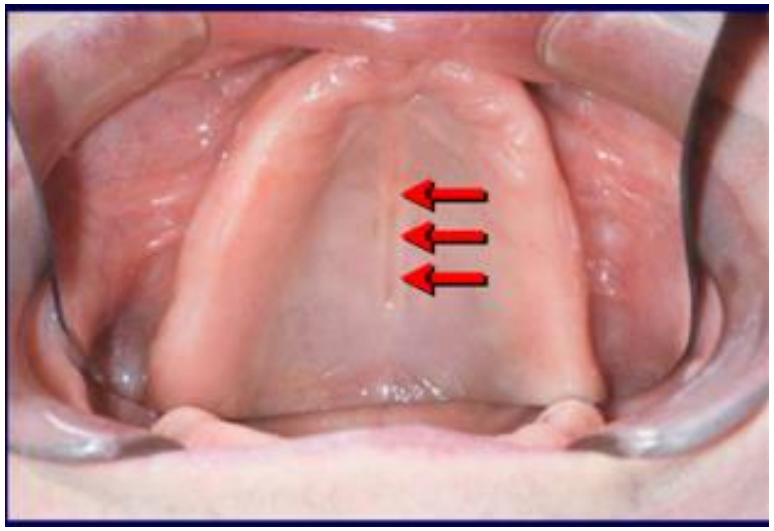
The mucosa is tightly bound to the periosteum of the bones of the hard palate. The mucosa may become stripped off of the periosteum when local anesthetic solution is introduced into the palate, which is very painful.



Hard palate

The mucosa of the hard palate in the oral cavity possesses numerous transverse palatine folds (palatine rugae) - It is covered with tough masticatory mucosa, which forms irregular folds anteriorly, known as ruggae, which aid in guiding food toward the pharynx. There ia a median longitudinal ridge (palatine raphe), which ends anteriorly in a small oval elevation (incisive papilla).

Incisive papilla: on the mucosa visible in the midline just behind the central incisors, 4 mm long and 2 mm wide. Evaluates the consistency and temperature of food intake. Incisive papilla is used as a landmark for setting of teeth when making dentuer.



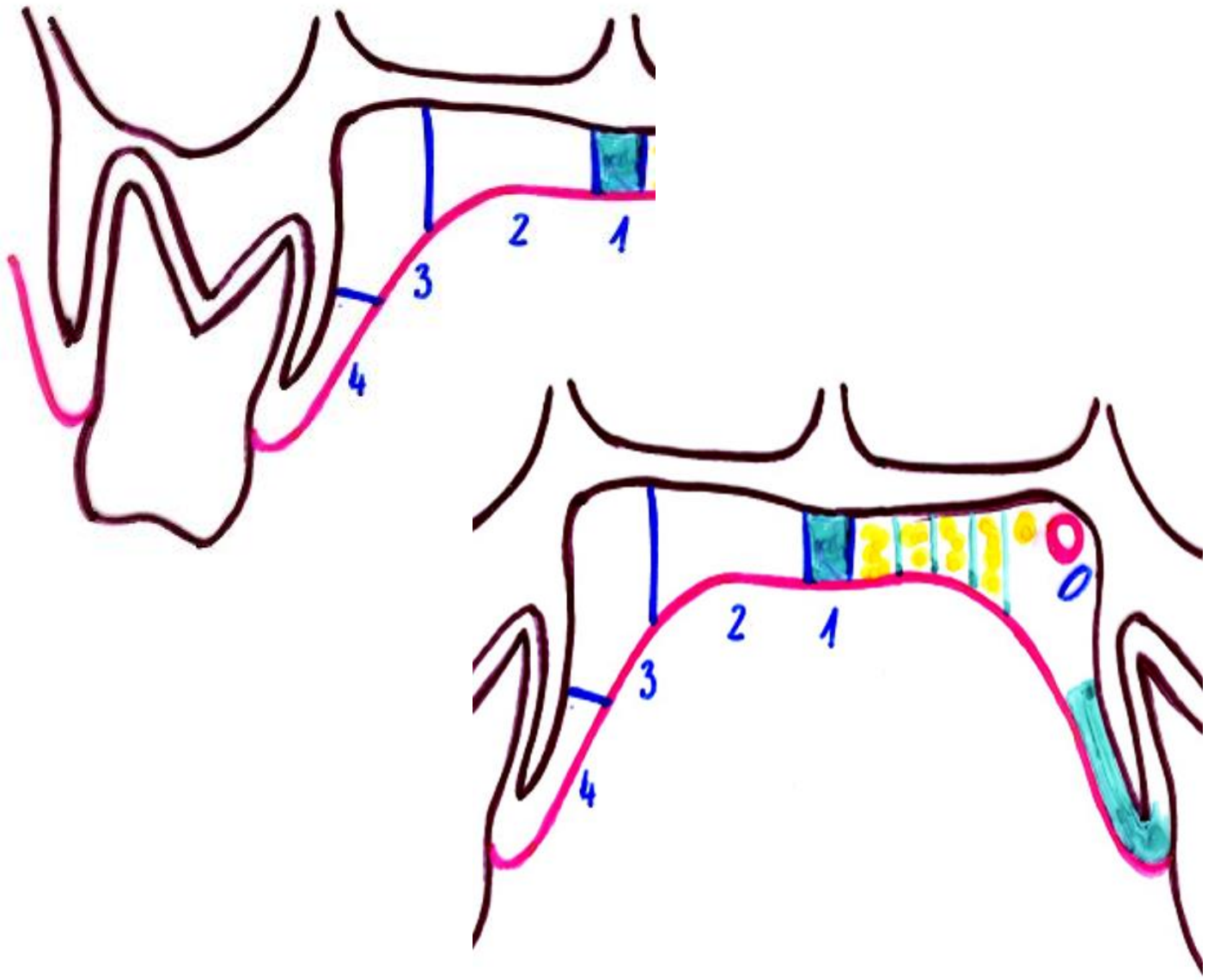
Zones of hard palate according to the content of submucousal connective tissue:

Zone 1: Palatine raphe – MUKOPERIOSTIUM

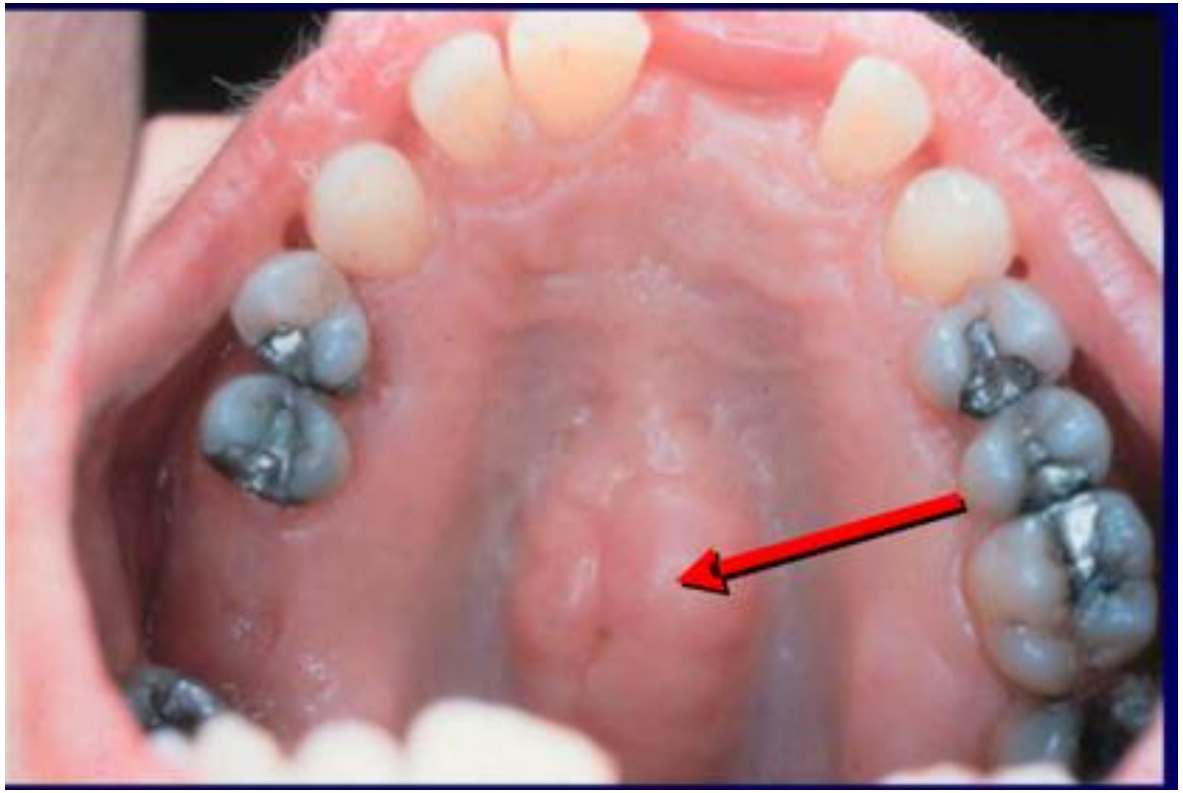
Zone 2: between 1 and 3 (anteriorly containing fat- till level of the canine and posteriorly containing mucouse Palatine glands- convex till level of M1)

Zone 3: Palatine sulcus + incisive papilla containing submucousal loose connective tissue – Greater palatine N and vesselse (nerve located more medially)

Zone 4: GINGIVA - MUKOPERIOST



Torus palatinus

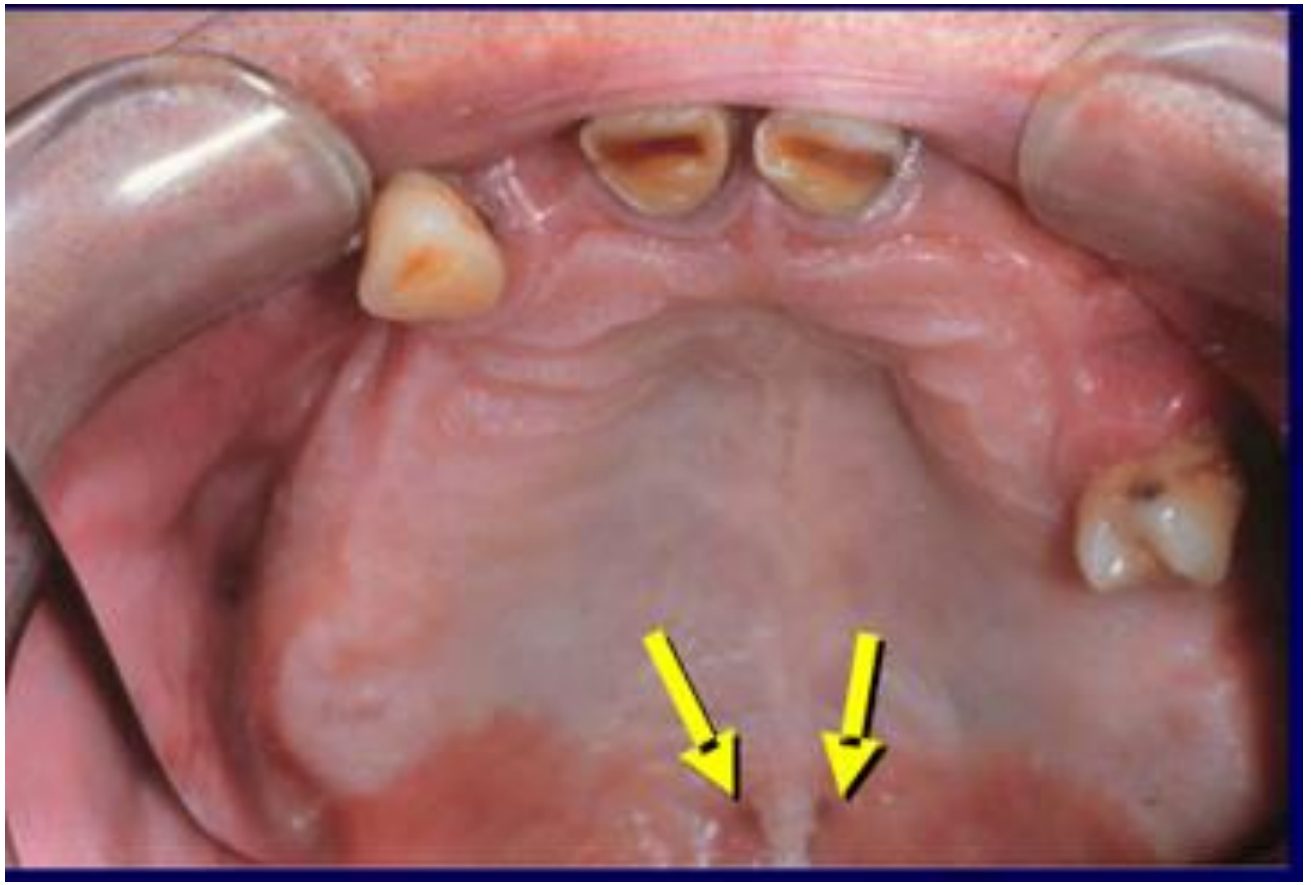


Foveae palatinae

Located at the posterior end of the hard palate near the median palatine raphe

There are 2 shallow fossae and they are Place of opening of the mucinose glands of posterior hard palate and soft palate.

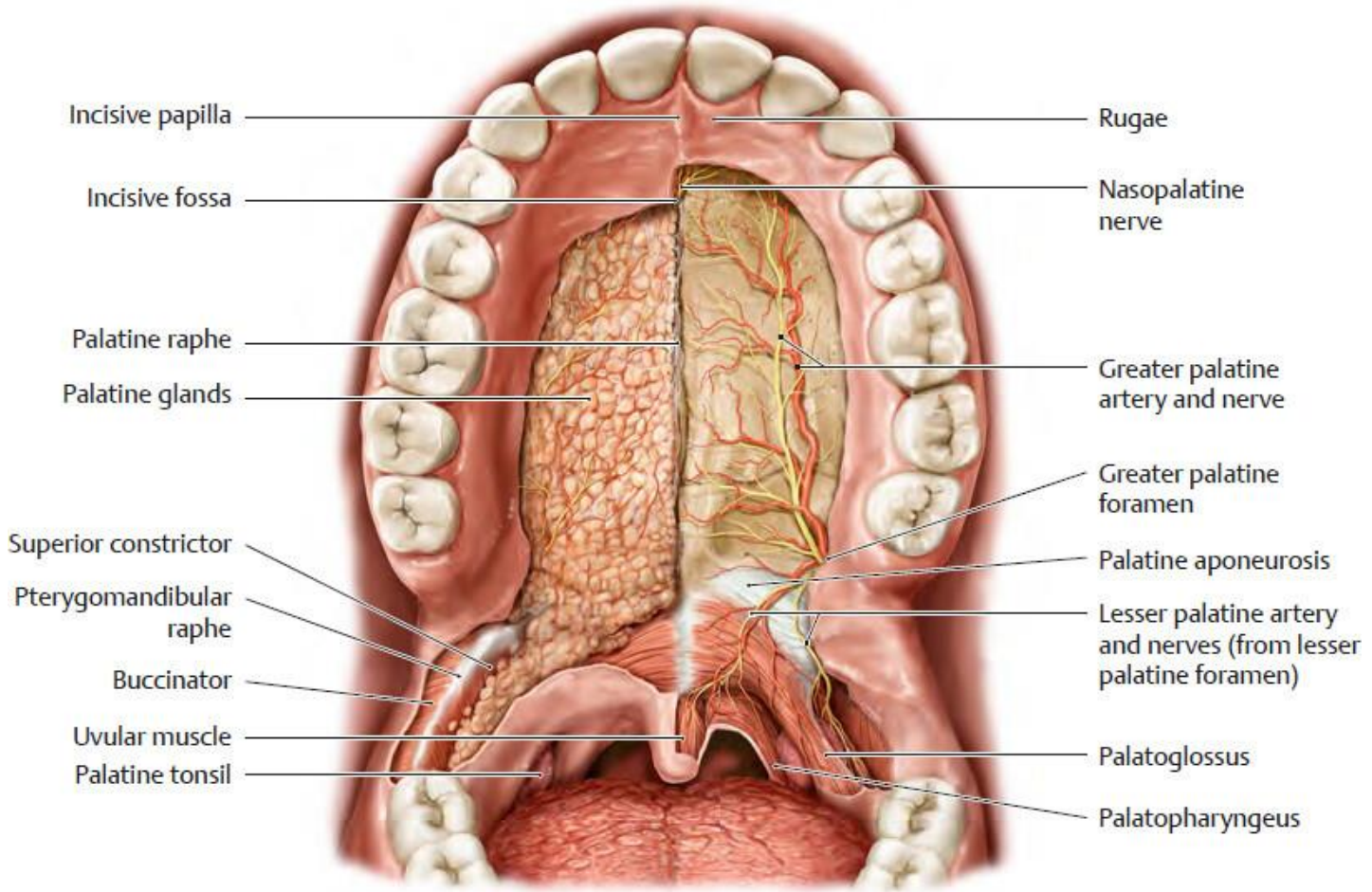
Mucous membrane has orange color.



Neurovasculature of the hard palate

Blood supply	Venous drainage	Innervation	Lymphatic drainage
Greater palatine a., Nasopalatine a. Sphenopalatine a.*	Pterygoid plexus	•Anterior one third: nasopalatine n. (from CN V_2) •Posterior two thirds: greater palatine n. (from CN V_2)	•Submandibular nodes •Superior deep cervical nodes •Retropharyngeal nodes (rarely)
*Supplies the aspect of the hard palate that forms the floor of the nasal cavity.			

The hard palate receives it blood supply from the greater palatine artery which arises from the descending palatine artery a branch of maxillary artery and nasopalatine artery which arises from the sphenopalatine artery a branch of maxillary artery
This view also shows the pterygomandibular raphe, which is a ligament formed from the buccopharngeal fascia. It attaches superiorly to the pterygoid hamulus and inferiorly to the posterior end of mylohyoid line of the mandible (retromolar triangle). The buccinator muscle is attached to the pterygomandibular raphe anteriorly and the superior constrictor of the pharynx posteriorly. The raphe forms an important landmark for the administration of an inferior alveolar nerve block !!



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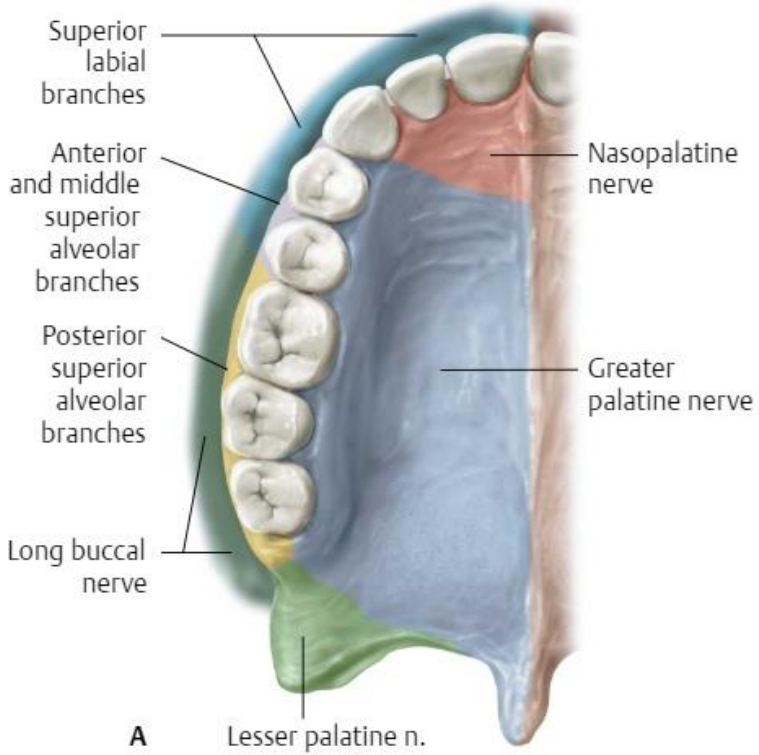
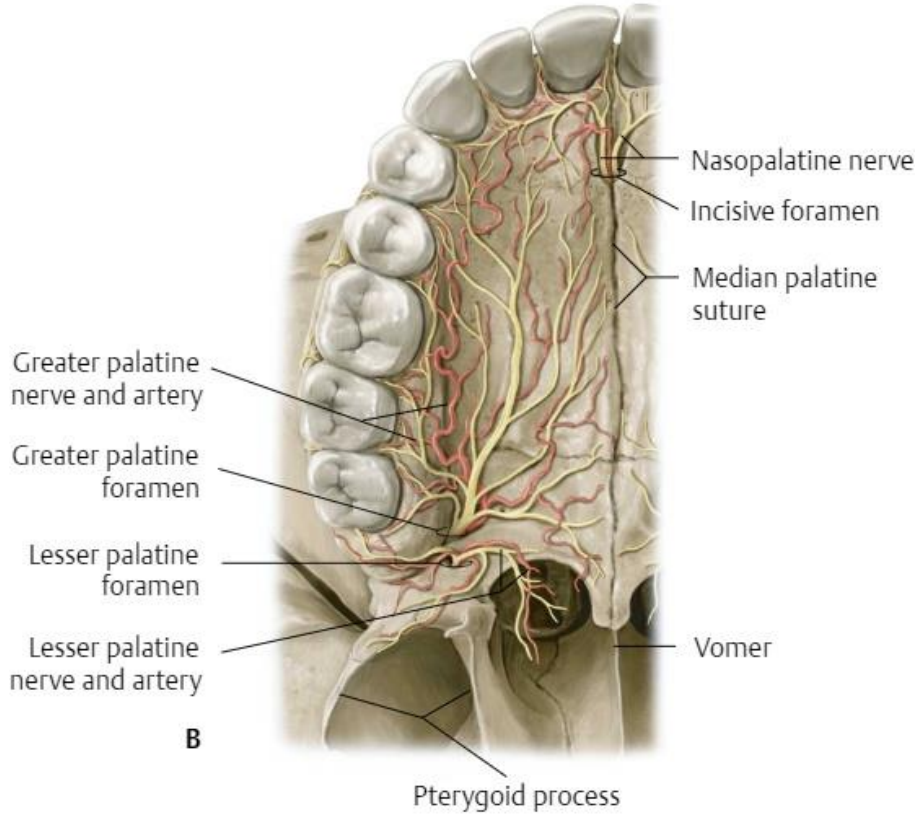
The hard palate is innervated by branches of the maxillary division of the trigeminal nerve (CN V_2). The anterior one third of the palate is in nervated by the nasopalatine nerve, which emerges from the incisive foramen. The posterior two thirds is innervated by the greater palatine nerve, which emerges from the greater palatine foramen along with the greater palatine artery (and the lesser palatine nerves and artery, which innervates and supplies the soft palate).





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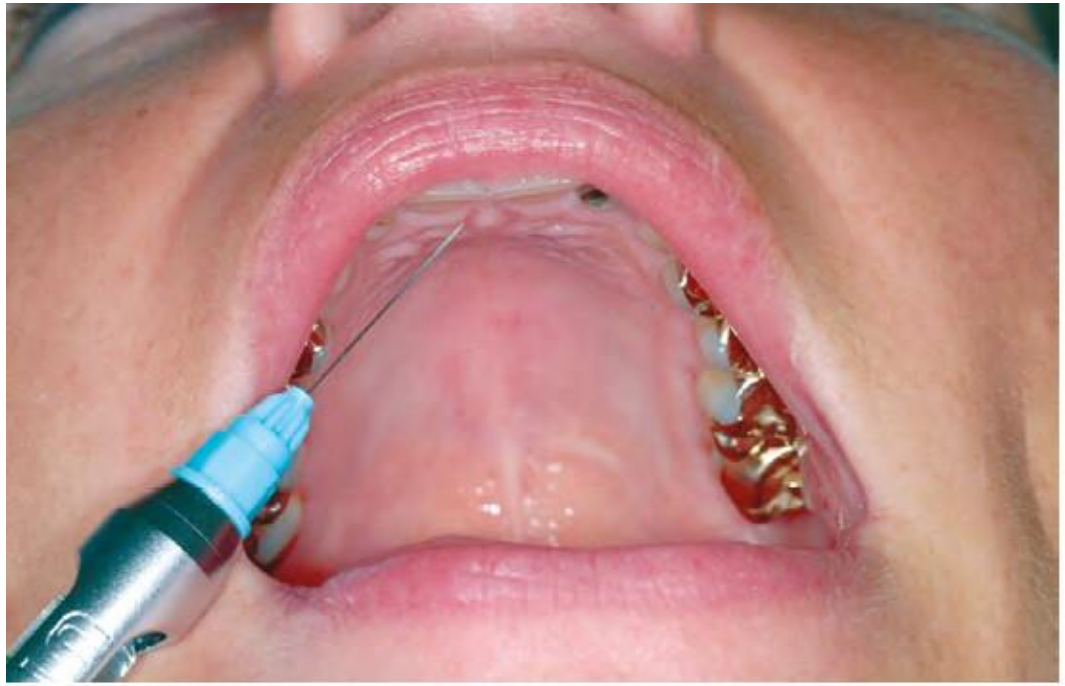

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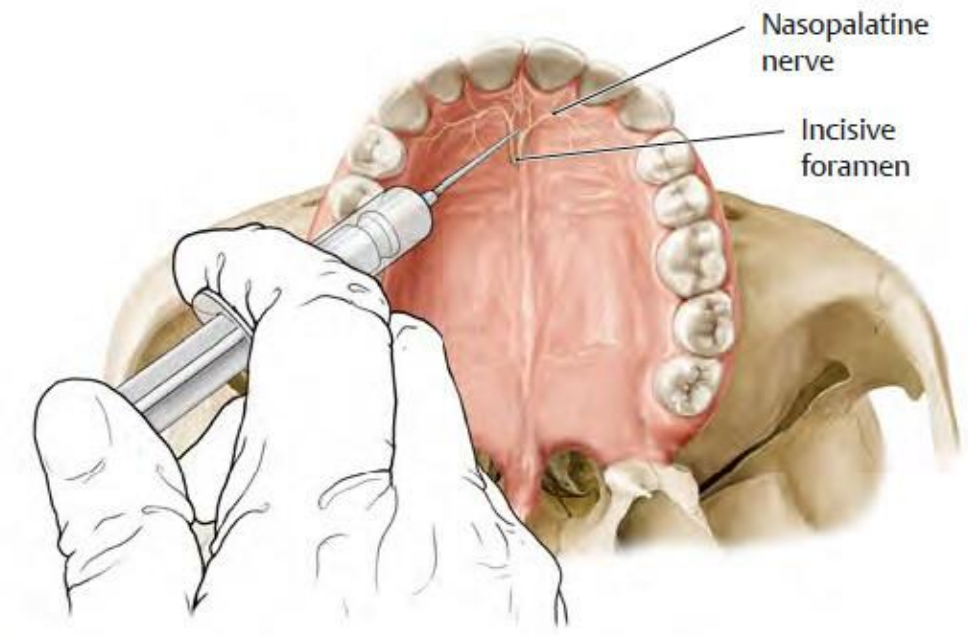

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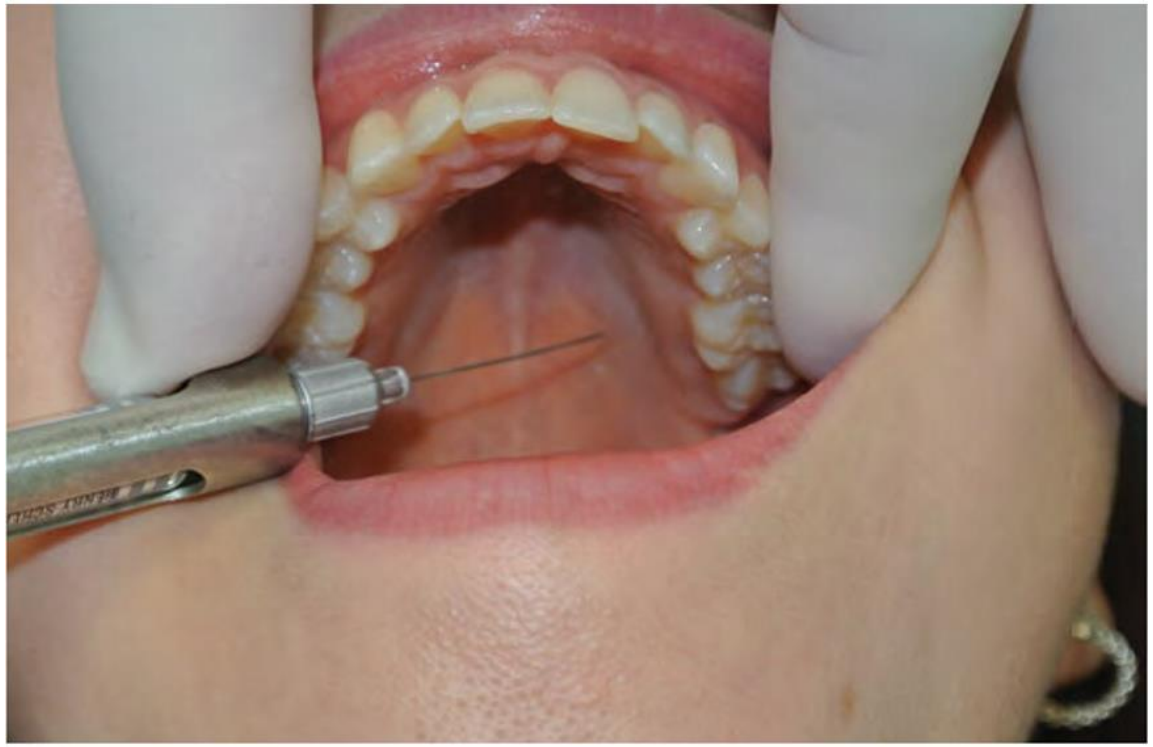

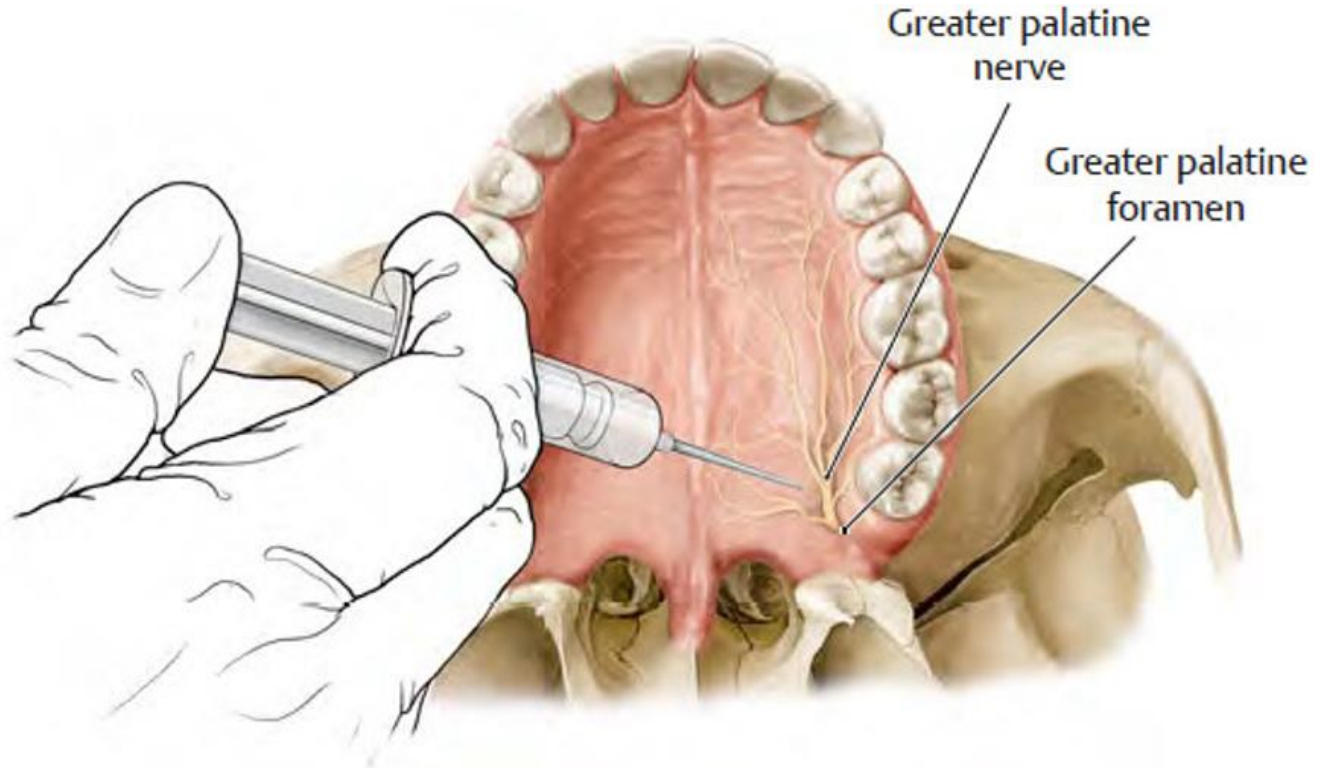

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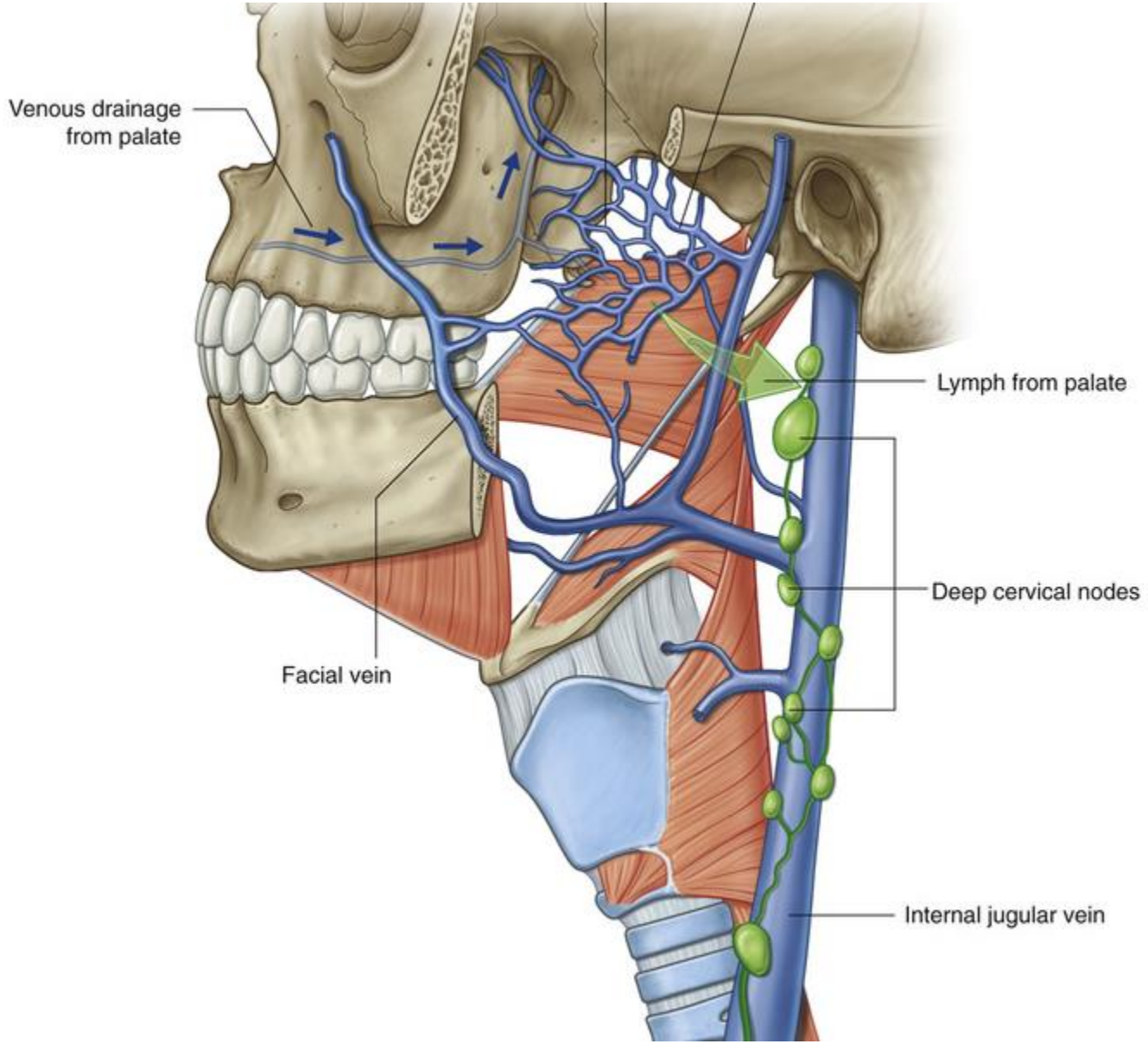
Venous and Lymphatic drainage

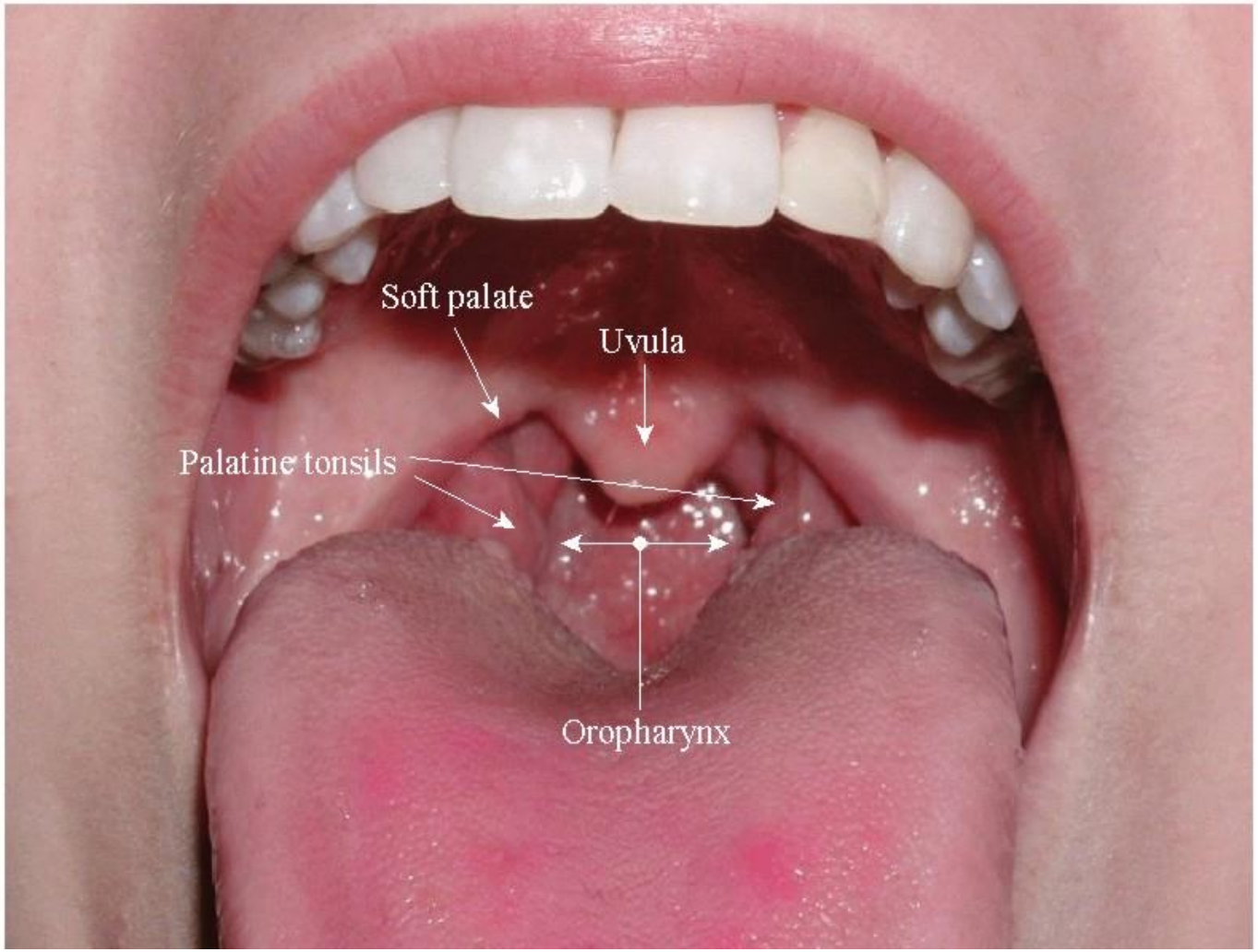
Veins drain to the pterygoid plexus.

Lymph from the hard palate most commonly drains to the

. submandibular nodes or directly to the superior deep cervical nodes.



Soft palate



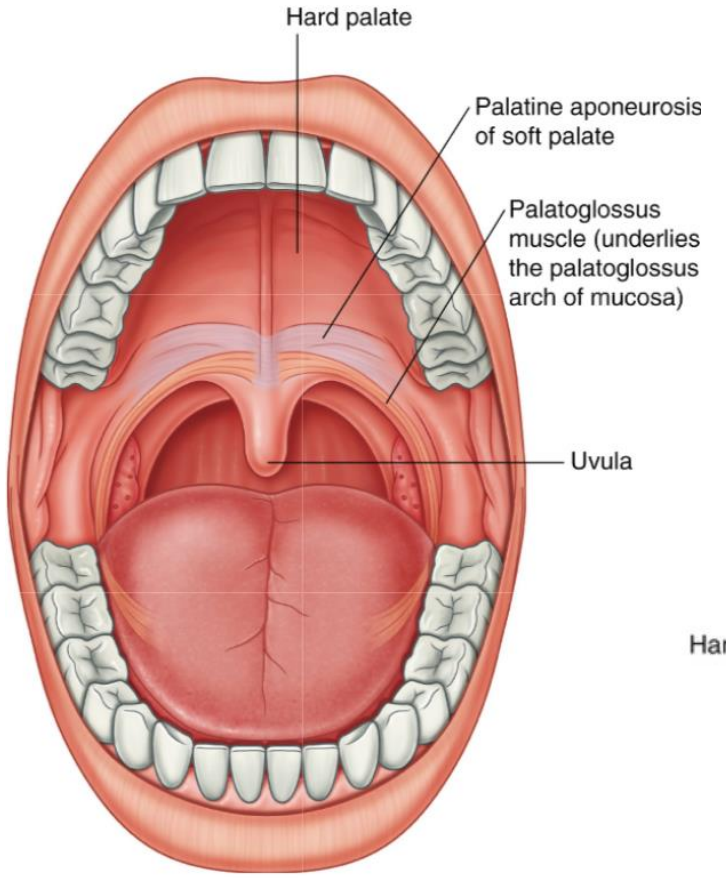
Soft palate

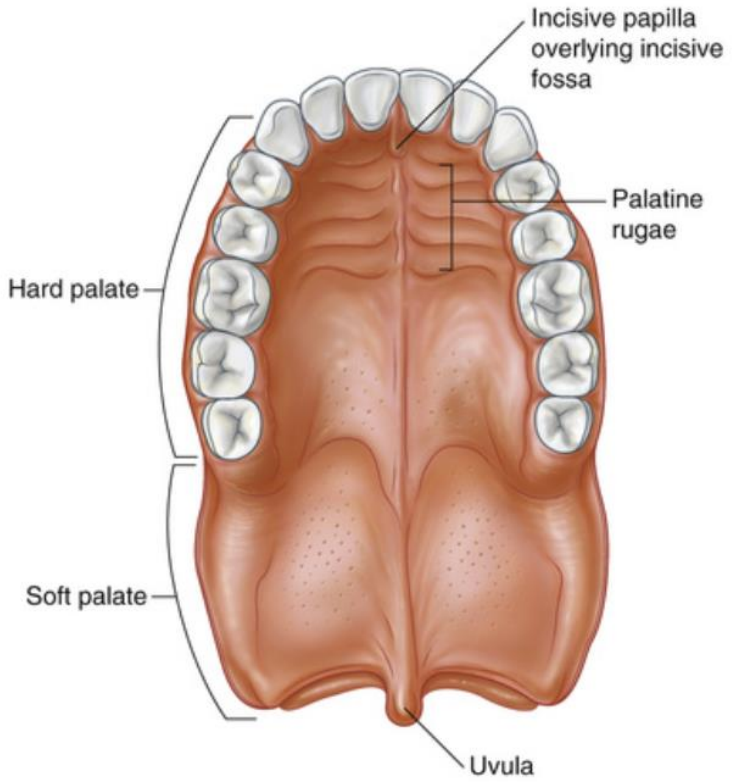
The soft palate continues posteriorly from the hard palate and acts as a valve that can be:

- **depressed to help close the oropharyngeal isthmus, and**
- **elevated to separate the nasopharynx from the oropharynx.**

The soft palate is formed and moved by five muscles and is covered by mucosa that is continuous with the mucosa lining the pharynx and oral and nasal cavities.

The small tear-shaped muscular projection that hangs from the posterior free margin of the soft palate is the uvula.





Muscles of the soft palate and pharyngotympanic tube

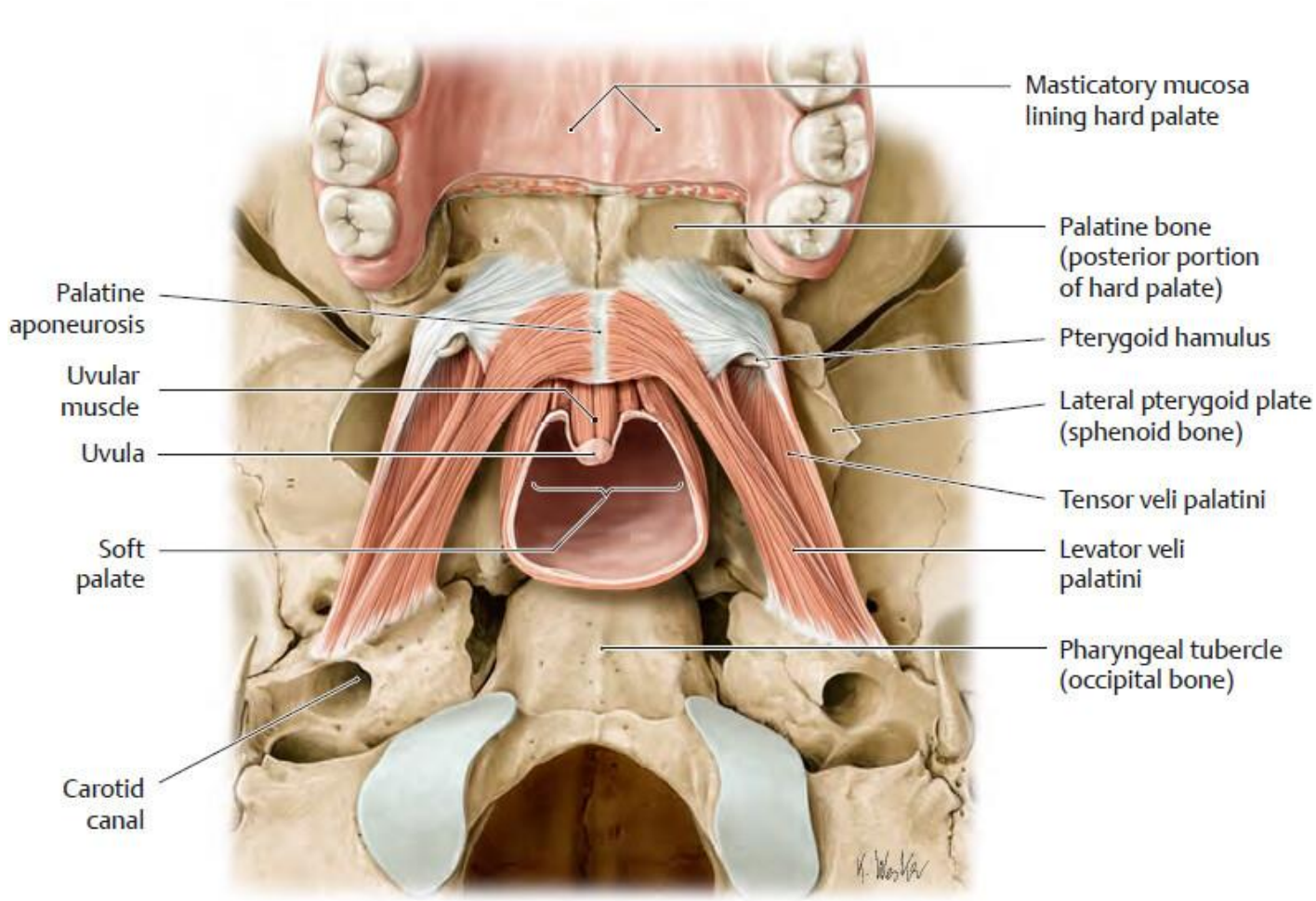
Inferior view.

The soft palate is the aponeurotic and muscular region hanging from the hard palate at the posterior portion of the oral cavity.

It separates the oropharynx from the nasopharynx, particularly during swallowing when it is tensed.

The palatoglossus restricts the communication between the oral cavity and oropharynx.

The tensor veli palatini has a significant role in keeping open the pharyngotympanic (auditory) tube.



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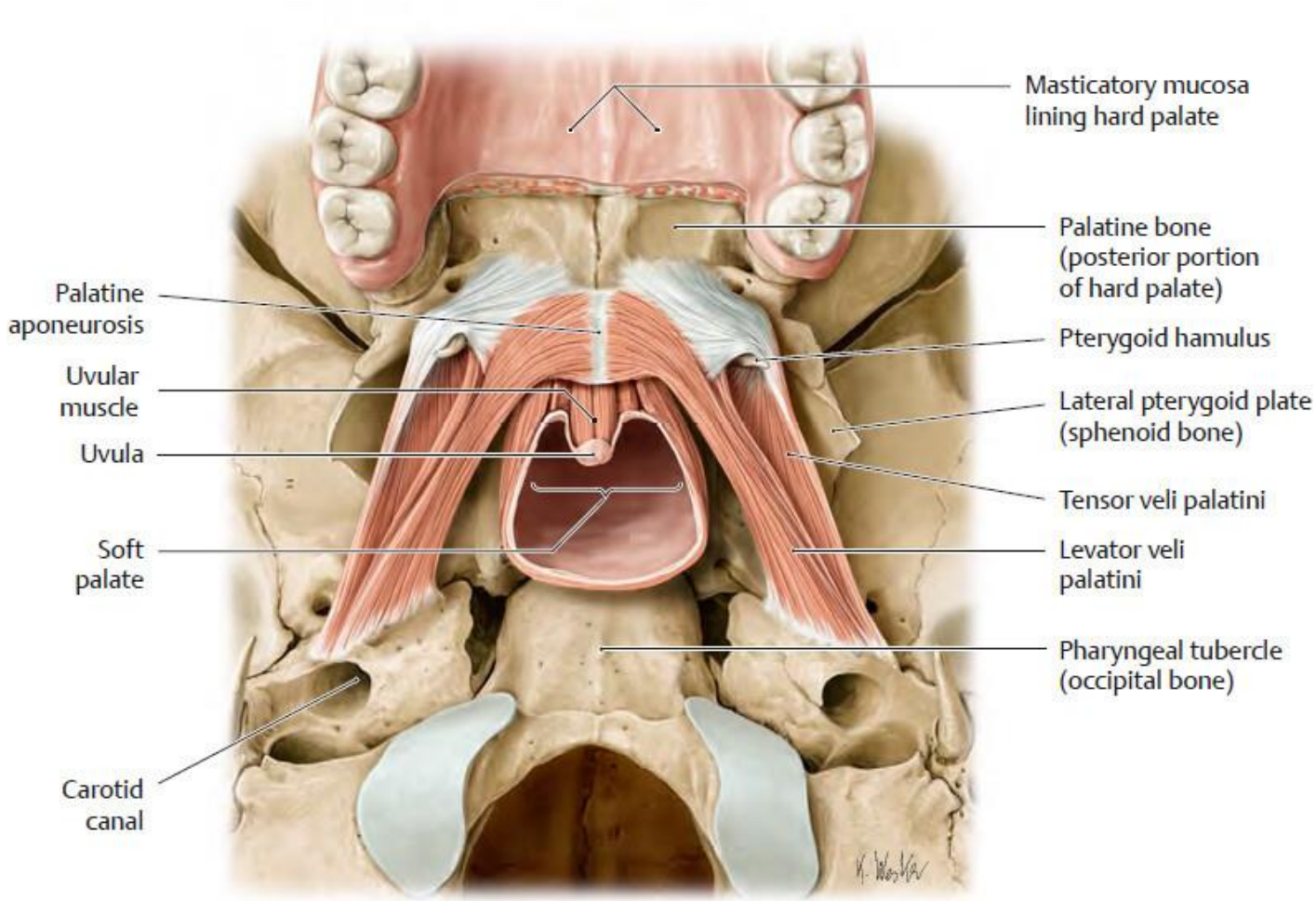
Muscles of soft palate

Five muscles on each side contribute to the formation and movement of the soft palate.

Two of these, the tensor veli palatini and levator veli palatini, descend into the palate from the base of the skull.

Two others, the palatoglossus and palatopharyngeus, ascend into the palate from the tongue and pharynx, respectively.

The last muscle, the musculus uvulae, is associated with the uvula.



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Muscles of the soft palate

Muscle	Origin	Insertion	Innervation	Action
Tensor veli palatini	Sphenoid bone (scaphoid fossa of pterygoid process and medial aspect of the spine; it is connected to the anterolateral membranous wall of the pharyngotympanic (auditory tube)	Palatine aponeurosis and palatine bone (horizontal plate) via a tendon that is redirected medially by the pterygoid hamulus	N. to medial pterygoid (CN V_3)	*Bilaterally:* tenses anterior portion of the soft palate and flattens its arch, separating the nasopharynx from oropharynx. Opens pharyngotympanic (auditory) tube. *Unilaterally:* deviates soft palate laterally.
Levator veli palatini	Vaginal process and petrous part of temporal bone (via a tendon, anterior to the carotid canal); it is connected to the inferior portion of the pharyngotympanic tube	Palatine aponeurosis (the two levators combine to form a muscular sling)	Vagus n. (CN X) via pharyngeal plexus	*Bilaterally:* pulls the posterior portion of the soft palate superoposteriorly, separating the nasopharynx from the oropharynx.
Uvular muscle (musculus uvulae)	Palatine bone (posterior nasal spine) and palatine aponeurosis (superior surface)	Mucosa of the uvula		Pulls the uvula posterosuperiorly, separating the nasopharynx from the oropharynx.
Palatoglossus (palatoglossal arch)	Palatine aponeurosis (oral surface)	Lateral tongue to dorsum or intrinsic transverse muscle		*Bilaterally:* pulls the root of the tongue superiorly narrowing the oropharngeal isthmus, separating the oral cavity from the oropharynx.

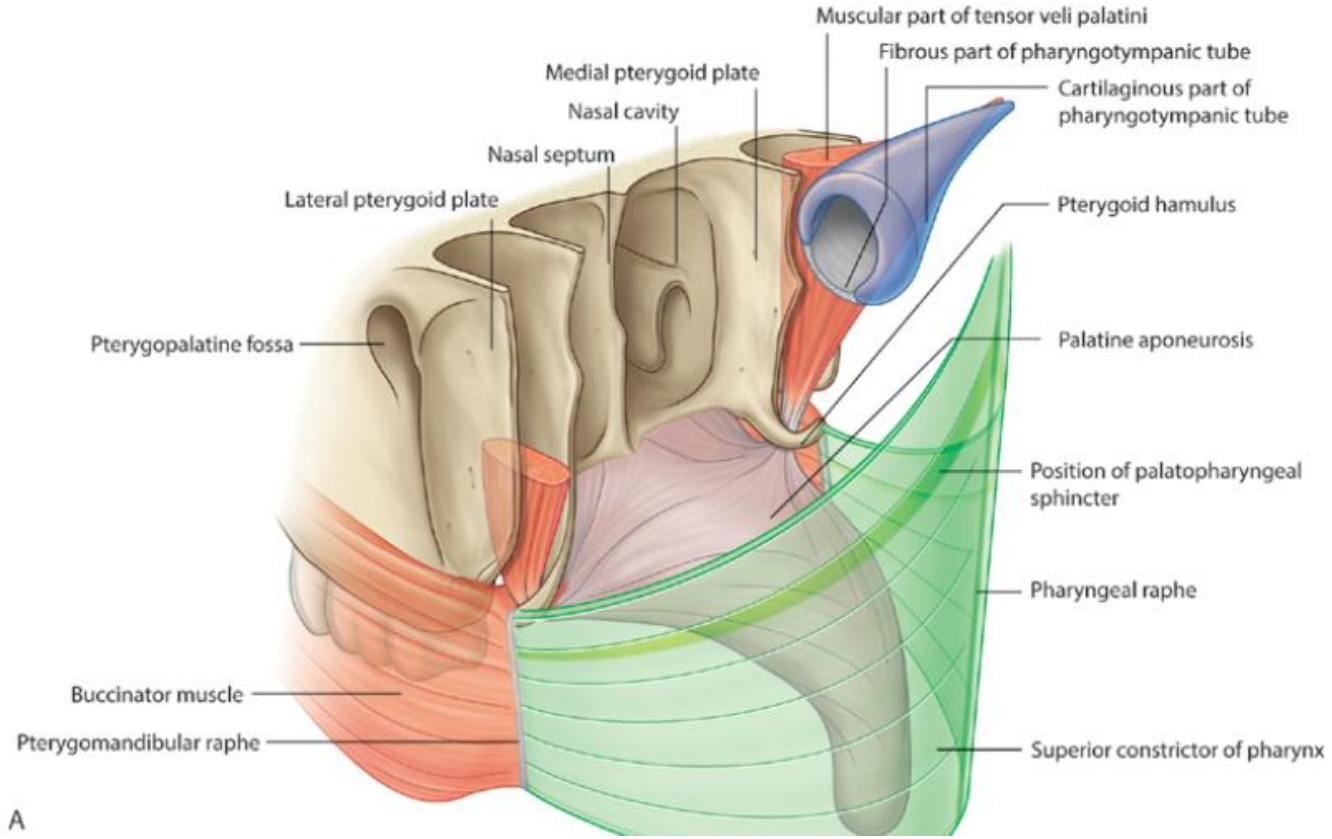
Tensor veli palatini

The tensor veli palatini muscle is composed of two parts—a vertical muscular part and a more horizontal fibrous part, which forms the palatine aponeurosis.

The vertical part of the tensor veli palatini is thin and triangular in shape with its base attached to the skull and its apex pointed inferiorly. It continues laterally along the membranous part of the pharyngotympanic tube to the spine of the sphenoid bone.

The tensor veli palatini descends vertically along the lateral surface of the medial plate of the pterygoid process and pharyngeal wall to the pterygoid hamulus where the fibers converge to form a small tendon.

The tendon loops 90° medially around the pterygoid hamulus, penetrating the origin of the buccinator muscle as it does, and expands like a fan to form the fibrous horizontal part of the muscle. This fibrous part is continuous across the midline with its partner on the other side to form the palatine aponeurosis.



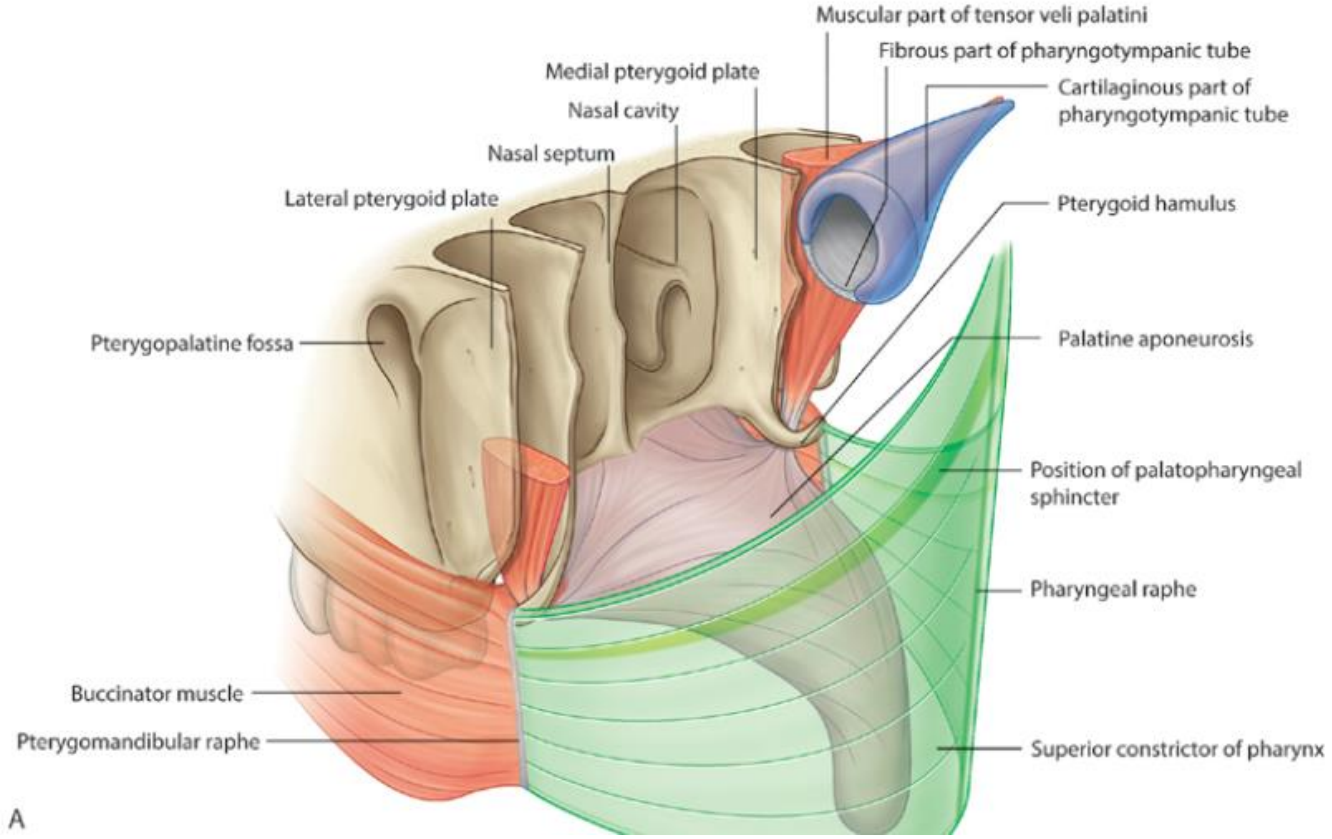
The palatine aponeurosis

The palatine aponeurosis is attached anteriorly to the margin of the hard palate, but is unattached posteriorly where it ends in a free margin. This expansive aponeurosis is the major structural element of the soft palate to which the other muscles of the palate attach.

The tensor veli palatini:

- tenses (makes firm) the soft palate so that the other muscles attached to the palate can work more effectively, and
- opens the pharyngotympanic tube when the palate moves during yawning and swallowing as a result of its attachment superiorly to the membranous part of the pharyngotympanic tube.

The tensor veli palatini is innervated by the nerve to the medial pterygoid from the mandibular nerve [V3].



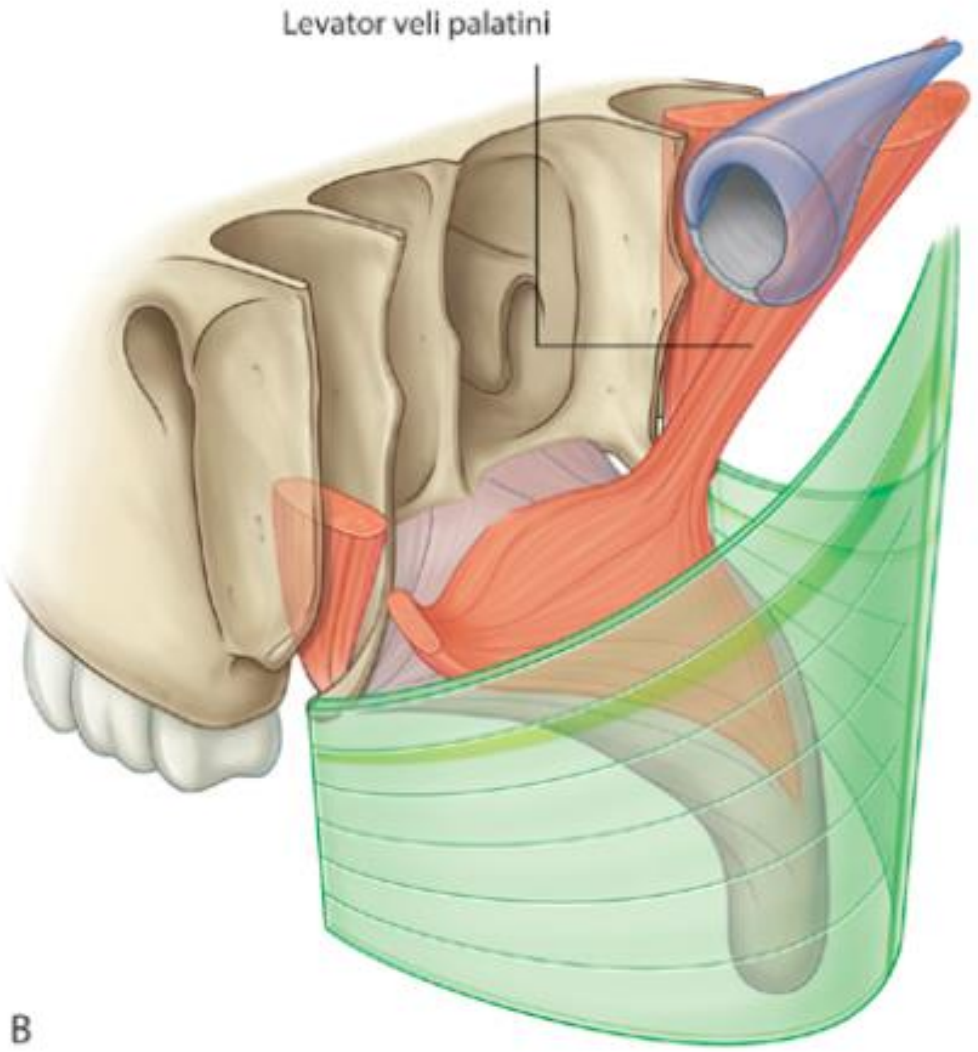
Levator veli palatini

The levator veli palatini muscle originates from the base of the skull and descends to the upper surface of the palatine aponeurosis. On the skull, it originates from a roughened area on the petrous part of the temporal bone immediately anterior to the opening of the carotid canal. Some fibers also originate from adjacent parts of the pharyngotympanic tube.

The levator veli palatini passes anteroinferiorly through fascia of the pharyngeal wall, passes medial to the pharyngotympanic tube, and inserts onto the palatine aponeurosis. Its fibers interlace at the midline with those of the levator veli palatini on the other side.

Unlike the tensor veli palatini muscles, the levator veli palatini muscles do not pass around each pterygoid hamulus, but course directly from the base of the skull to the upper surface of the palatine aponeurosis. Therefore, they are the only muscles that can elevate the palate above the neutral position and close the pharyngeal isthmus between the nasopharynx and oropharynx.

The levator veli palatini is innervated by the vagus nerve [X] through the pharyngeal branch to the pharyngeal plexus (CN IX,X).



“Ah.”

Clinically, the levator veli palatini can be tested by asking a patient to say “ah.” If the muscle on each side is functioning normally, the palate elevates evenly in the midline. If one side is not functioning, the palate deviates away from the abnormal side.

Note that the uvula hangs down from the roof of the mouth, directly in the mid-line. With an "Ah," the uvula rises up. Deviation to one side may be caused by CN 9 or 10 palsy (the uvula deviates away from the affected side), a tumor or an infection.
Cranial Nerve 9 Dysfunction: Patient has suffered stroke, causing loss of function of left CN 9. As a result, uvula is pulled towards the normally functioning (ie right) side.

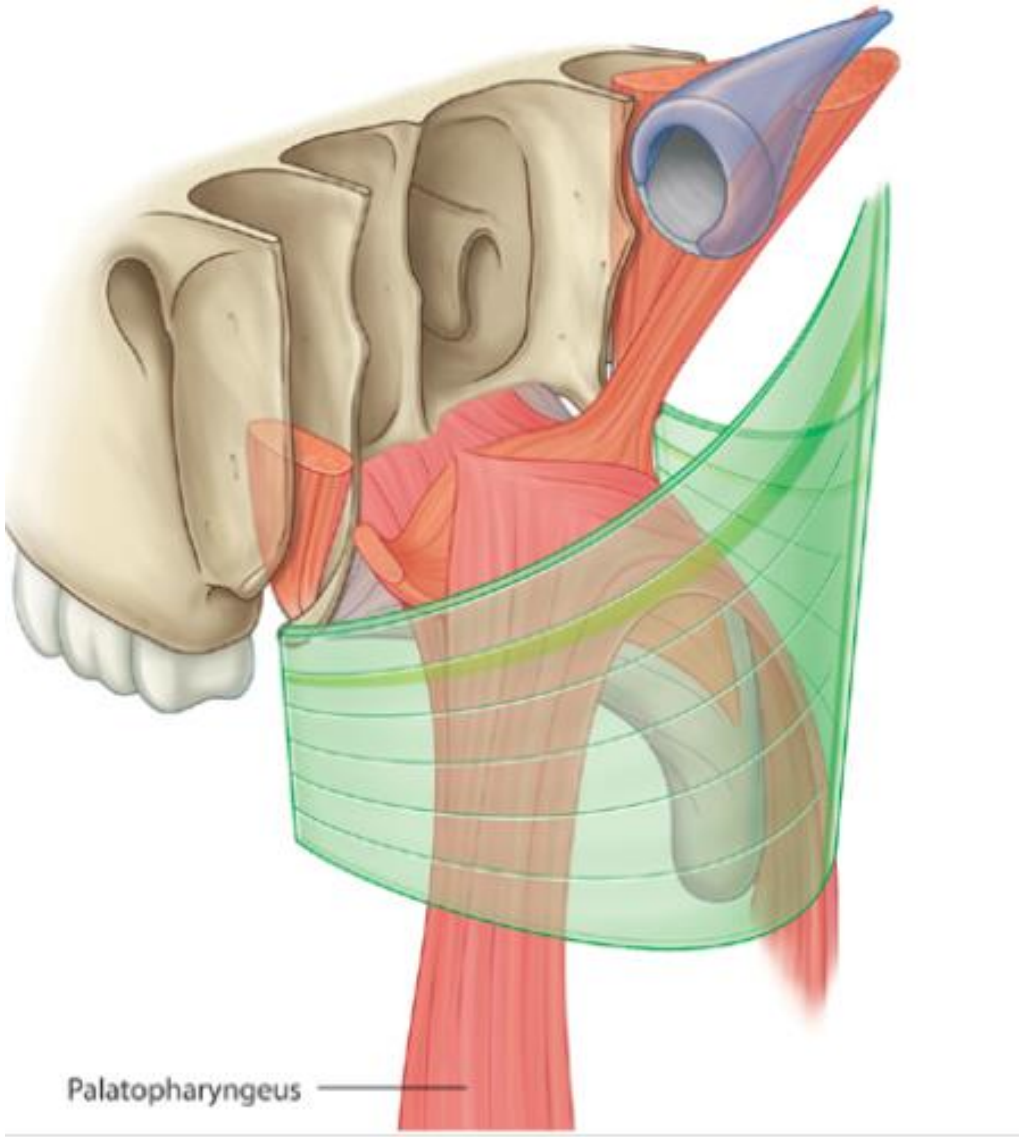
Palatopharyngeus

The palatopharyngeus muscle originates from the superior surface of the palatine aponeurosis and passes posterolaterally over its margin to descend and become one of the longitudinal muscles of the pharyngeal wall. It is attached to the palatine aponeurosis by two flat lamellae separated by the levator veli palatini muscle. The more anterior and lateral of these two lamellae is attached to the posterior margin of the hard palate as well as to the palatine aponeurosis.

The palatopharyngeus muscles:

- depress the palate and move the palatopharyngeal arches toward the midline like curtains—both these actions help close the oropharyngeal isthmus; and
- elevate the pharynx during swallowing.

The palatopharyngeus is innervated by the vagus nerve [X] through the pharyngeal branch to the pharyngeal plexus.

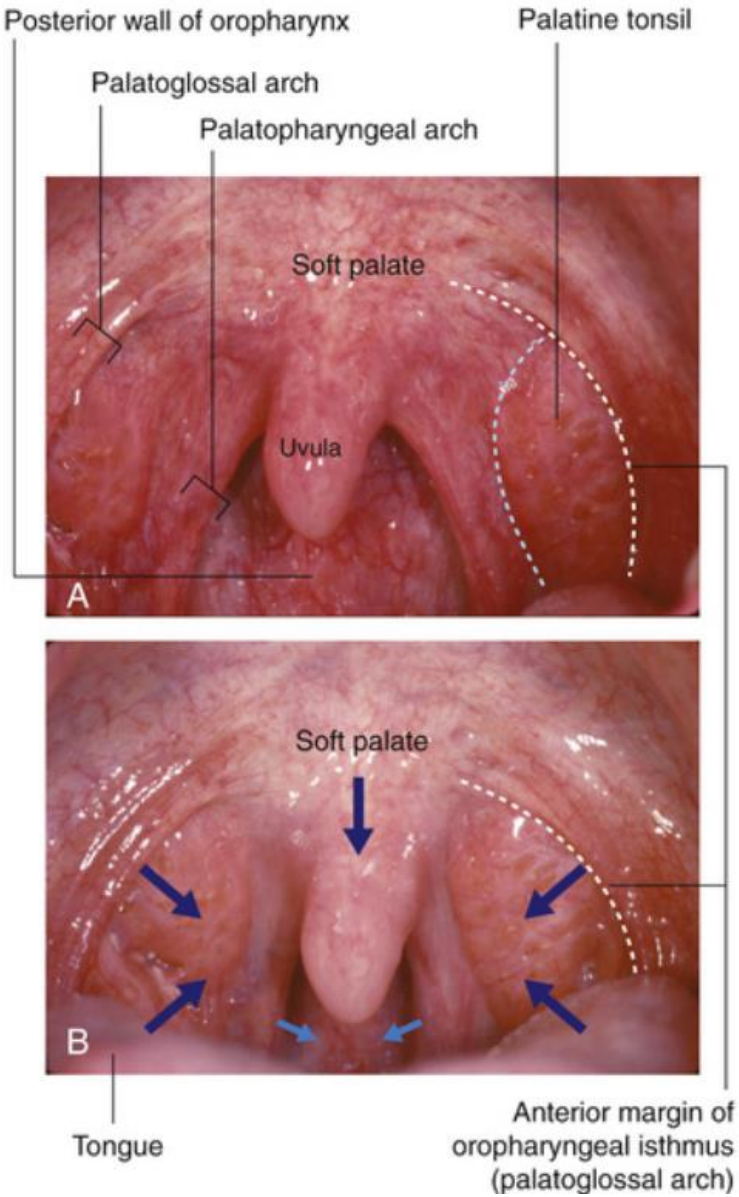


Open mouth with soft palate.
A. Oropharyngeal isthmus opened. B. Oropharyngeal isthmus closed.

The two palatopharyngeus muscles, one on each side, underlie the palatopharyngeal arches on the oropharyngeal wall.

The palatopharyngeal arches lie posterior and medial to the palatoglossal arches when viewed anteriorly through the oral cavity

On each side, the palatine tonsil is between the palatopharyngeal and palatoglossal arches on the lateral oropharyngeal wall.



Palatoglossus

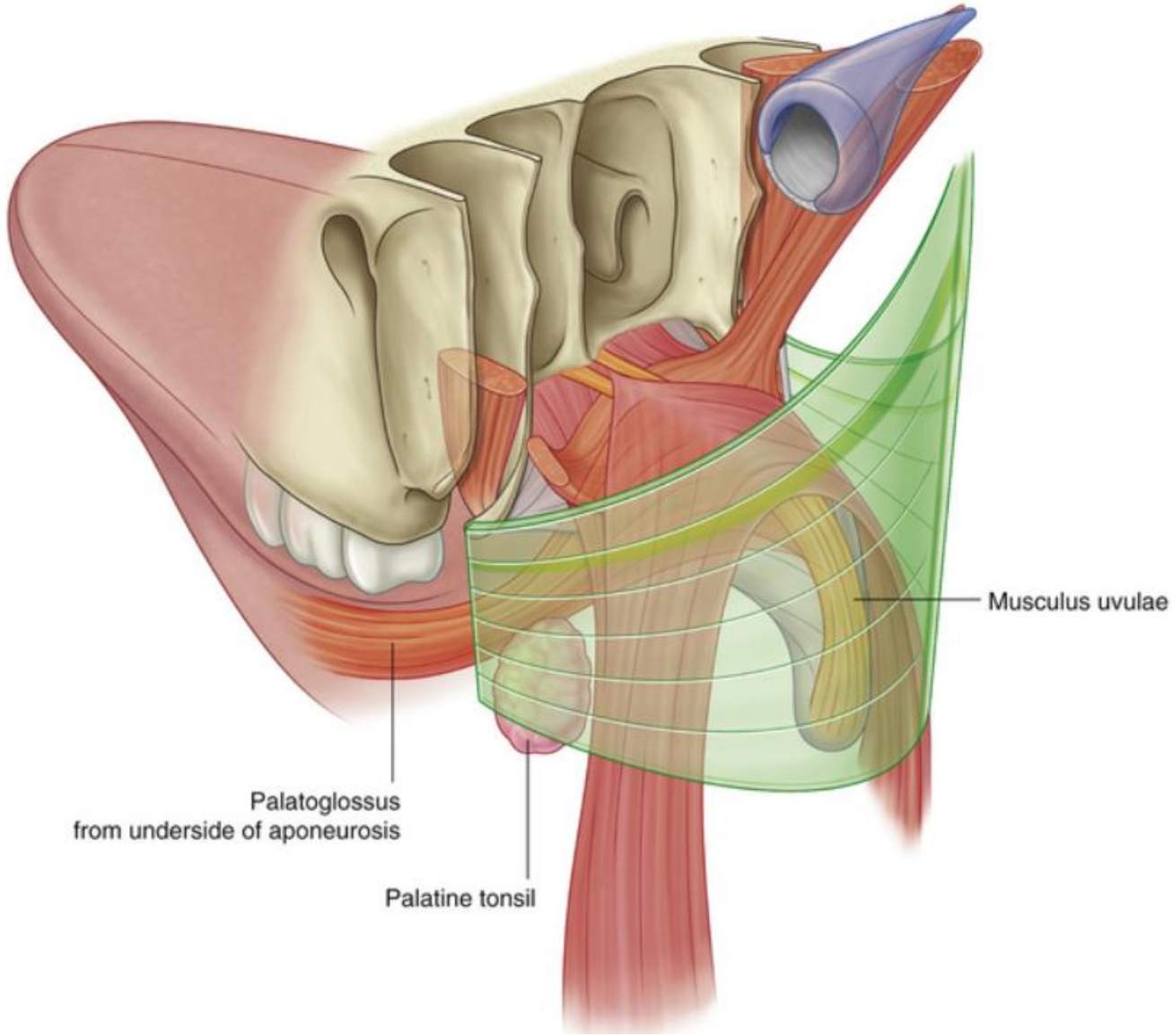
The palatoglossus muscle attaches to the inferior (oral) surface of the palatine aponeurosis and passes inferiorly and anteriorly into the lateral surface of the tongue

The palatoglossus muscle underlies a fold of mucosa that arches from the soft palate to the tongue. These palatoglossal arches, one on each side, are lateral and anterior to the palatopharyngeal arches and define the lateral margins of the oropharyngeal isthmus.

The palatine tonsil is between the palatoglossal and palatopharyngeal arches on the lateral oropharyngeal wall.

The palatoglossus muscles depress the palate, move the palatoglossal arches toward the midline like curtains, and elevate the back of the tongue. These actions help close the oropharyngeal isthmus.

The palatoglossus is innervated by the vagus nerve [X] through the pharyngeal branch to the pharyngeal plexus.

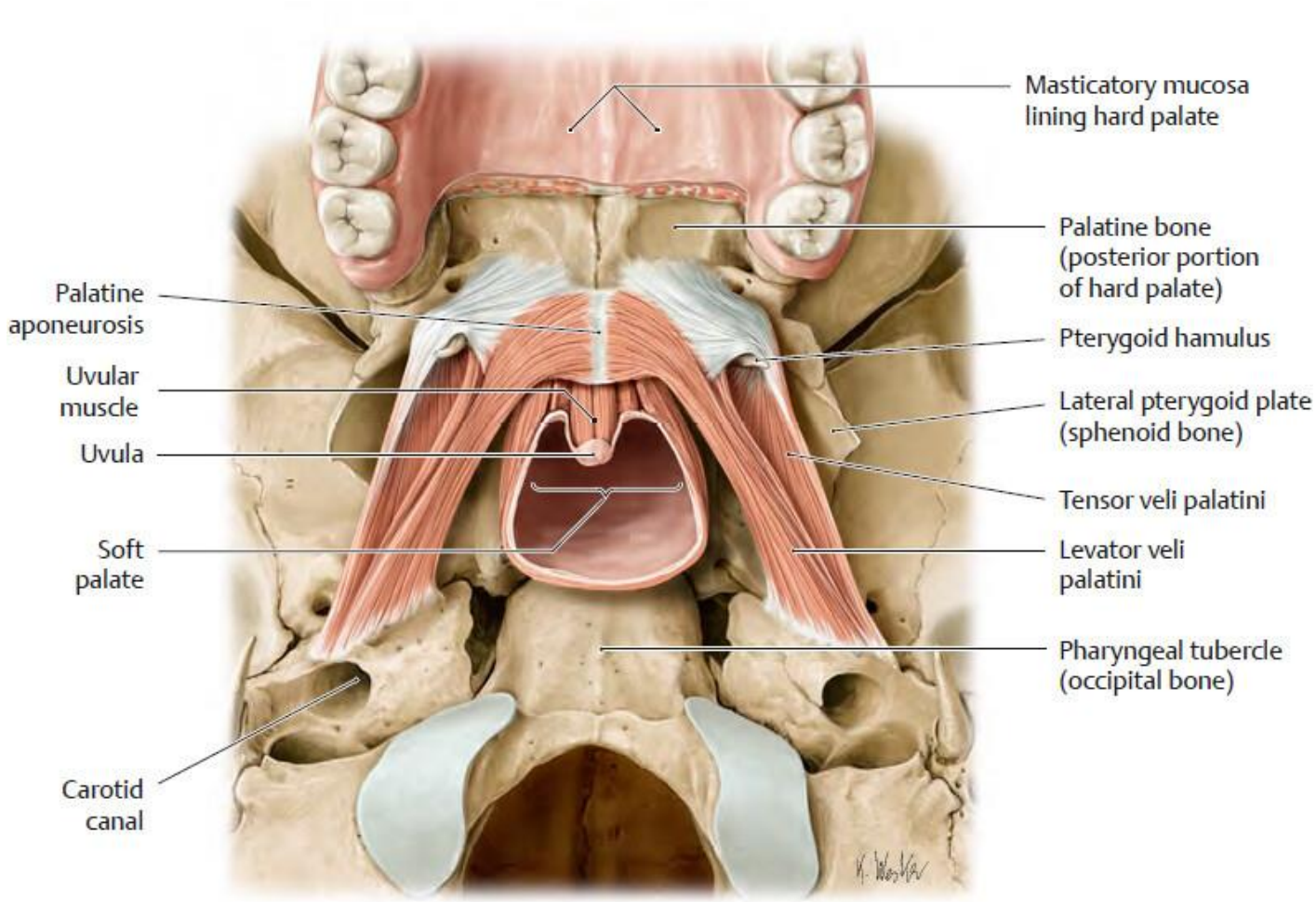


Musculus uvulae

The musculus uvulae originates from the posterior nasal spine on the posterior margin of the hard palate and passes directly posteriorly over the dorsal aspect of the palatine aponeurosis to insert into connective tissue underlying the mucosa of the uvula. It passes between the two lamellae of the palatopharyngeus superior to the attachment of the levator veli palatini. Along the midline, the musculus uvulae blends with its partner on the other side.

The musculus uvulae elevates and retracts the uvula. This action thickens the central part of the soft palate and helps the levator veli palatini muscles close the pharyngeal isthmus between the nasopharynx and oropharynx.

The musculus uvulae is innervated by the vagus nerve [X] through the pharyngeal branch to the pharyngeal plexus.



Artery blood supply

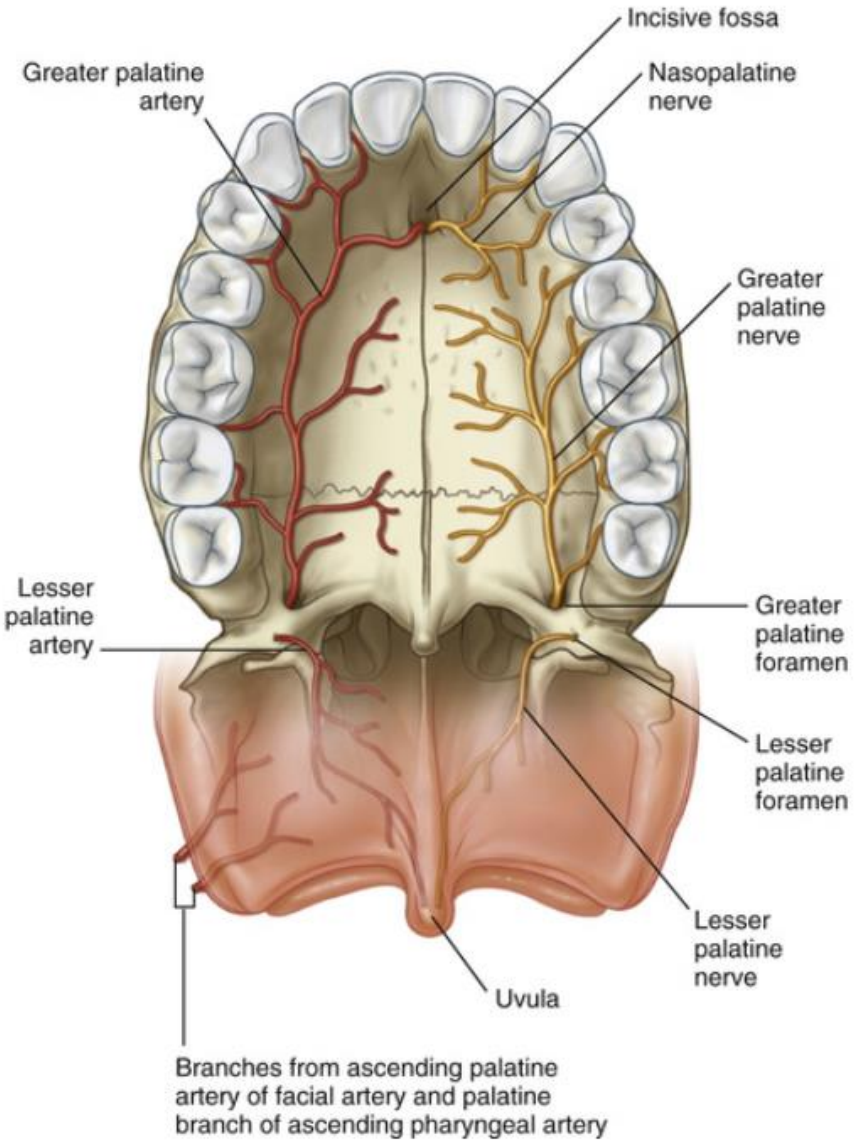
Arteries of the palate include :

.The descending palatine artery branch of maxillary artery which then gives off the greater and lesser palatine arteries for hard and soft palate respectively.

.The ascending palatine artery a branch of the facial artery

.The palatine branch of the ascending pharyngeal artery.

The maxillary, facial, and ascending pharyngeal arteries are all branches that arise in the neck from the external carotid artery.



Artery blood supply

The ascending palatine artery of the facial artery ascends along the external surface of the pharynx. The palatine branch loops medially over the top of the superior constrictor muscle of the pharynx to penetrate the pharyngeal fascia with the levator veli palatini muscle and follow the levator veli palatini to the soft palate.

The palatine branch of the ascending pharyngeal artery follows the same course as the palatine branch of the ascending palatine artery from the facial artery and may replace the vessel.

The descending palatine artery originates from the maxillary artery in the pterygopalatine fossa. It descends into the palatine canal where it gives origin to a small lesser palatine branch, and then continues through the greater palatine foramen onto the inferior surface of the hard palate. The greater palatine artery passes forward on the hard palate and then leaves the palate superiorly through the incisive canal to enter the medial wall of the nasal cavity where it terminates. The greater palatine artery is the major artery of the hard palate. It also supplies palatal gingiva.

The lesser palatine branch passes through the lesser palatine foramen just posterior to the greater palatine foramen, and contributes to the vascular supply of the soft palate.

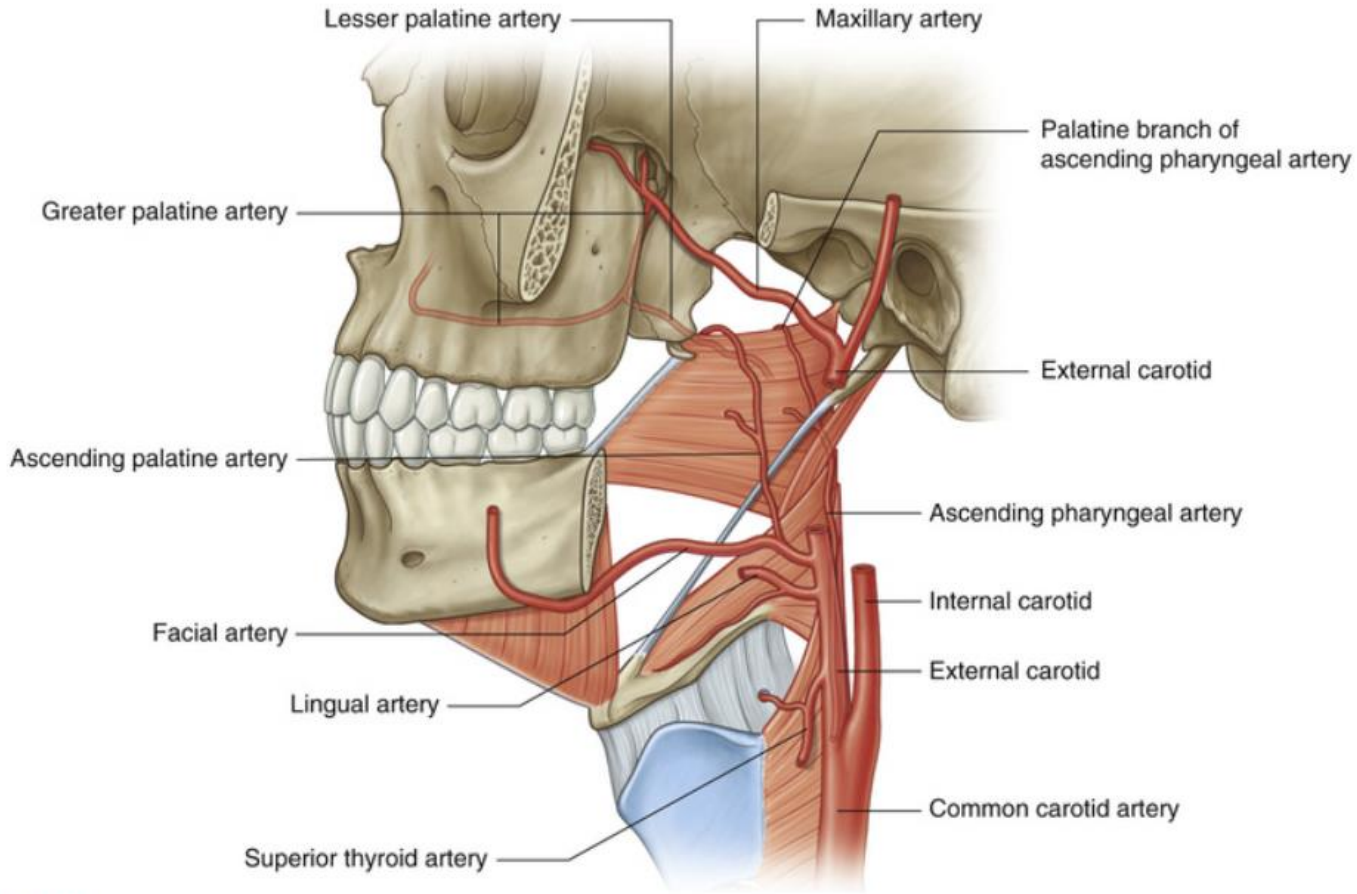


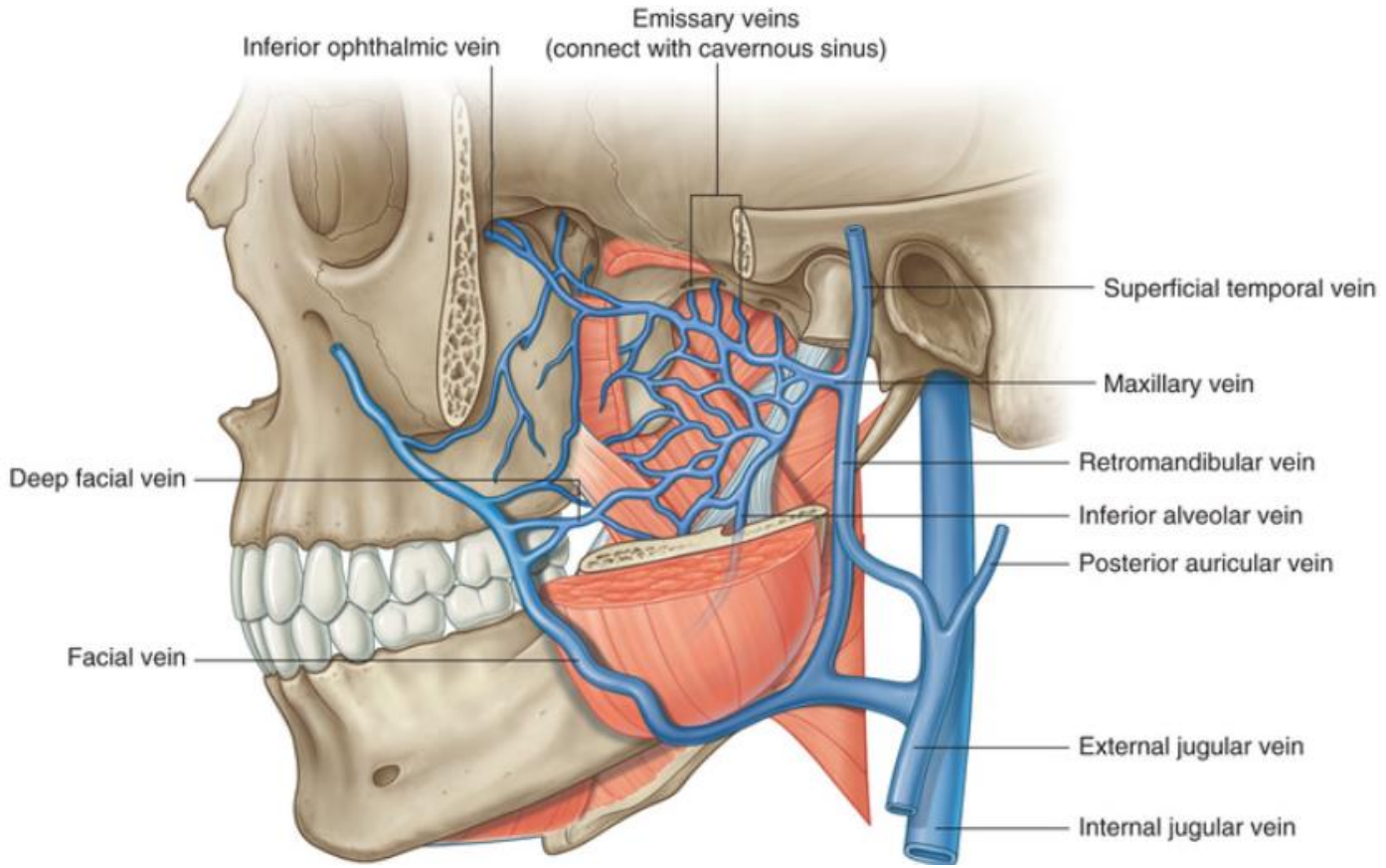
FIG. 8.273 Arteries of the palate.

Venous drainage of palate

Veins from the palate generally follow the arteries (greater and lesser palatine vv.) and ultimately drain into the pterygoid plexus of veins in the infratemporal fossa,

or into a network of veins associated with the palatine tonsil, which drain into the pharyngeal plexus of veins

or directly into the facial vein.



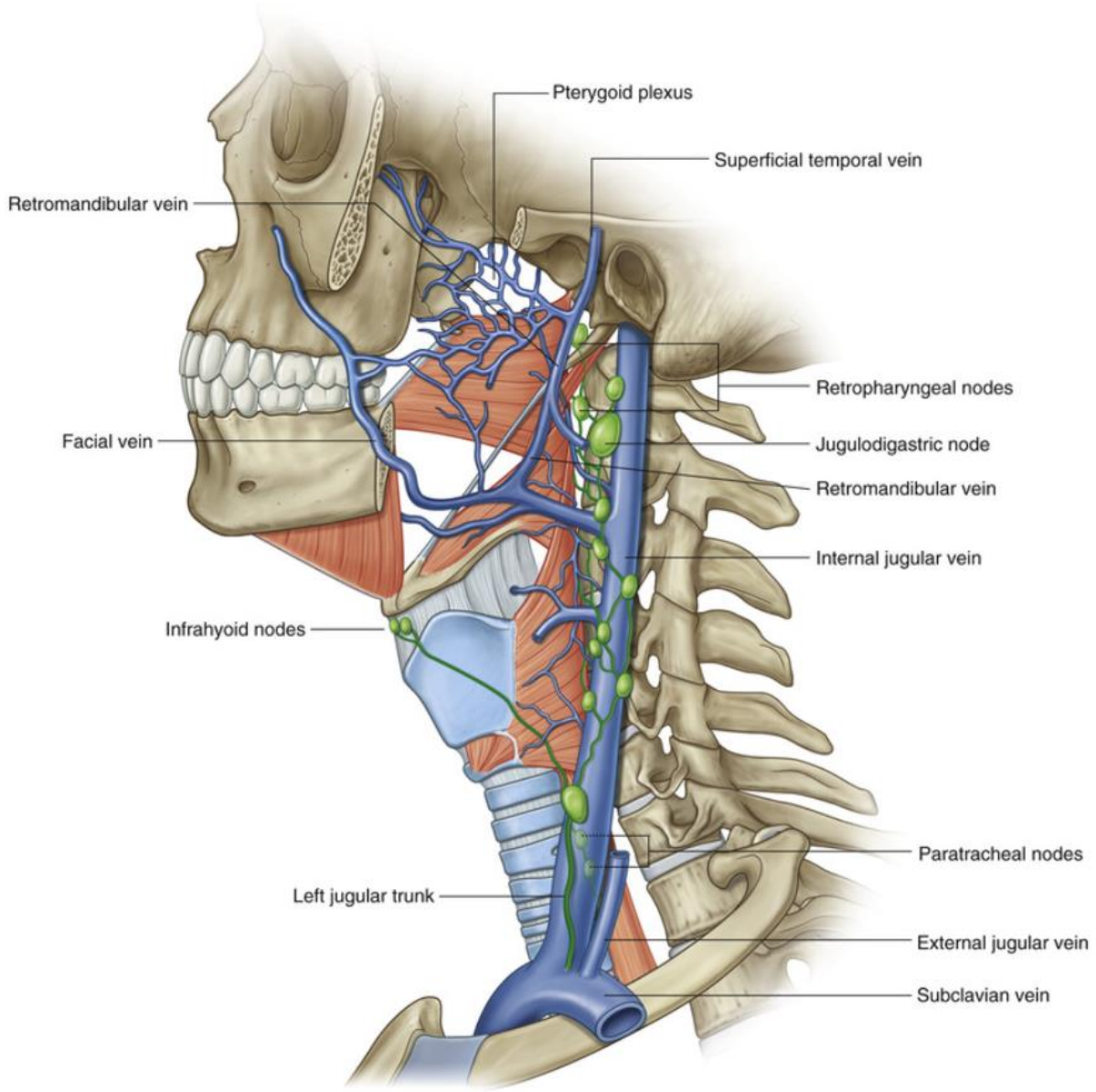
Lymphatic drainage

Lymphatic vessels from the palate drain into

.submandibular nodes,

.retropharyngeal nodes and

.deep cervical nodes



The palate is supplied by the greater and lesser palatine nerves and the nasopalatine nerve

General sensory fibers carried in all these nerves originate in the pterygopalatine fossa from the maxillary nerve [V2].

Parasympathetic (to glands) and SA (taste on soft palate) fibers from a branch of the facial nerve [VII] join the nerves in the pterygopalatine fossa, as do the sympathetics (mainly to blood vessels) ultimately derived from the T1 spinal cord level.

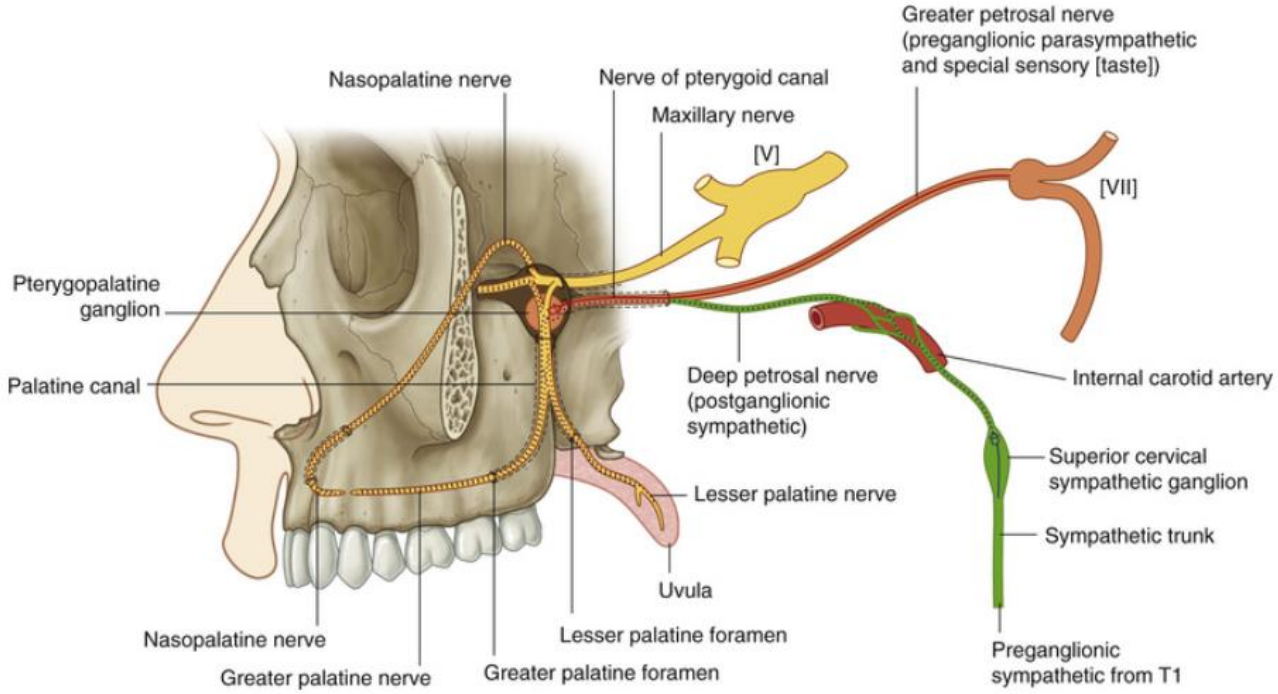
The greater and lesser palatine nerves descend through the pterygopalatine fossa and palatine canal to reach the palate:

- The greater palatine nerve travels through the greater palatine foramen and turns anteriorly to supply the hard palate and gingiva as far as the first premolar.

- The lesser palatine nerve passes posteromedially to supply the soft palate.

The nasopalatine nerve also originates in the pterygopalatine fossa, but passes medially into the nasal cavity. It continues medially over the roof of the nasal cavity to reach the medial wall, then anteriorly and obliquely down the wall to reach the incisive canal in the anterior floor, and descends through the incisive canal and fossa to reach the inferior surface of the hard palate.

The nasopalatine nerve supplies gingiva and mucosa adjacent to the incisors and canine.



8.276 Innervation of the palate.

Salivary glands

Omid Moztarzadeh

Saliva

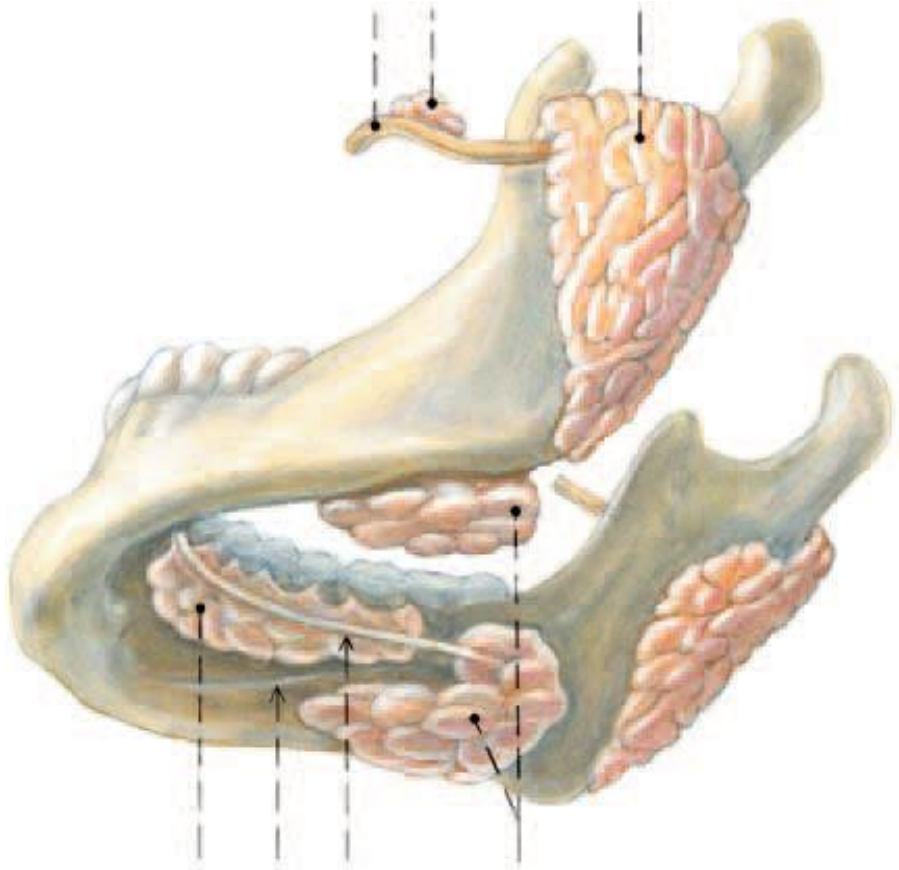
The saliva keeps the oral mucosa moist. It also has digestive and protective functions: saliva contains the starch splitting enzyme **amylase** and the bactericidal enzyme **lysozyme**. Salivary glands can be classified as **serous, mucous or seromucous (mixed)**.

- **Serous (watery):** the main type of protein secreted is **alpha-amylase (ptyalin)** - breaks down starch into maltose and glucose
- **Mucous:** the main protein secreted is **mucin**, which acts as a **lubricant**
- **Mixed (seromucous):** Most of the salivary glands are mixed.

The secretion of saliva (salivation) is mediated by **parasympathetic stimulation**; acetylcholine is the active neurotransmitter and binds to muscarinic receptors in the glands, leading to **increased salivation**. Sympathetic stimulation leading to decreased salivation.

Major salivary glands

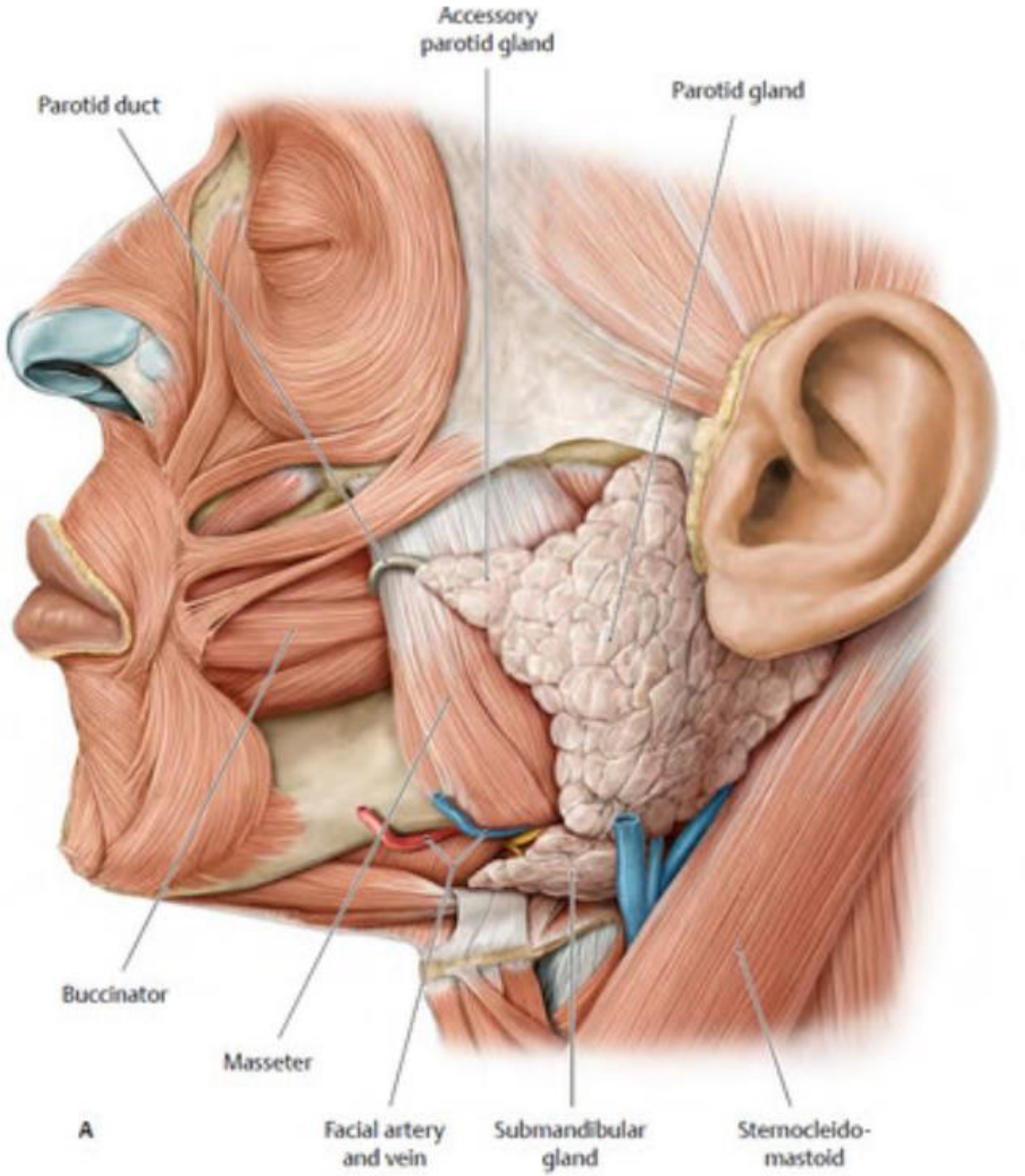
- There are three **major** (large, paired) salivary glands: **parotid, submandibular, and sublingual**. They are enclosed by fibrous capsule. They collectively produce 0.5 to 2.0 liters of saliva per day, excreted into the oral cavity via excretory ducts.



Parotid gland

Is the largest of the salivary glands; is almost wedge shaped and the **facial nerve splits the parotid gland into superficial and deep lobes**, which are connected by an isthmus; the **parotid duct (Stensen's duct)** arises from the deep lobe and crosses the face superficial to the masseter, pierces the buccinators, and opens into the oral vestibule opposite the second upper molar. It is a **purely serous** gland (watery secretions).

They produce 20% of the total salivary content in the oral cavity.



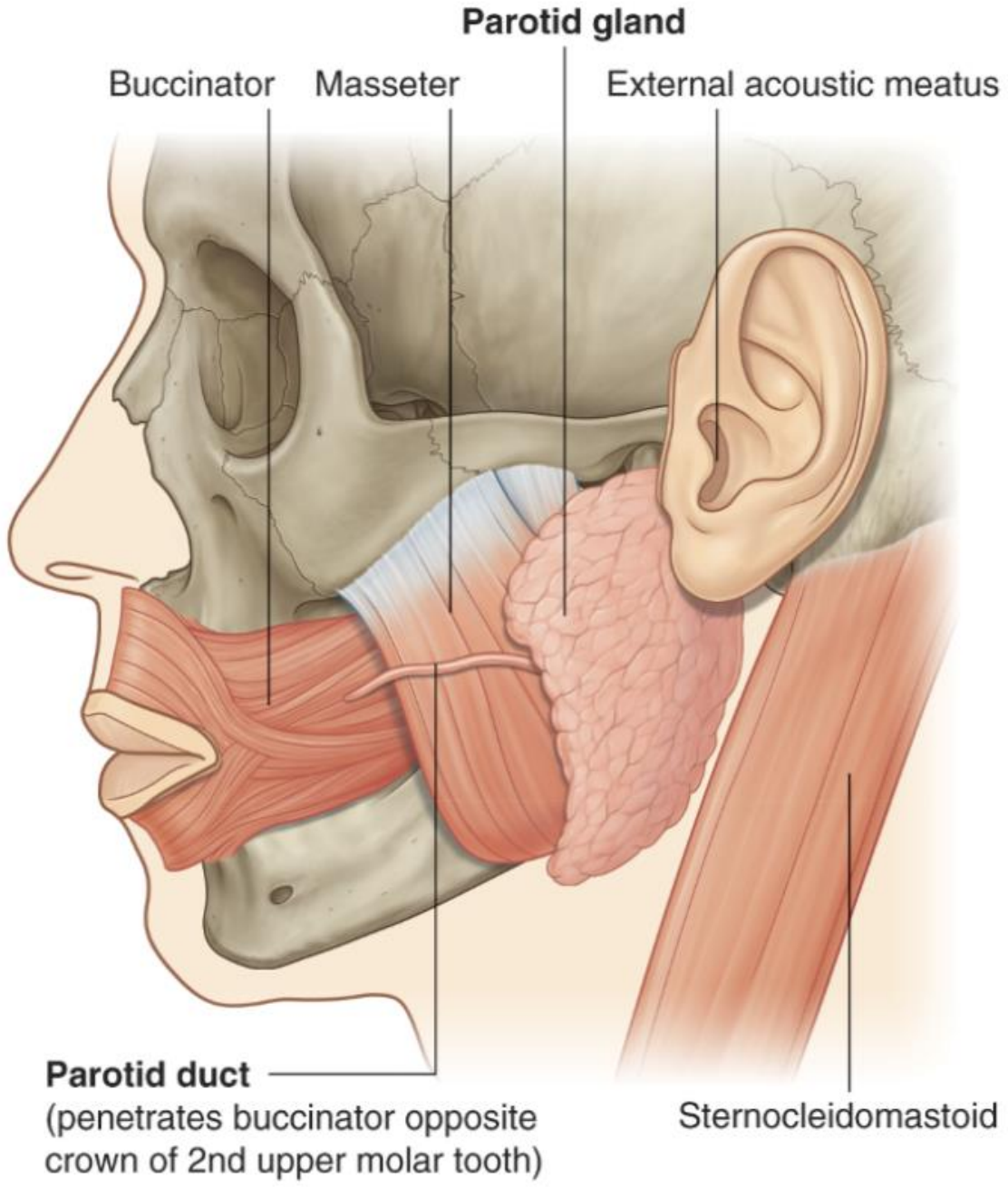
Parotid gland

Is located anterior to and below the lower half of the ear, superficial, posterior, and deep to the ramus of the mandible. They extend down to the lower border of the mandible and up to the zygomatic arch. Posteriorly they cover the anterior part of the sternocleidomastoid muscle and continue anteriorly to halfway across the masseter muscle. The gland normally extends anteriorly over the masseter muscle, and inferiorly over the posterior belly of the digastric muscle

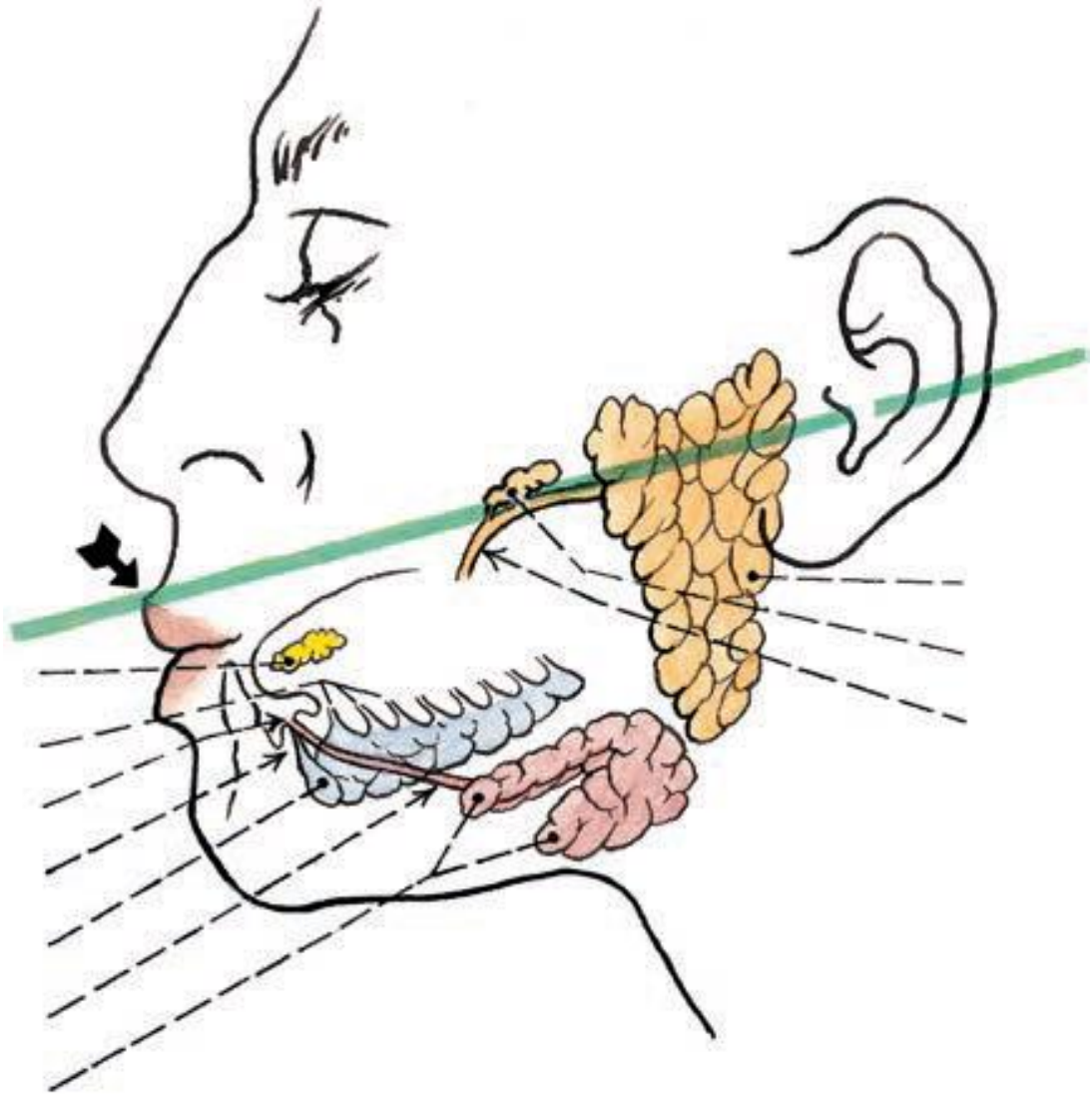
Parotid gland enclosed within the **split investing layer of deep cervical fascia.**

The **parotid duct** leaves the anterior edge of the parotid gland midway between the zygomatic arch and the corner of the mouth. It crosses the face in a transverse direction and, after crossing the medial border of the masseter muscle, turns deeply into the buccal fat pad and pierces the buccinator muscle. It opens into the oral vestibule opposit to the second upper molar tooth.

produces a watery saliva and salivary **amylase**, which are necessary for food bolus formation, oral digestion, and smooth passage of the bolus into the upper gastrointestinal tract.



Accessory parotid gland



Parotideomasseteric fascia

- Covers **masseter m. and parotid gland.**
- It extends to the deep part of the parotid gland as a septum and firmly adhers to the surface of the masseter m., **dorsally it turns medially to the deep region behind the ramus of the mandible and extends to the internal surface of the medial pterygoid m.**
- It extends above from the **zygomatic arch down to the margin of the mandible** and continues to the neck as an **investment cervical fascia** and dorsally continue as a **fascia of the styloid septum**.
- At the mandibular angle it runs obliquely and it become very thick called **angular tract** which separates parotideomasseteric region from the **submandibular region**.

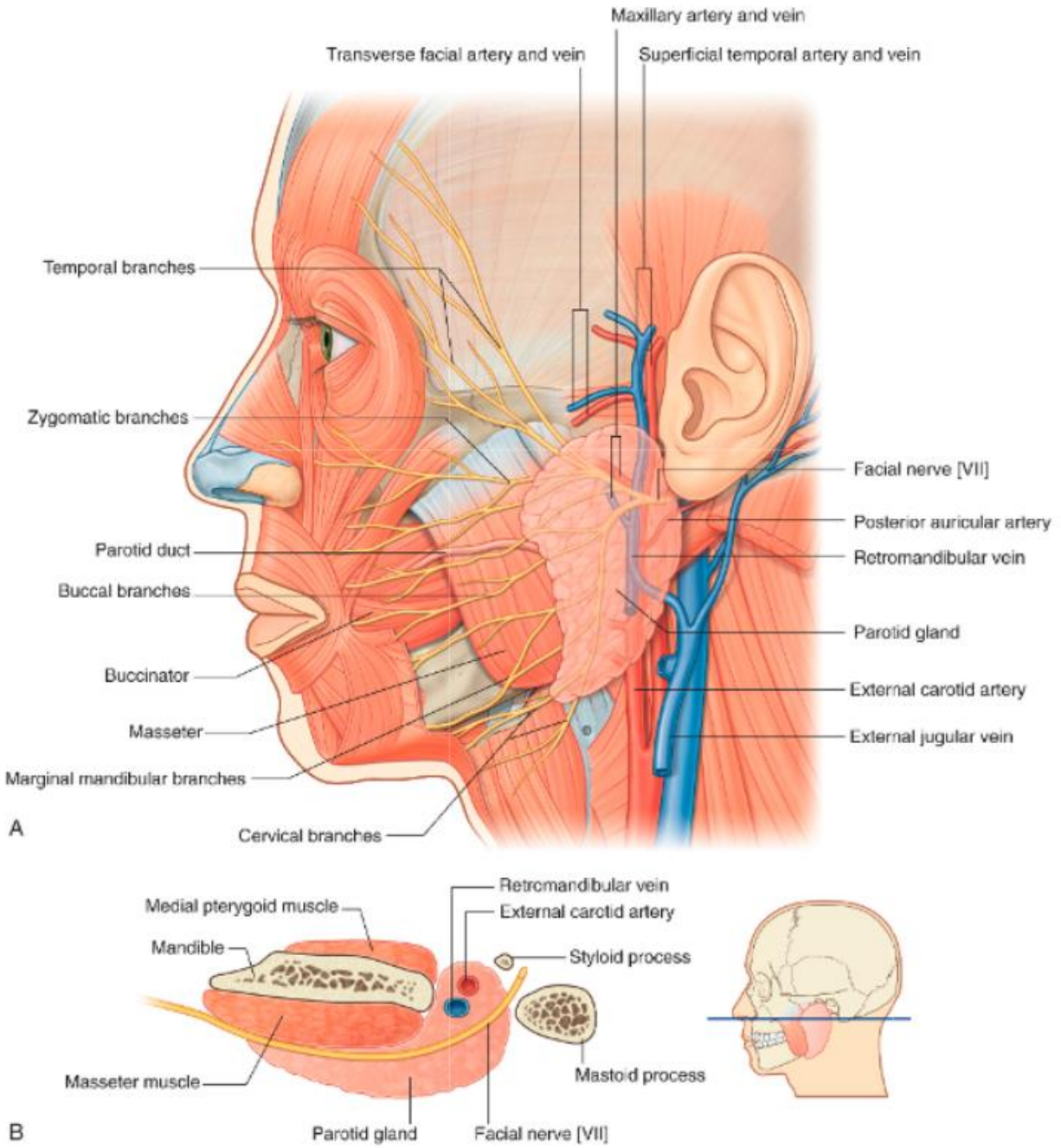
Important relationships

Several major structures enter and pass through or pass just deep to the parotid gland. These include the **facial nerve [VII], the external carotid artery and its branches, and the retromandibular vein and its tributaries.**

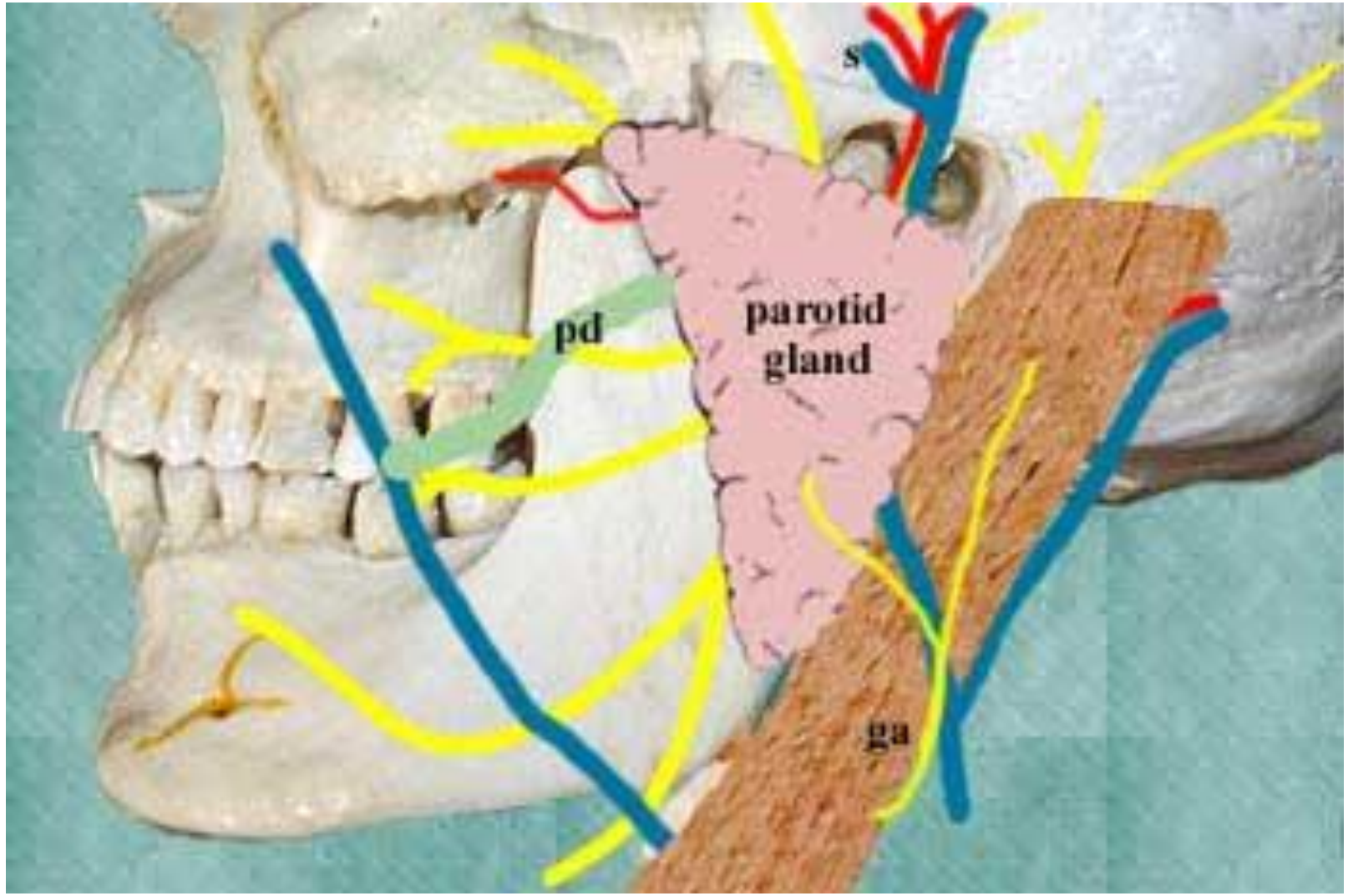
Five terminal groups of branches of the facial nerve [VII]—the **temporal**, **zygomatic**, **buccal**, **marginal mandibular**, and **cervical branches**—emerge from the upper, anterior, and lower borders of the parotid gland.

The external carotid artery gives off the **posterior auricular artery** before dividing into its two terminal branches (the **maxillary** and **superficial temporal arteries** - giving off the **transverse facial artery**) near the lower border of the ear.

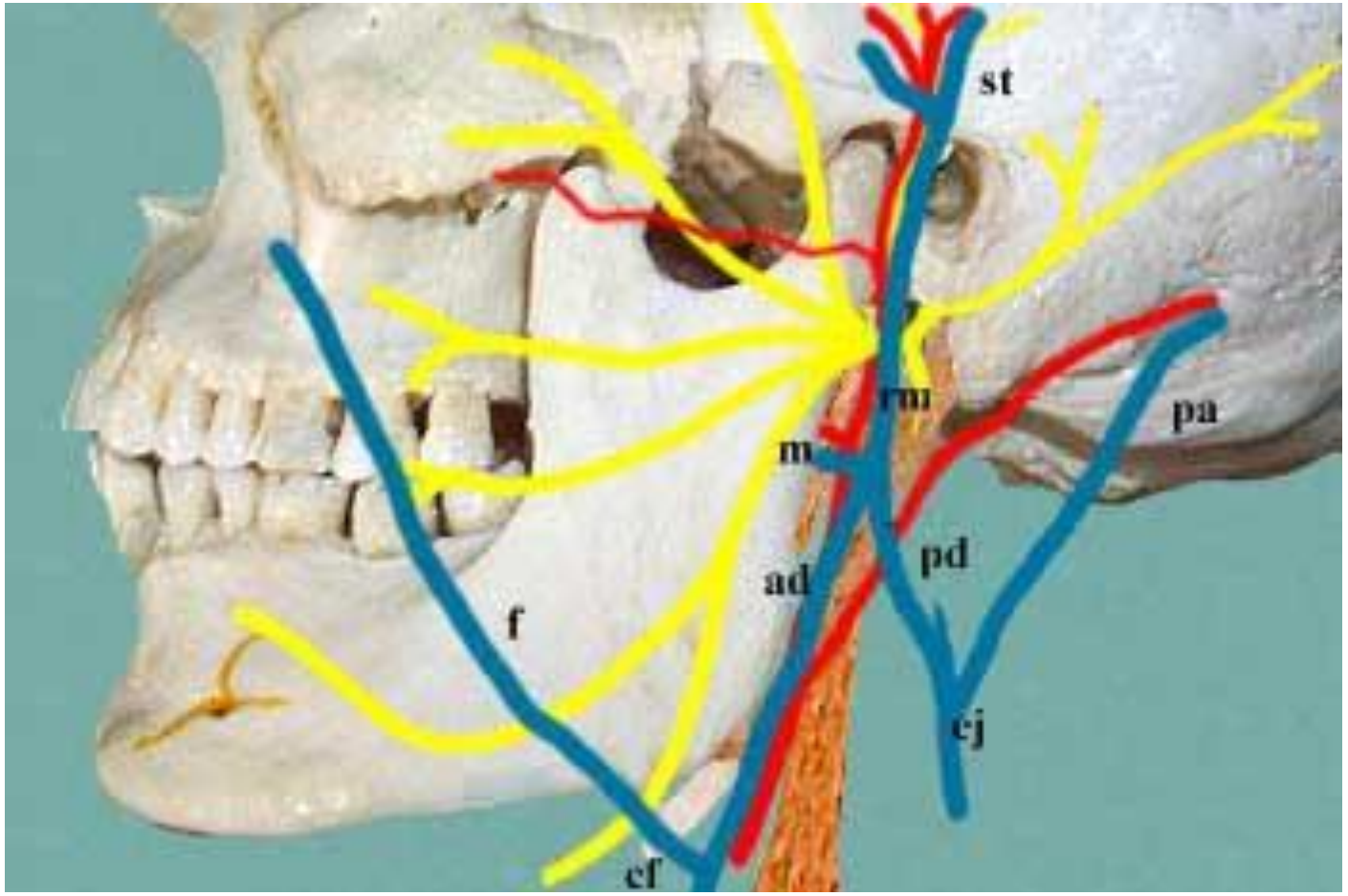
The retromandibular vein is formed in the substance of the parotid gland when the **superficial temporal** and **maxillary veins** join together, and passes inferiorly in the substance of the parotid gland. It usually divides into anterior and posterior branches just below the inferior border of the gland.

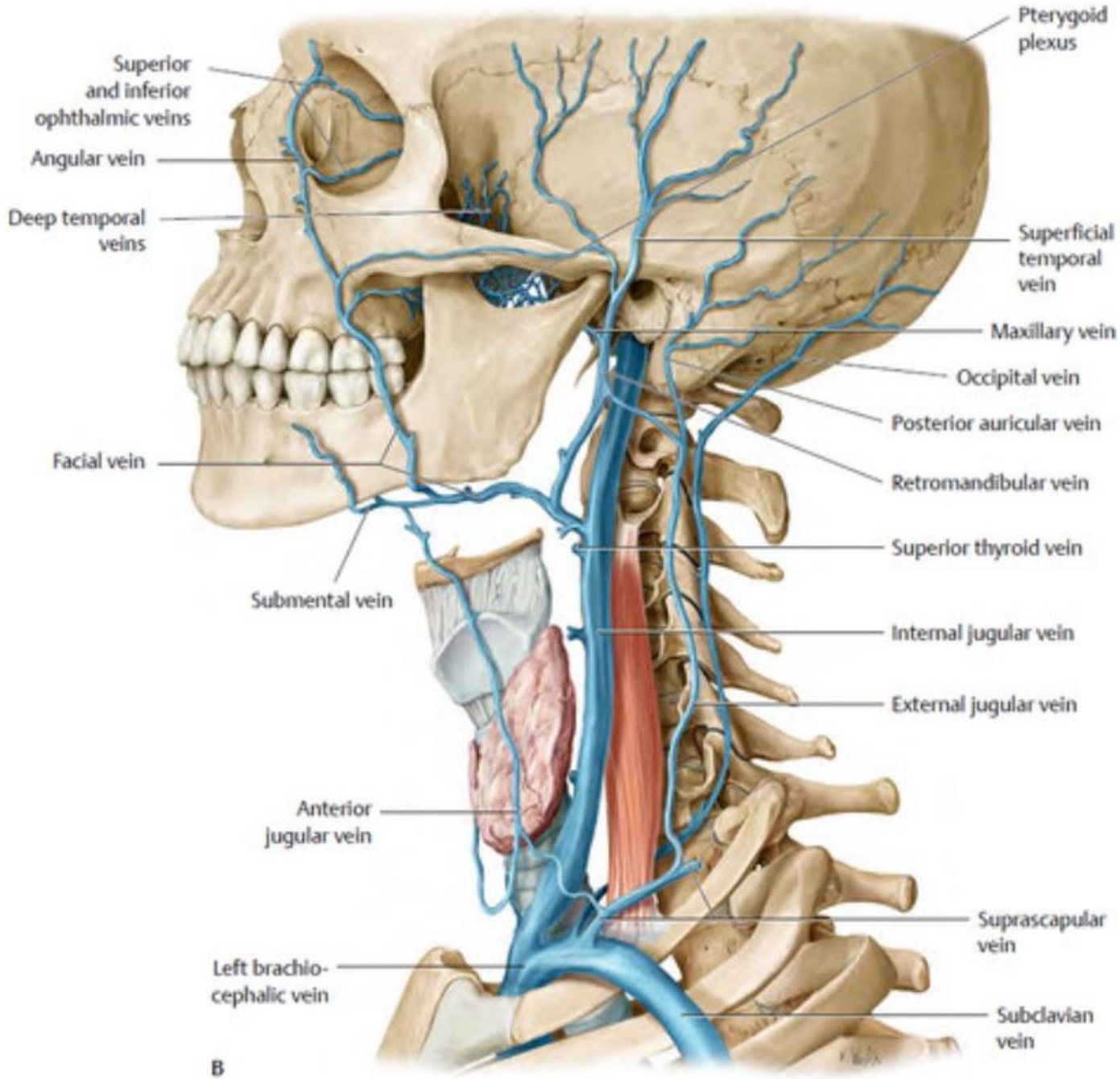


The parotid gland is a superficial structure located in the upper neck above the posterior belly of the digastric muscle. Fatty tissue in the gland gives it flexibility to the motion of the mandible. It is a salivary gland that has a large duct (pd) which crosses the masseter muscle parallel and about fingers breadth inf. to the zygomatic arch to pierce the buccinator muscle opposite the upper 2nd molar tooth. The duct can frequently be rolled between the finger and the masseter muscle. The skin overlying the lower pole of the gland is supplied by the greater auricular nerve (ga), a branch of the cervical plexus and upper pole by auriculotemporal n. You have already identified the branches of the facial nerve appearing at the upper and anterior edges of the gland (yellow).

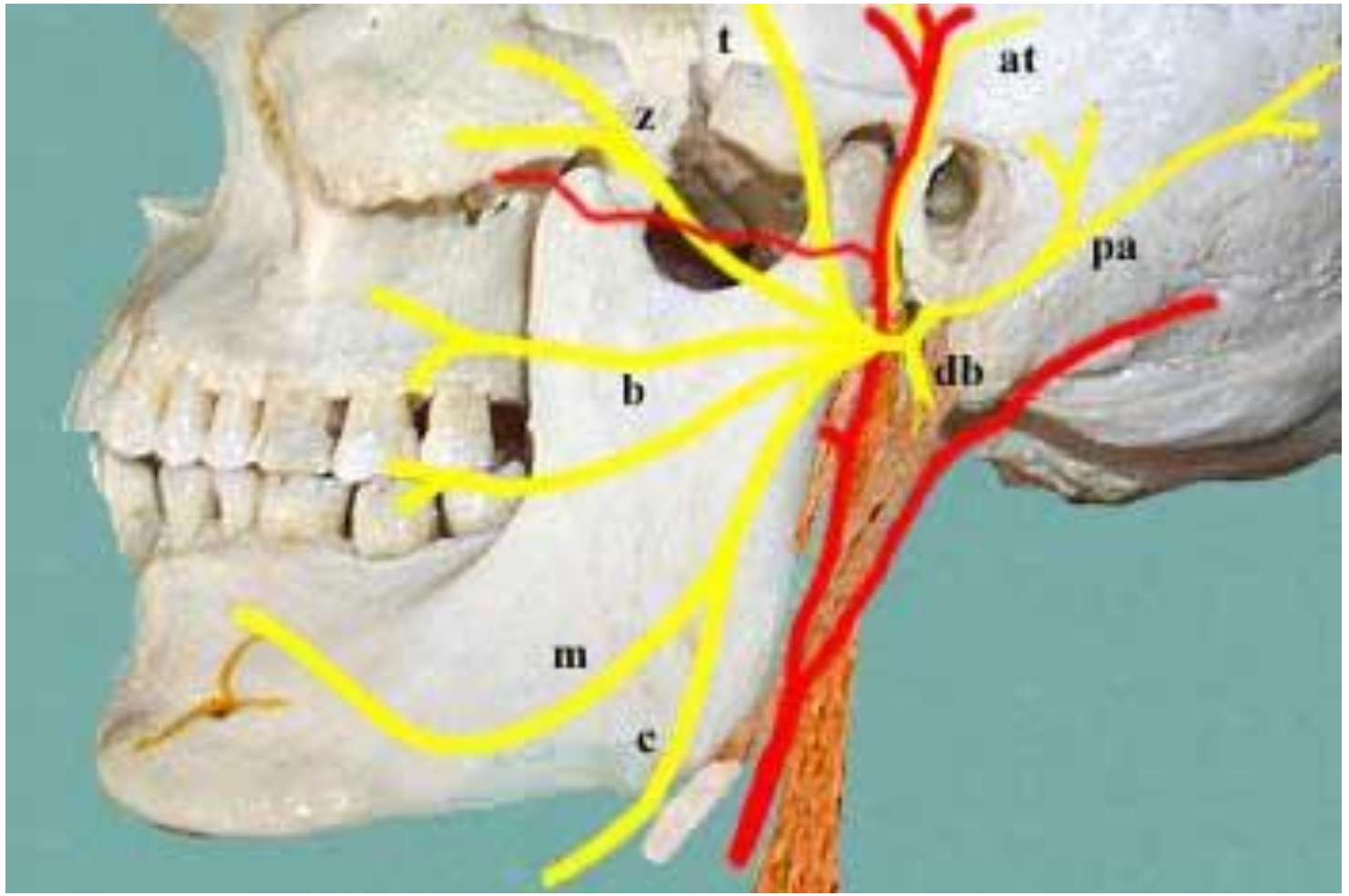


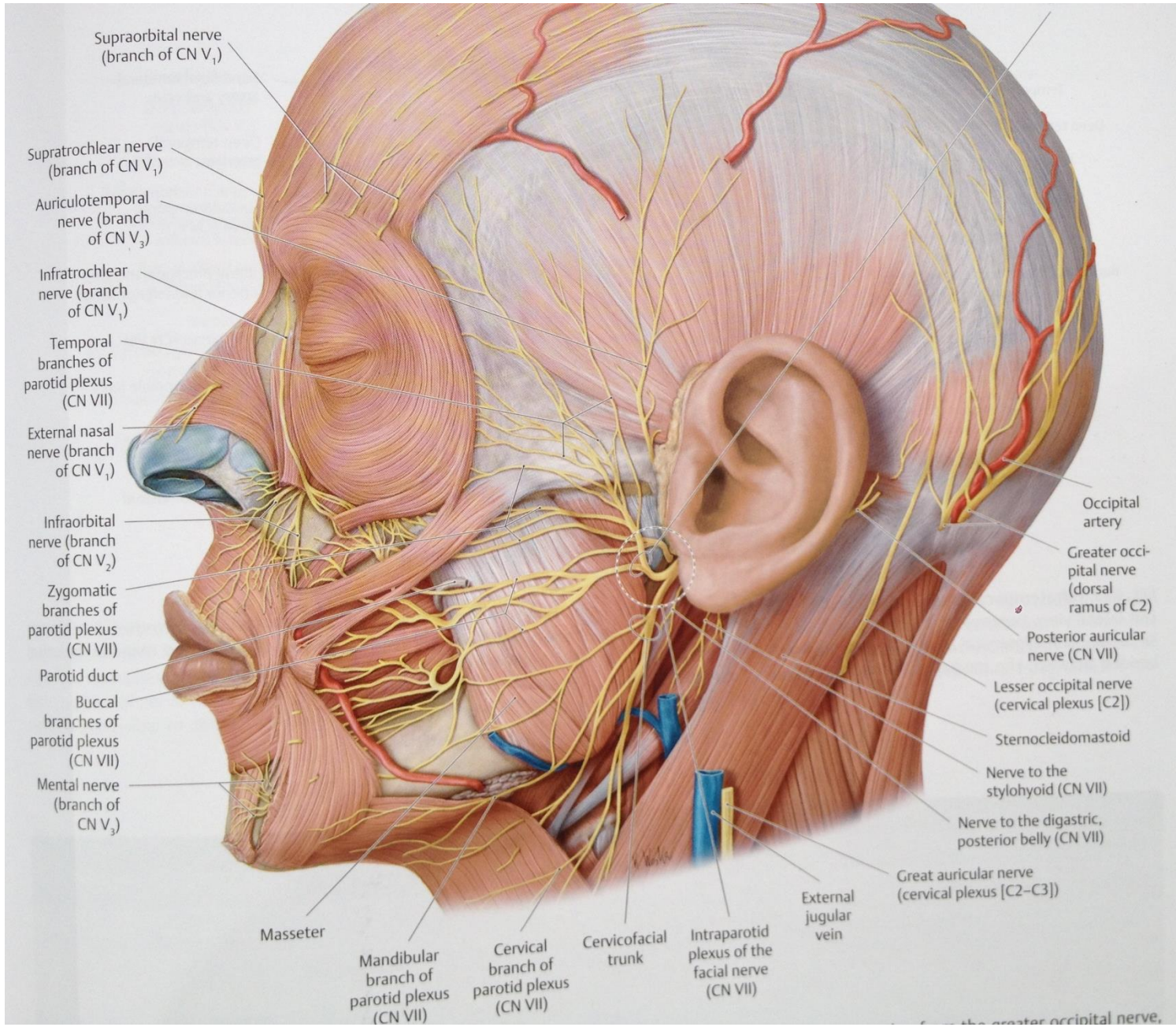
If the parotid gland is carefully removed, you can identify the structures located within it. The first plane is the venous plane and consists of the retromandibular vein (rm) and its tributaries and branches:
st--superficial temporal
rm--retromandibular vein
m--maxillary vein
ad--anterior division
f--facial
cf--common facial
pd--posterior division
pa--posterior auricular
ej--external jugular
The common facial vein empties into the internal jugular vein and the external jugular into the subclavian vein near its junction with the internal jugular vein.




Pterygoid plexus
Superior and inferior ophthalmic veins
Angular vein
Deep temporal veins
Superficial temporal vein
Maxillary vein
Occipital vein
Posterior auricular vein
Facial vein
Retromandibular vein
Superior thyroid vein
Submental vein
Internal jugular vein
External jugular vein
Anterior jugular vein
Suprascapular vein
Left brachio-cephalic vein
Subclavian vein
B

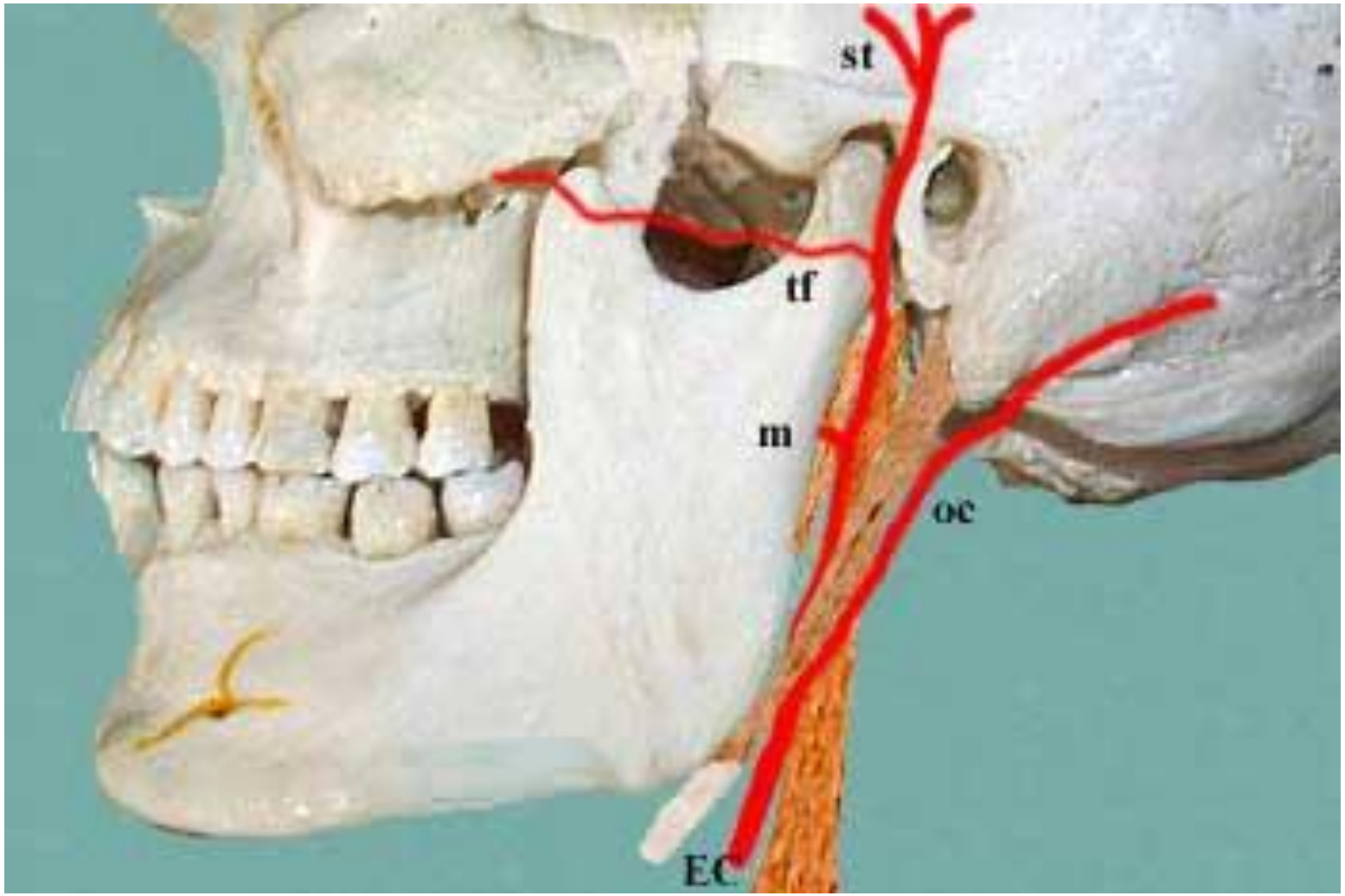
When the venous plane is removed we reach the important nervous plane. The importance of this plane is the presence of the facial (VII) nerve. The facial nerve leaves the skull through the stylomastoid foramen and immediately enters the deep part of the parotid gland where it gives off its branches:
posterior auricular (pa)
motor branch to posterior belly of digastric (db)
and stylohyoid m
temporal branch (t)
zygomatic branch (z)
buccal branches (b)
mandibular branch (m)
cervical branch (c)

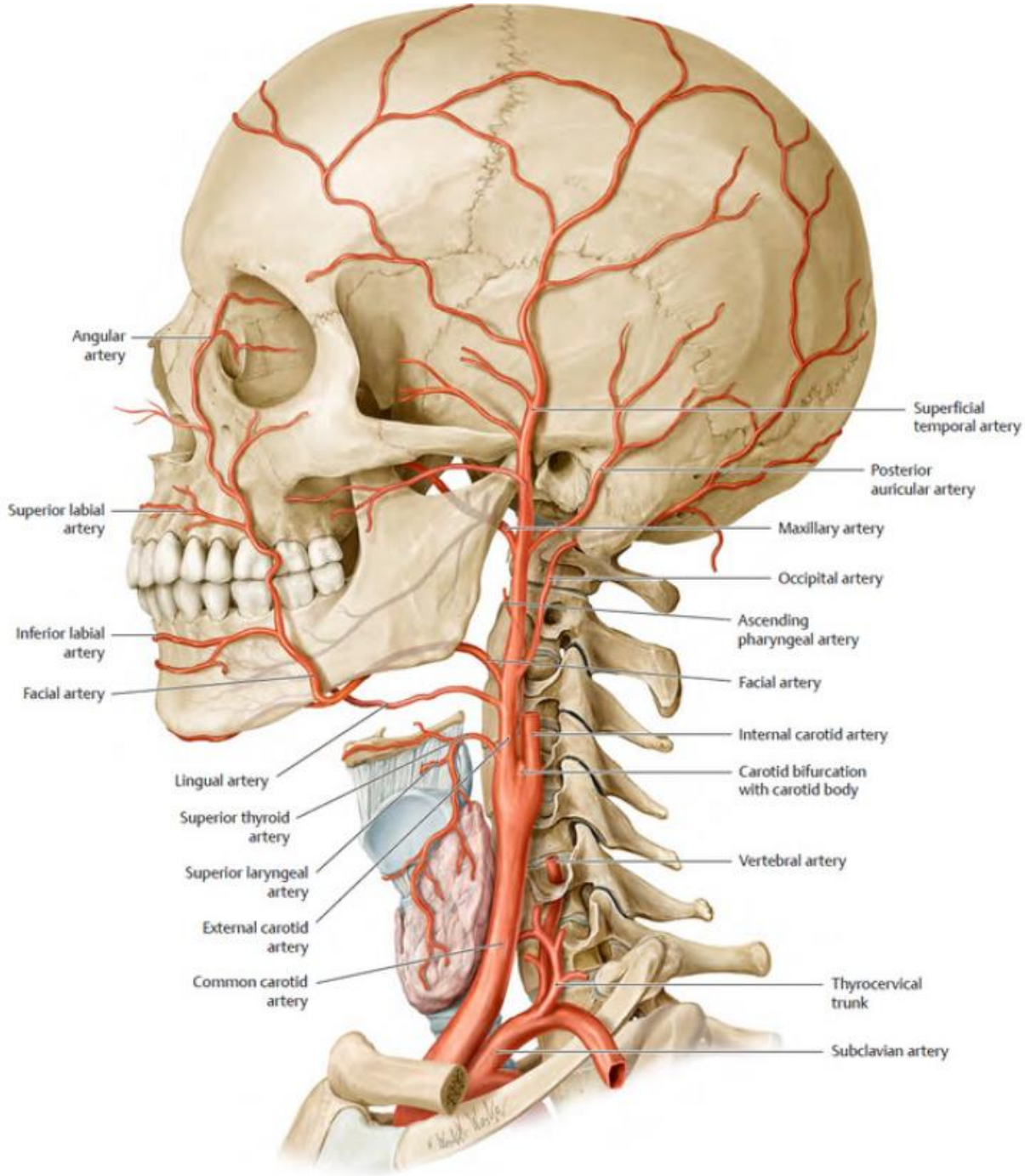


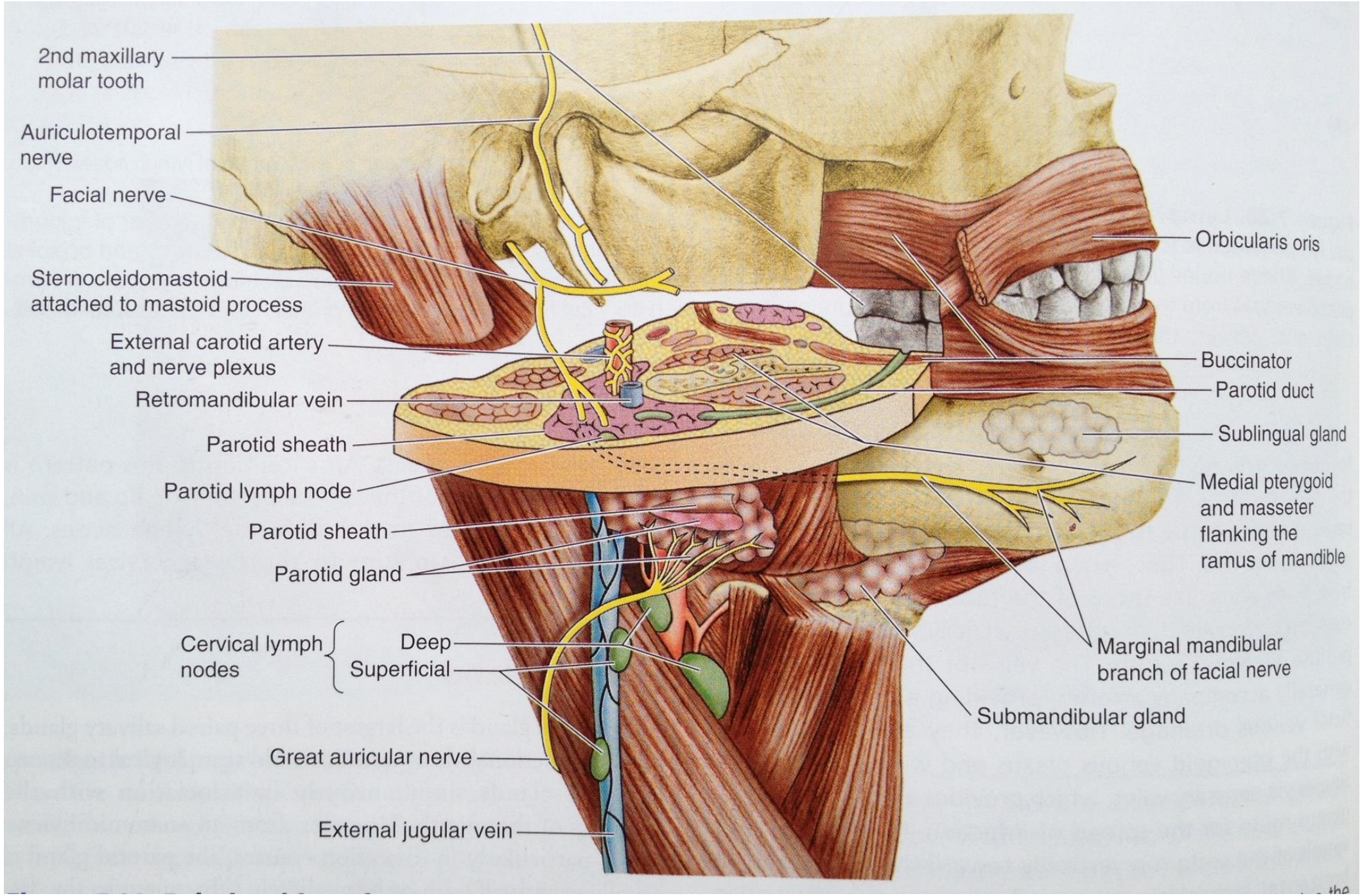

Supraorbital nerve (branch of CN V1)
Supratrochlear nerve (branch of CN V1)
Auriculotemporal nerve (branch of CN V3)
Infratrochlear nerve (branch of CN V1)
Temporal branches of parotid plexus (CN VII)
External nasal nerve (branch of CN V1)
Infraorbital nerve (branch of CN V2)
Zygomatic branches of parotid plexus (CN VII)
Parotid duct
Buccal branches of parotid plexus (CN VII)
Mental nerve (branch of CN V3)
Occipital artery
Greater occipital nerve (dorsal ramus of C2)
Posterior auricular nerve (CN VII)
Lesser occipital nerve (cervical plexus [C2])
Sternocleidomastoid
Nerve to the stylohyoid (CN VII)
Nerve to the digastric, posterior belly (CN VII)
Great auricular nerve (cervical plexus [C2–C3])
External jugular vein
Masseter
Mandibular branch of parotid plexus (CN VII)
Cervical branch of parotid plexus (CN VII)
Cervicofacial trunk
Intraparotid plexus of the facial nerve (CN VII)


Temporal
Zygomatic
Buccal
Marginal mandibular
Cervical

Deep to the nerves lies the arterial plane which includes terminal parts of the external carotid artery and its branches:
external carotid artery (EC)
post.auricular and (occipital?) aa. (oc)
maxillary artery (m)
transverse facial artery (tf)
superficial temporal artery




Angular artery
Superficial temporal artery
Posterior auricular artery
Superior labial artery
Maxillary artery
Occipital artery
Ascending pharyngeal artery
Inferior labial artery
Facial artery
Facial artery
Internal carotid artery
Lingual artery
Carotid bifurcation with carotid body
Superior thyroid artery
Vertebral artery
Superior laryngeal artery
External carotid artery
Common carotid artery
Thyrocervical trunk
Subclavian artery


2nd maxillary molar tooth
Auriculotemporal nerve
Facial nerve
Sternocleidomastoid attached to mastoid process
External carotid artery and nerve plexus
Retromandibular vein
Parotid sheath
Parotid lymph node
Parotid sheath
Parotid gland
Cervical lymph nodes
Deep
Superficial
Great auricular nerve
External jugular vein
Orbicularis oris
Buccinator
Parotid duct
Sublingual gland
Medial pterygoid and masseter flanking the ramus of mandible
Marginal mandibular branch of facial nerve
Submandibular gland

Clinical notes

The salivary glands are a potential site of tumor formation. The majority of such tumors are benign and occur in the superficial lobe of the parotid gland. These are **pleomorphic adenomas.** The tumors cells can lie outside the capsule and so treatment involves surgical excision of the superficial lobe with a margin.

Malignant tumors of the parotid gland may invade surrounding structures directly or indirectly via regional lymph nodes. They may also spread systematically through the vascular system. Malignant tumors of the parotid gland, are suspected if there is pain, rapid growth, fixation to surrounding tissues, and involvement of the facial nerve.

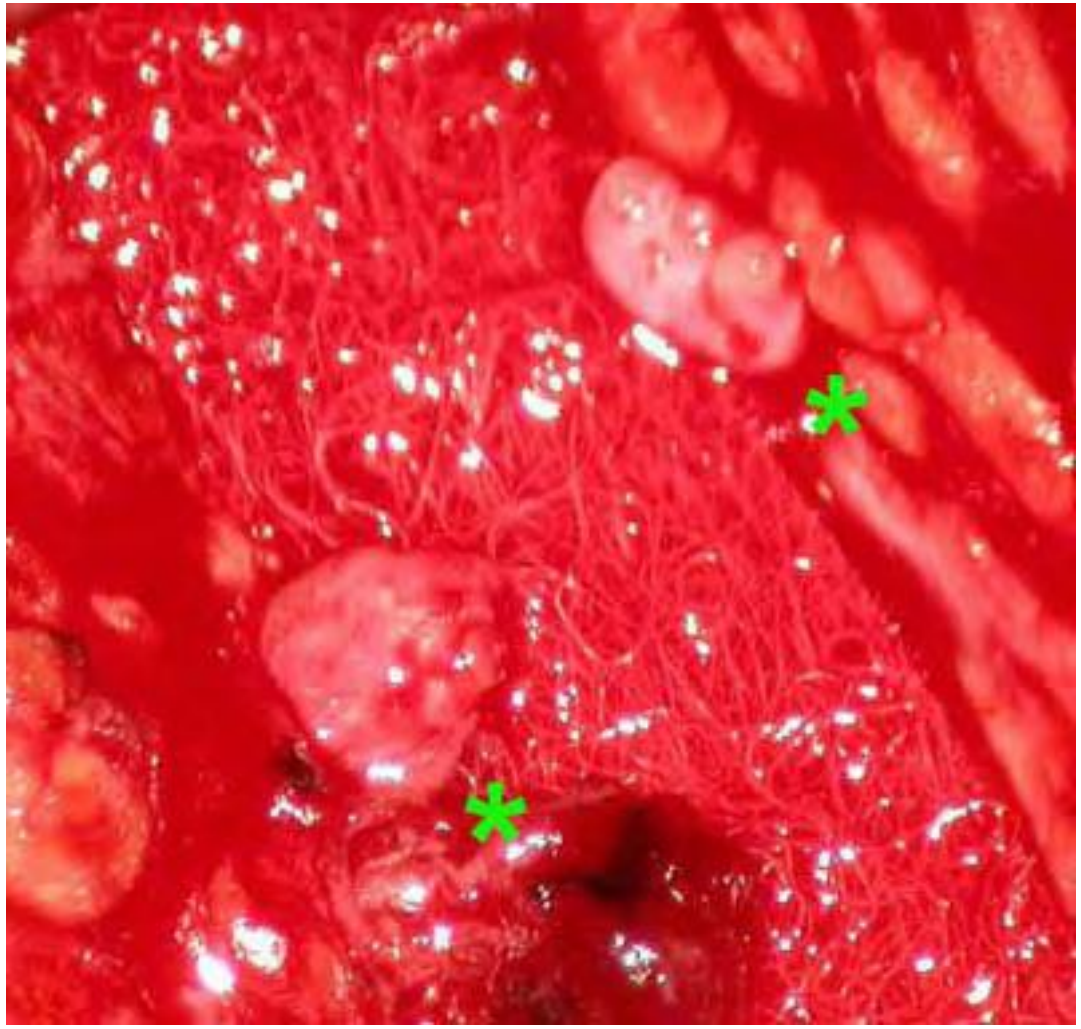
Parotid gland **stones** are not uncommon.

Mumps is a viral infection, caused by infection in the parotid gland.

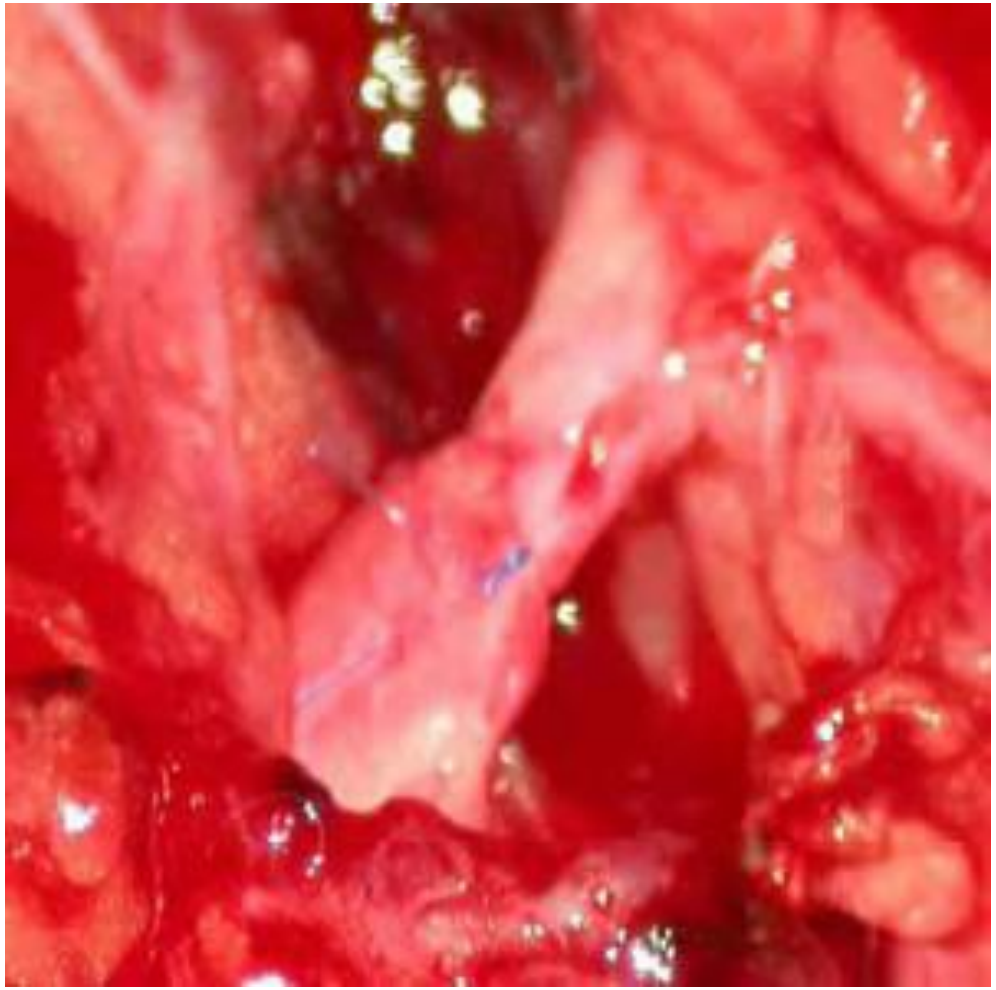
Lymph from the parotid gland drains to the superficial and deep cervical nodes.

FIG. 8.63 Tumor in parotid gland. Axial CT scan.

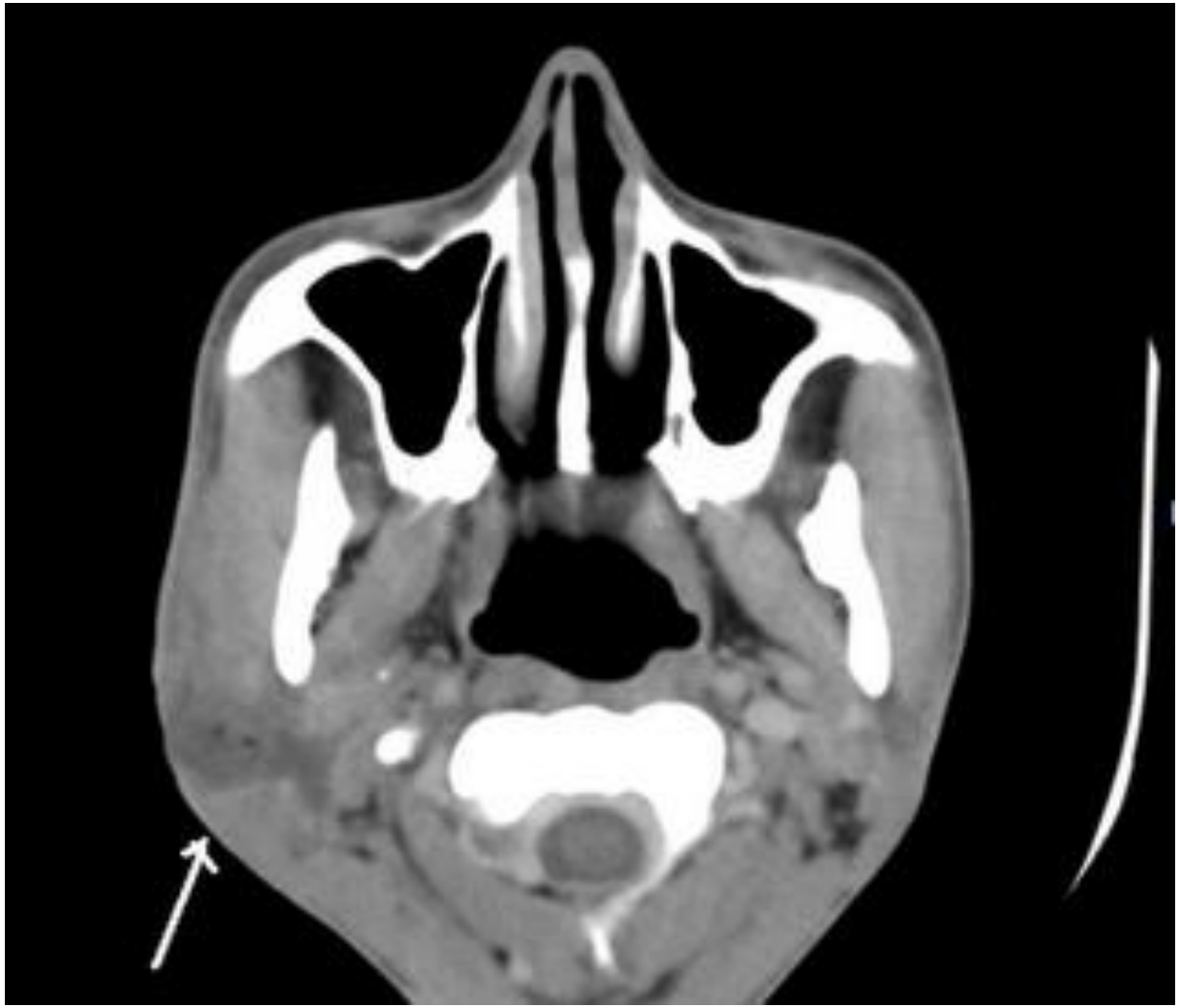
Stumps of nerve are labelled



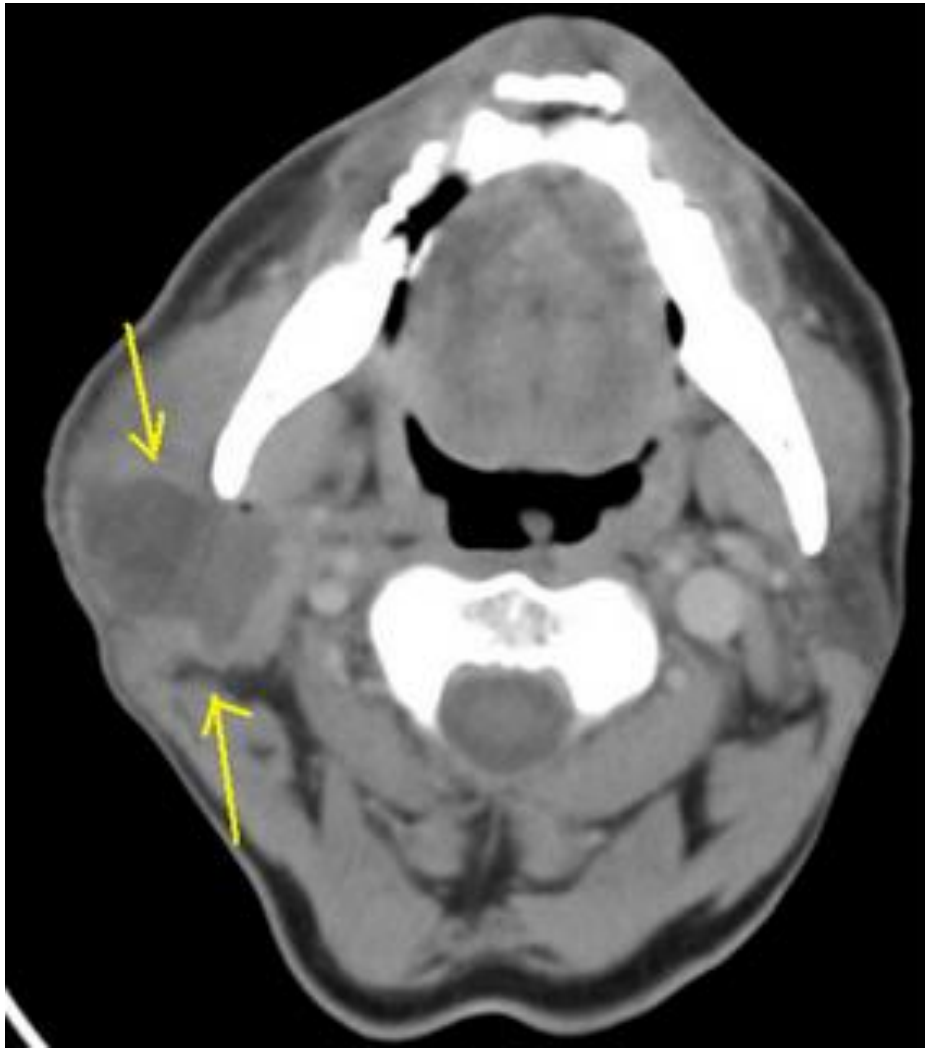
Nerve stumps are connected



Axial CT image of parotid abscess in a 34yr old male



Right parotid gland is bulky and shows central necrotic area with air loculi within measuring around 3.8cm x 2.3cm. Surrounding fat planes with massetric space are lost.Findings indicate parotid abscess as described. Patient is 70 year old male, alcoholic



The deepest part of the parotid region is the parotid bed and houses the deep part of the gland which fills the small space between the neck of the condyle of the mandible (nc) and the mastoid process (m). Other structures forming the floor of this space are the :
styloid process (sp)
stylohyoid muscle (sh)
stylopharyngeus muscle (sph)
posterior belly of the digastric muscle (pbd)
The gland becomes infected and swollen in mumps.severe pain occurs because the parotid sheath limits swelling. If you have had the mumps, you will realize just how difficult it is to open your mouth. Now, you can see why this is so. When you open the mouth, you narrow the parotid bed space and compress the deep parotid gland between the neck of the condyle and the mastoid process.

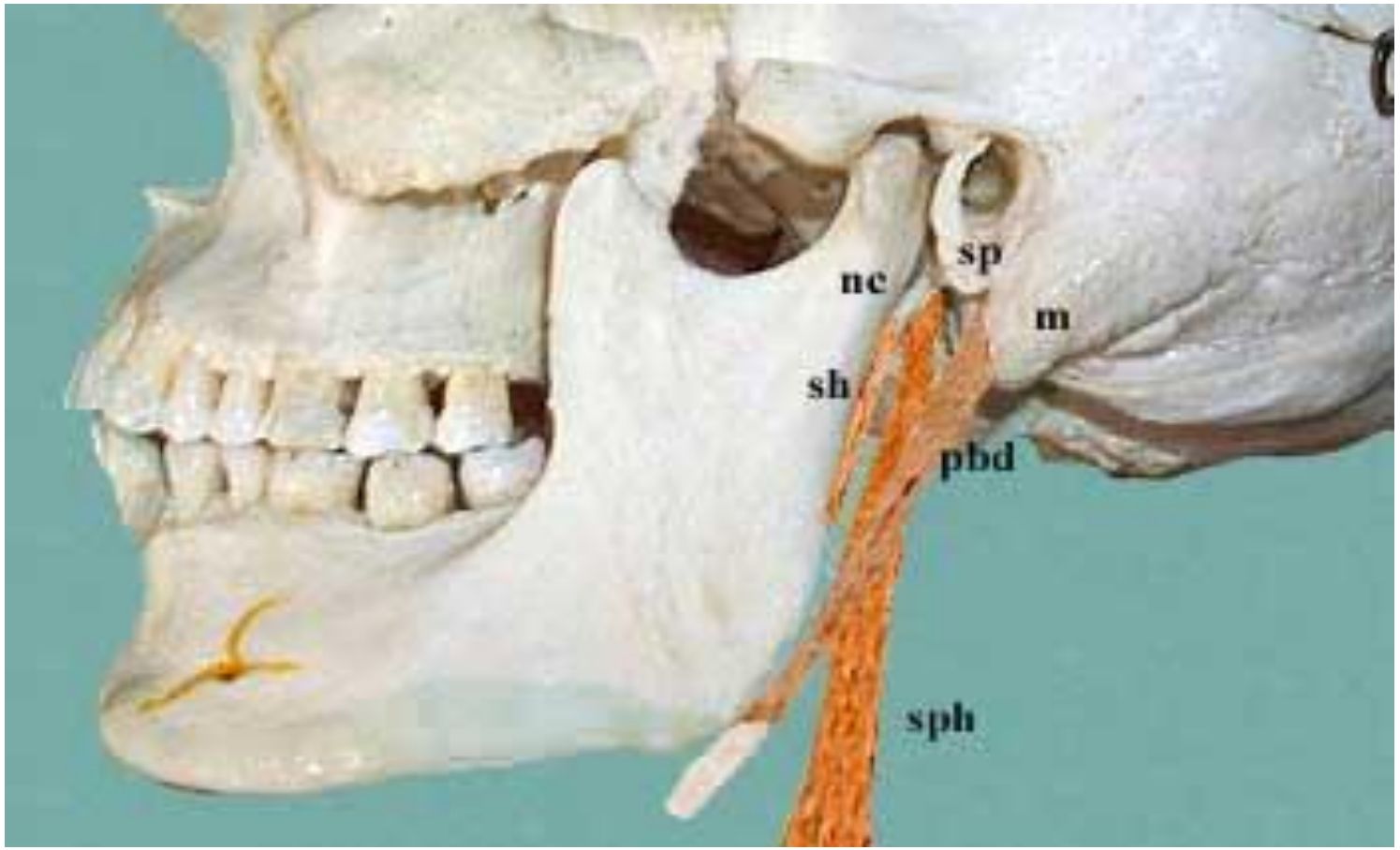


Figure 1: Photograph showing right submandibular and parotid abscess by *N.asteroides*.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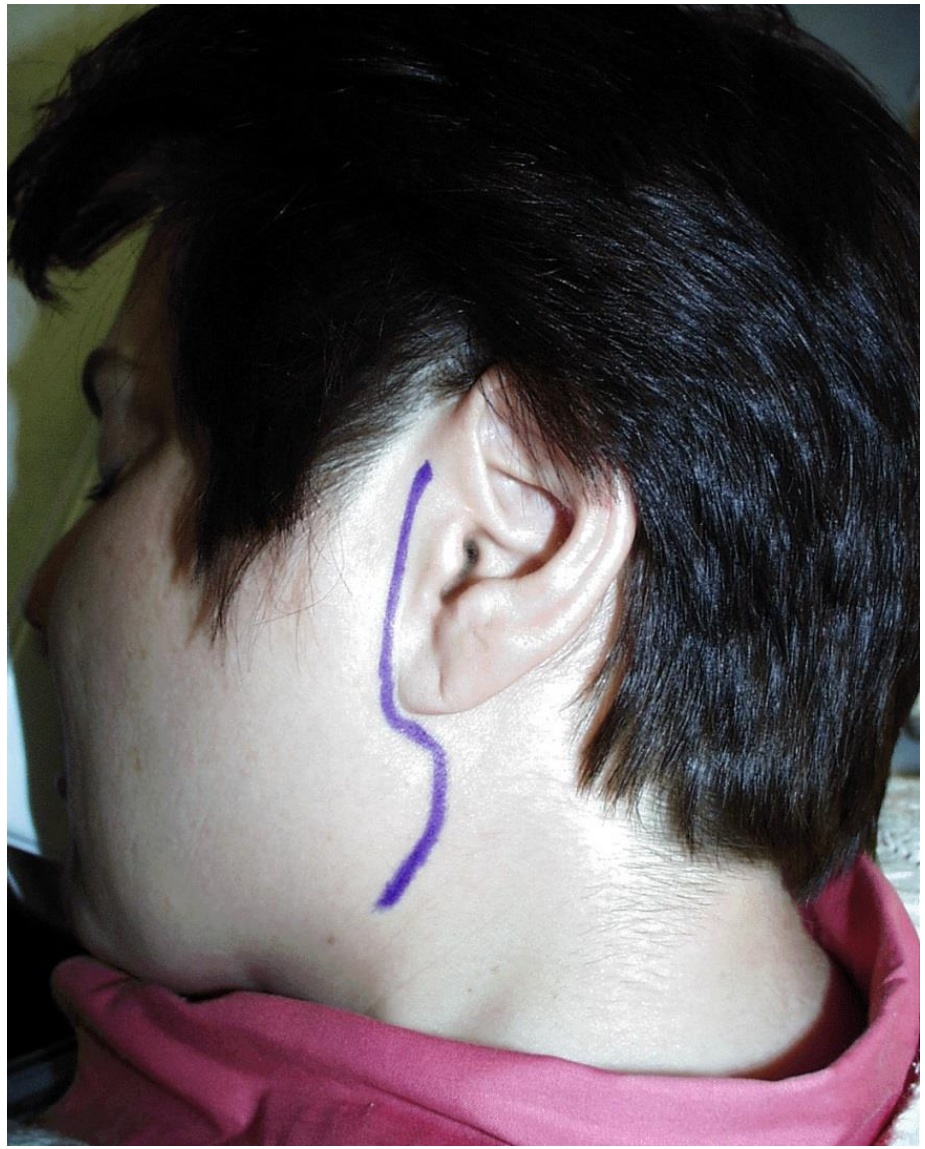
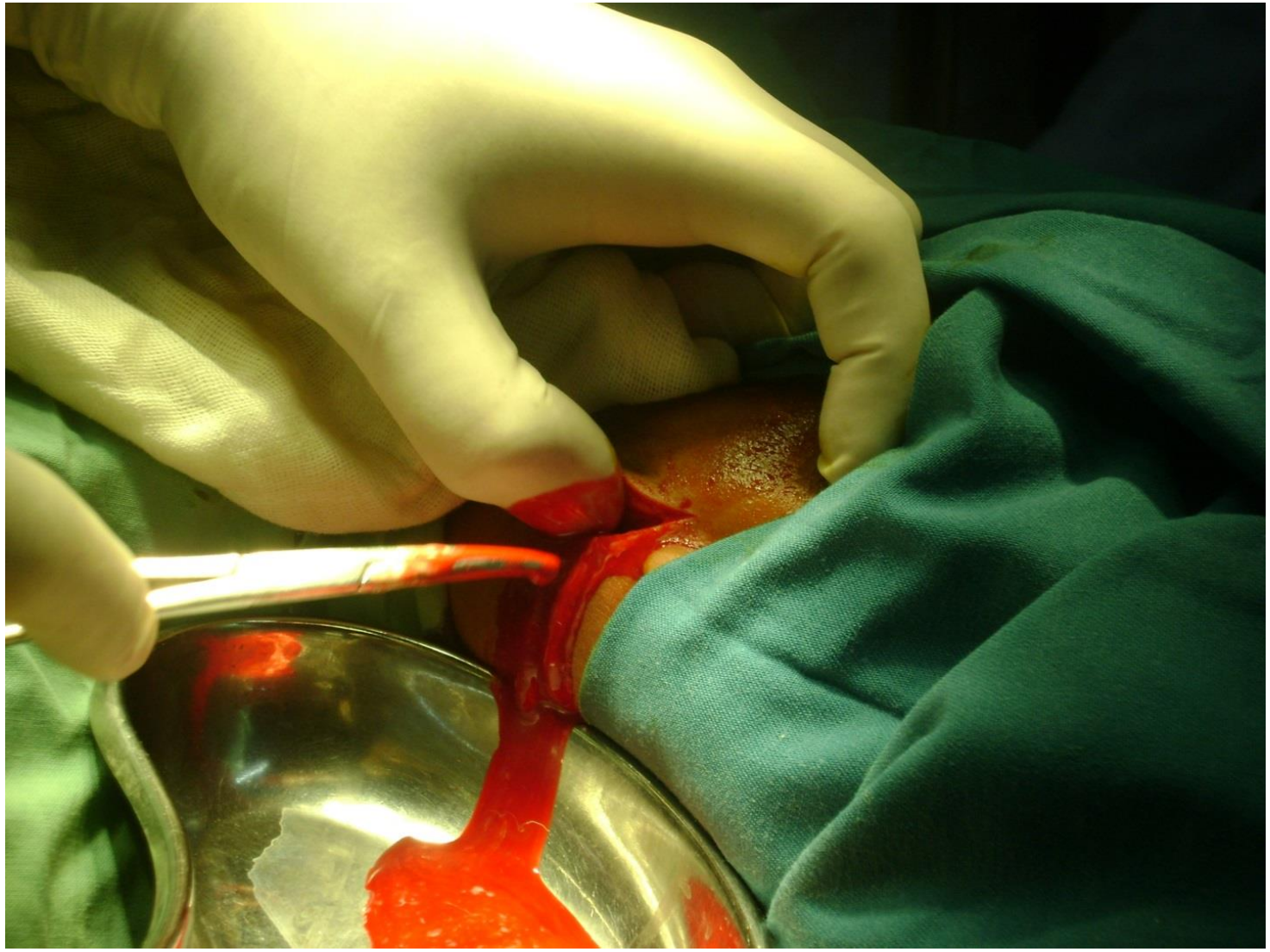
Swelling of the parotid gland caused by a tumour

Incision outlined for incision and drainage of parotid abscess.





Submandibular gland

It is the second largest of the salivary glands and is located in the floor of the oral cavity, where it wraps around the posterior border of mylohyoid muscle.

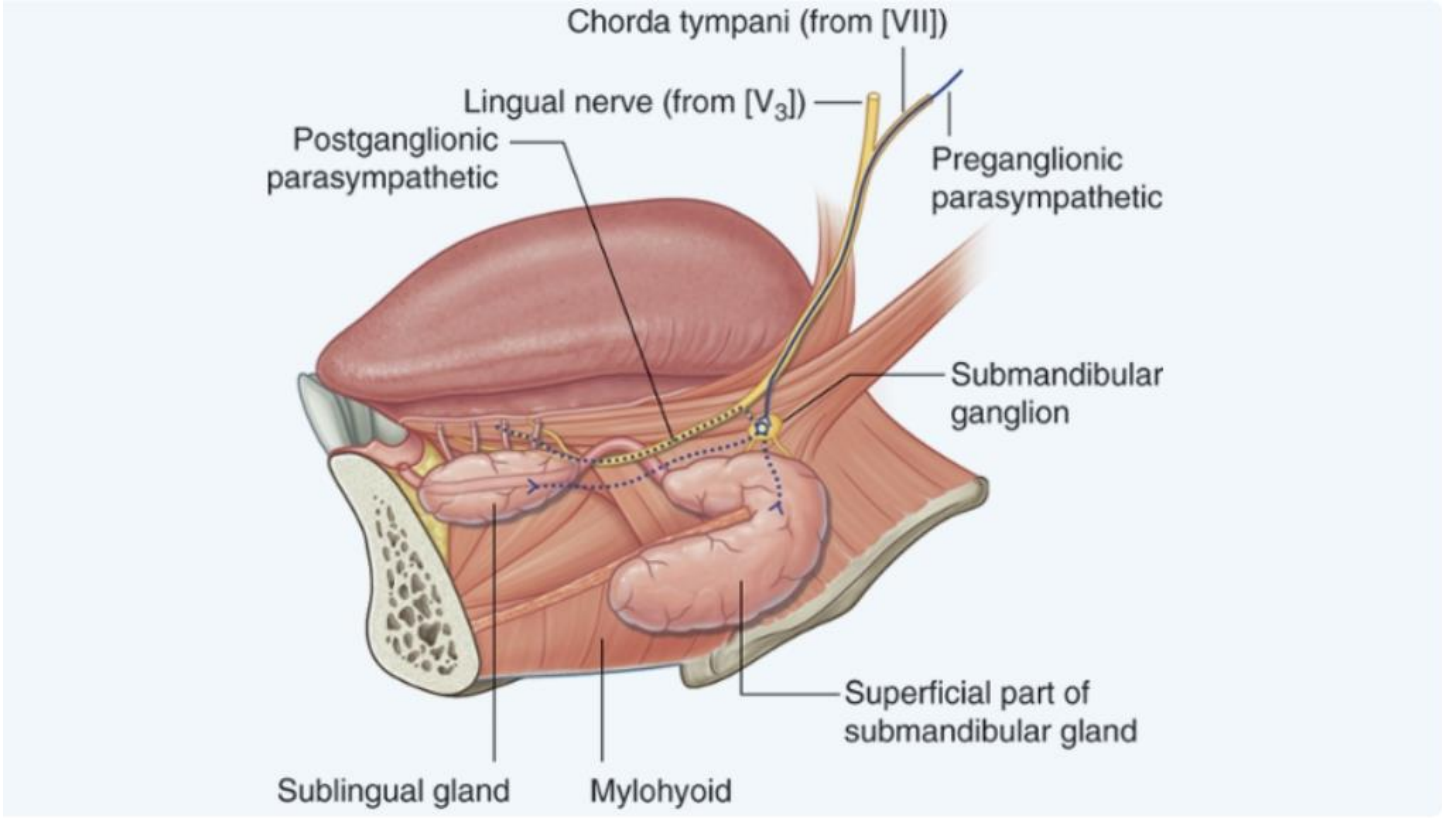
It is a mixed seromucous gland (watery and mucus secretions), and it is hook shaped:

The larger arm of the hook is directed forward in the horizontal plane below the mylohyoid muscle (superior to the digastric 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.

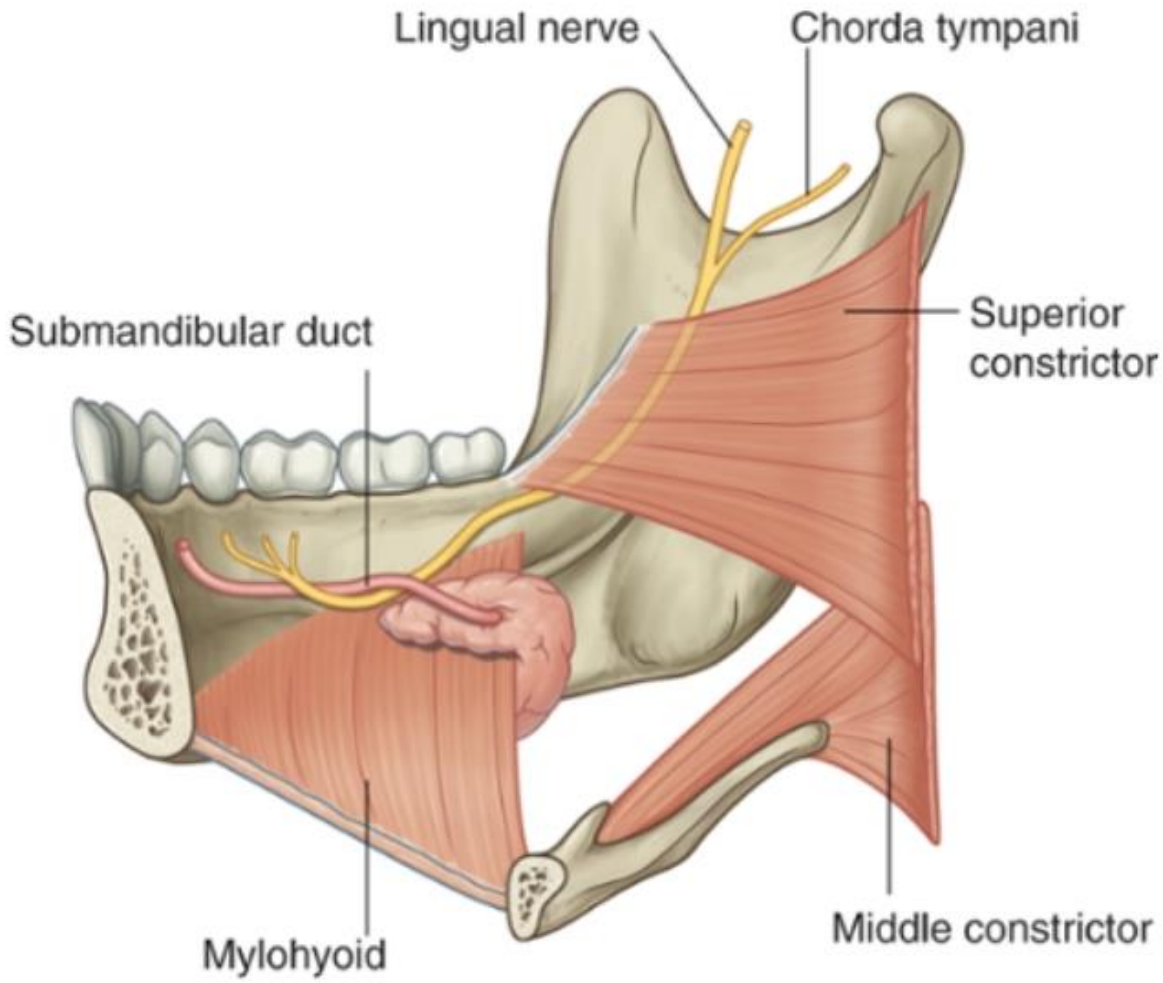
The submandibular duct (Wharton's duct) emerges from the medial side of the deep part of the gland in the oral cavity and passes forward to open on to the sublingual papilla (caruncle) behind the lower incisors beside the base of the frenulum of the tongue.

Tumors of the submandibular, sublingual, and minor salivary glands are more likely to be malignant.

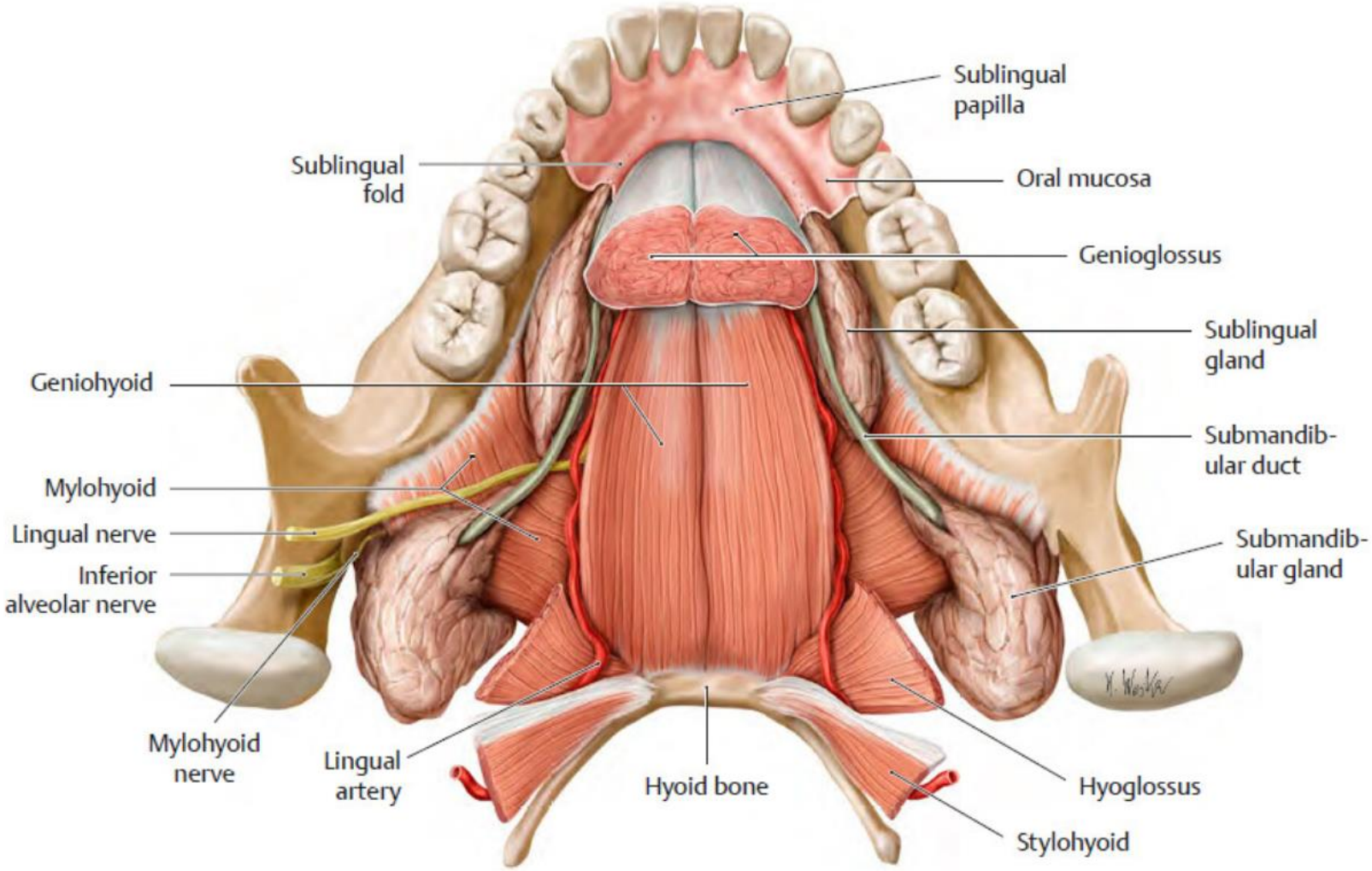


Lingual nerve and submandibular duct

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.



Approximately 65-70% of saliva in the oral cavity is produced by the submandibular glands, even though they are much smaller than the parotid glands



The submandibular abscess was incised and drained. It contained thick, greenish pus.
Marginal mandibular branch of facial nerve!!!
facial vessels!!!

Sublingual gland

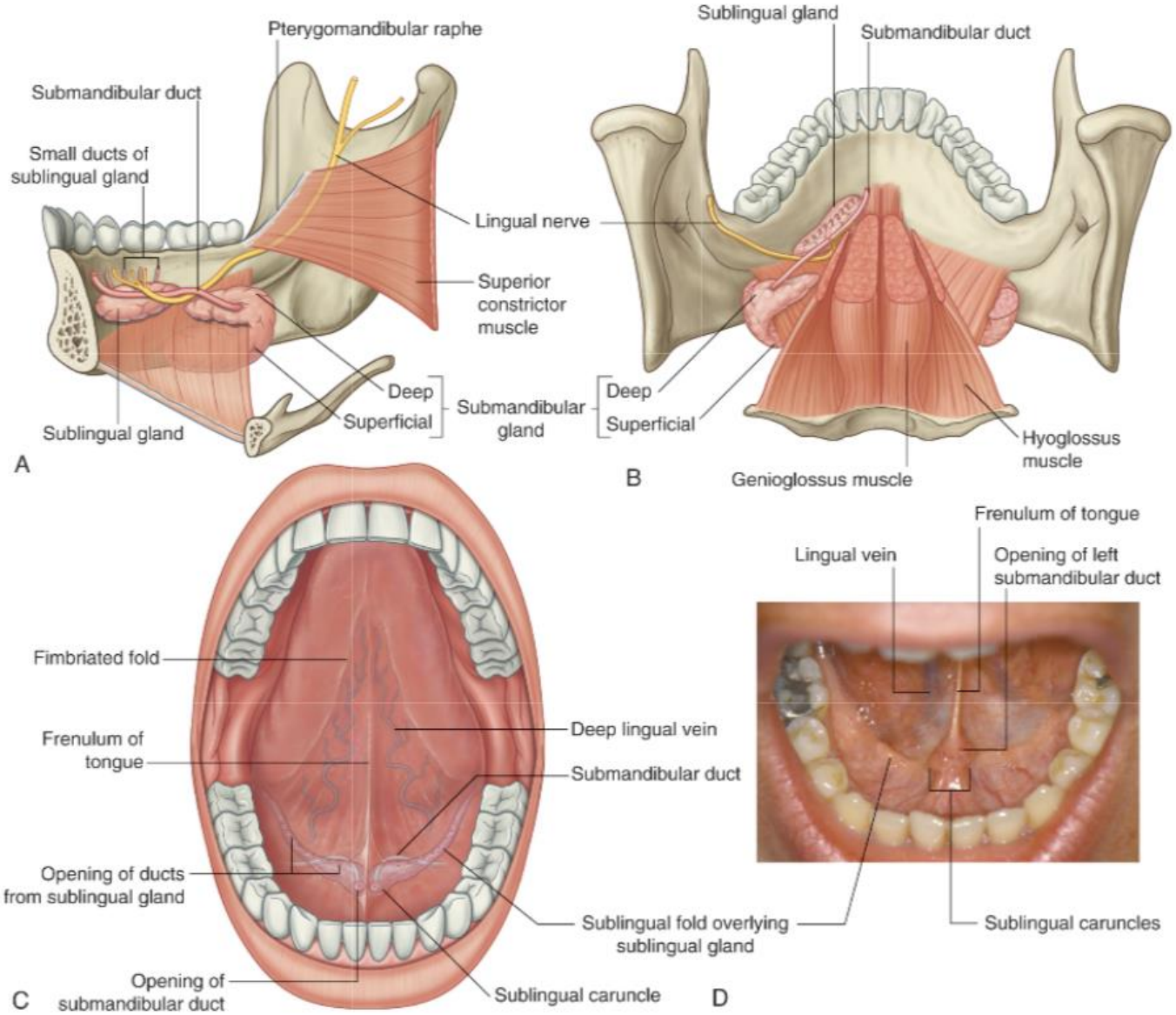
It is the smallest of the three major salivary glands. t is located anterior in the floor of the oral cavity between the oral mucosa and the mylohyoid. The sublingual gland drains into the oral cavity via numerous small ducts (minor sublingual ducts), which open onto the crest of the sublingual fold. Occasionally, the more anterior part of the gland is drained by a duct (major sublingual duct) that opens together with the submandibular duct on the sublingual caruncle.

It is predominantly a mucus secreting gland (mucoserous).

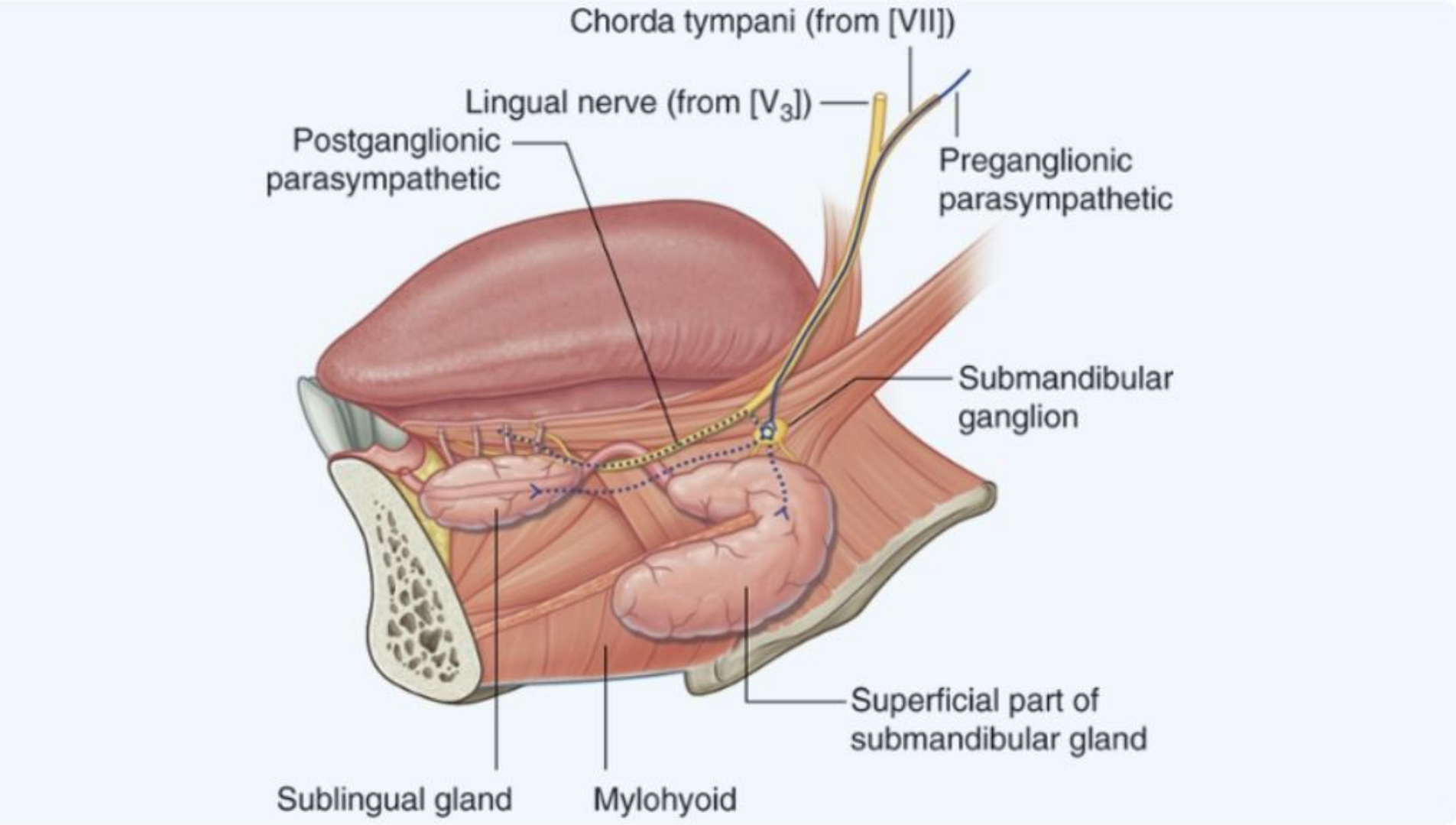
Each sublingual gland lies directly against the medial surface of the mandible where it forms a shallow groove (sublingual fossa) superior to the anterior one-third of the mylohyoid line.

The superior margin of the sublingual gland raises an elongate fold of mucosa (sublingual fold), which extends from the posterolateral aspect of the floor of the oral cavity to the sublingual papilla beside the base of the frenulum of the tongue at the midline anteriorly.

Tumors of the submandibular, sublingual, and minor salivary glands are more likely to be malignant.

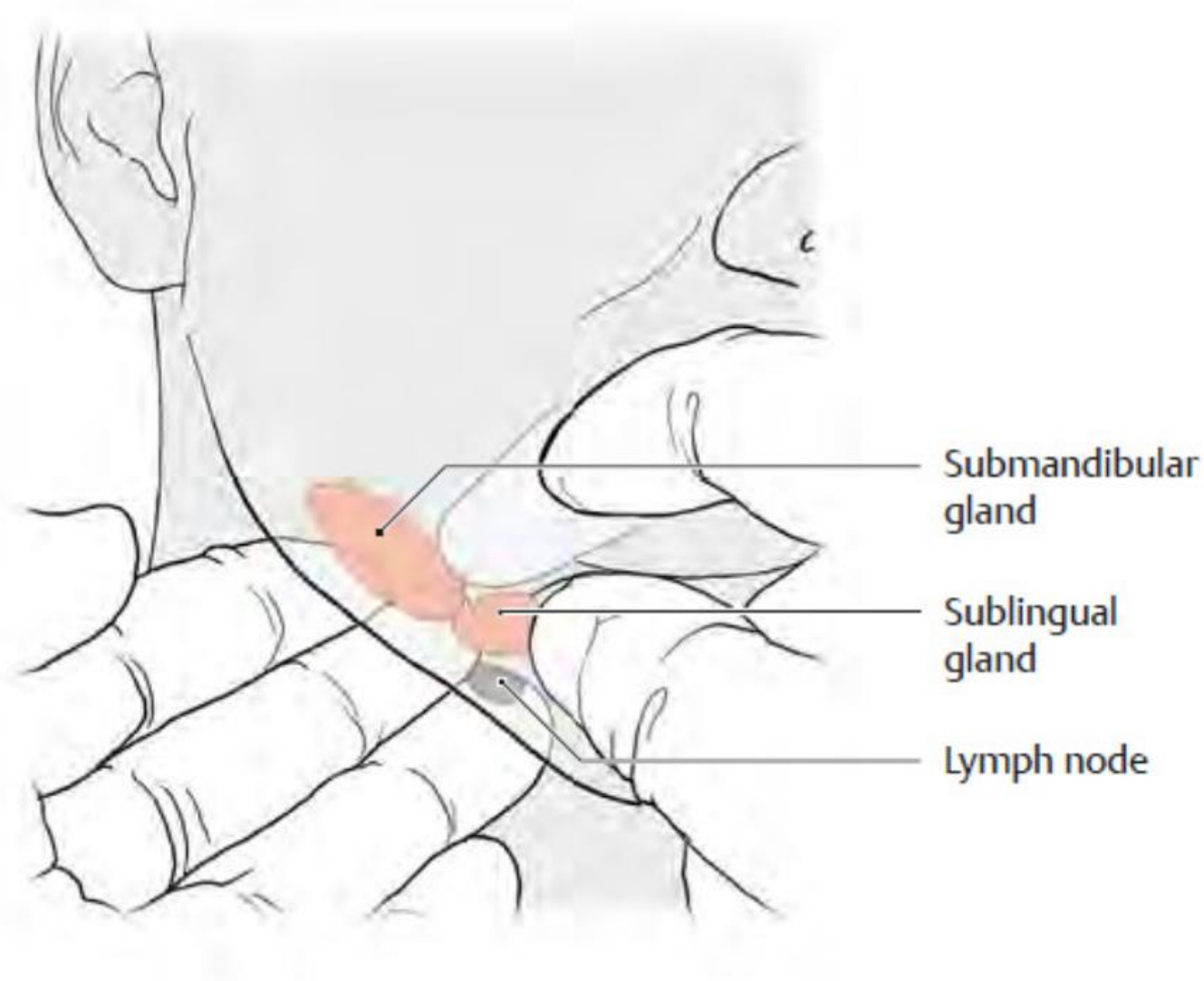


The sublingual gland is almond shaped and is immediately lateral to the submandibular duct and associated lingual nerve in the floor of the oral cavity. Approximately 5% of saliva entering the oral cavity comes from these glands



Bimanual examination of the salivary glands

The two salivary glands of the mandible, the submandibular gland and sublingual gland, and the adjacent lymph nodes are grouped around the mobile oral floor and therefore must be palpated against resistance. This is done with bimanual examination.




STONE
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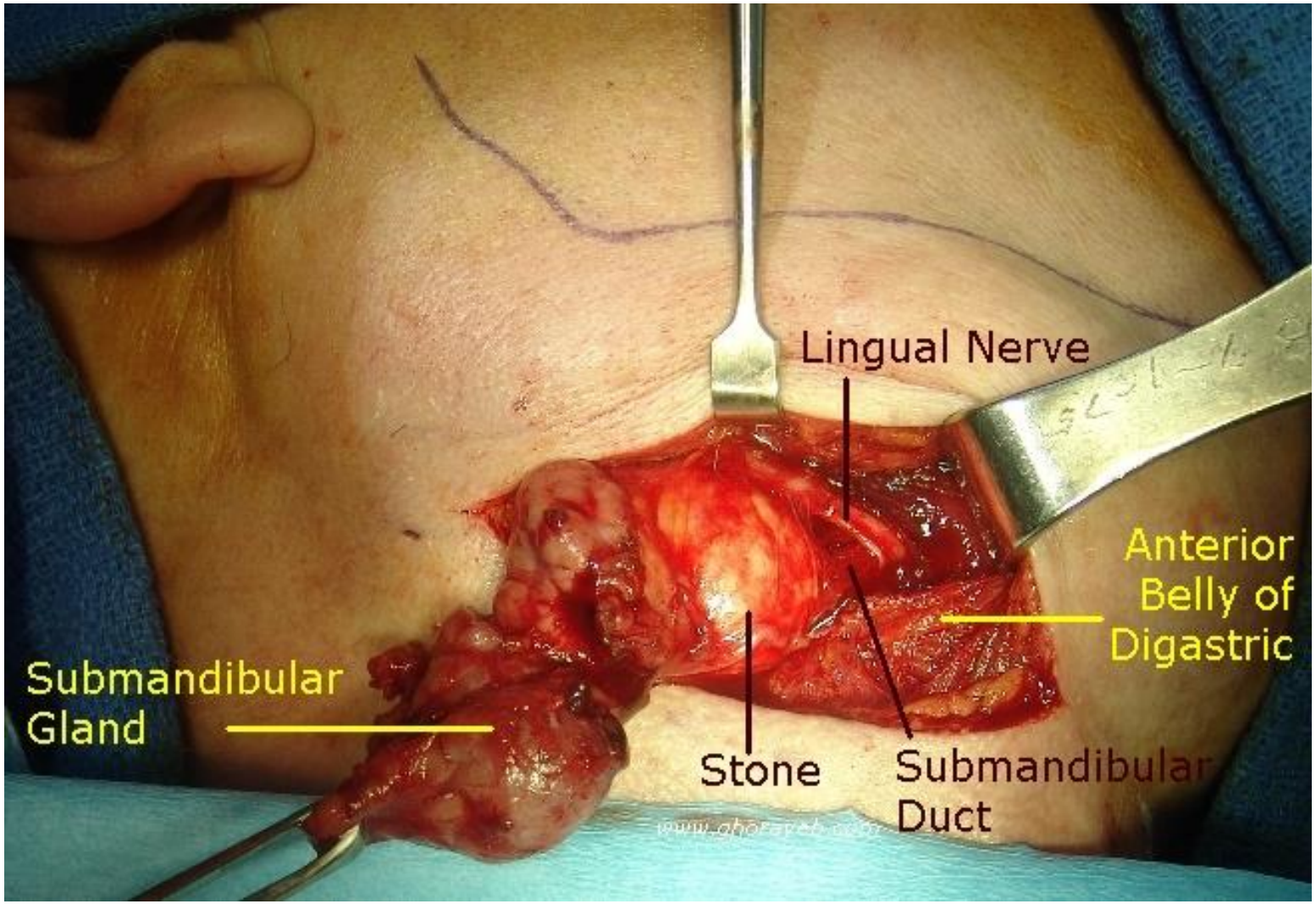
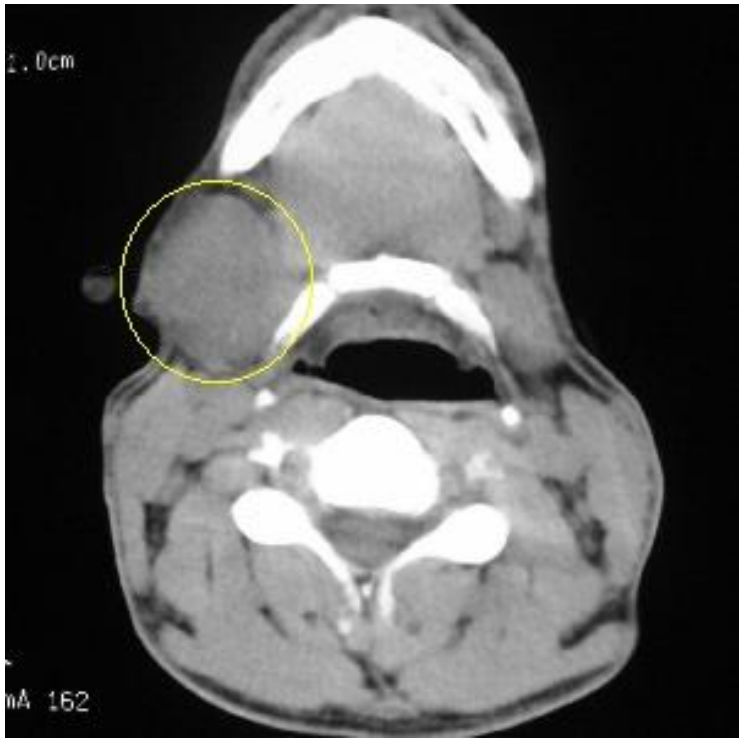

Lingual Nerve
Anterior Belly of Digastric
Submandibular Gland
Stone
Submandibular Duct


Devon
OR Products & Safety

Pleomorphic Adenoma of the Submandibular (submaxillary) Gland. These tumors are benign. They are removed very carefully, so as not to injure the marginal mandibular branch of the facial nerve which courses in the deep cervical fascia covering the submandibular gland. Other nerves at risk are the hypoglossal and the lingual nerves which are also intimately related to the submandibular gland.



Minor salivary glands

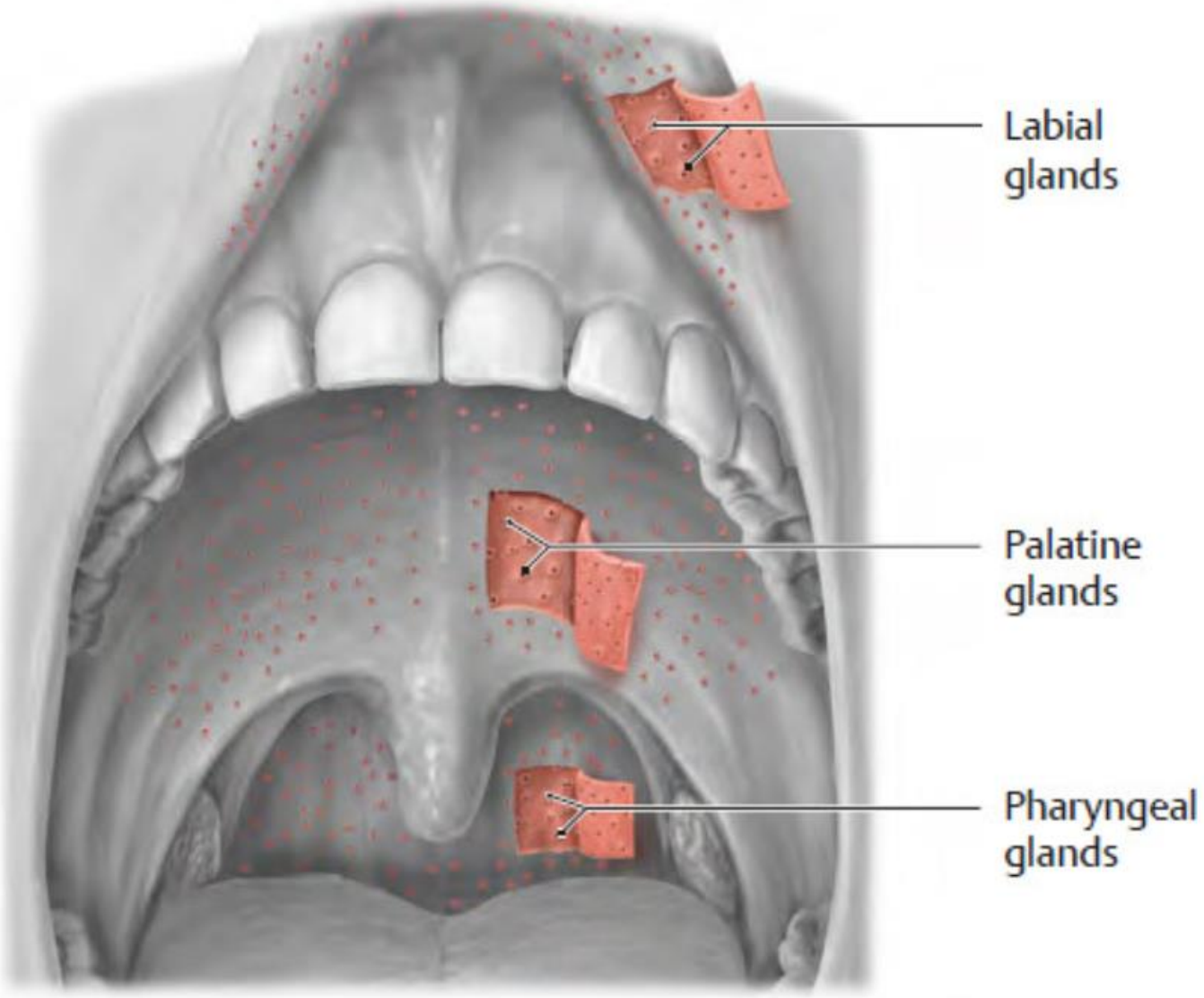
In addition to the three major paired glands, 700 to 1000 minor glands permanently secrete saliva into the oral cavity. They produce only 5 to 8 percent of the total output, but this amount suffices to keep the mouth moist when the major salivary glands are not functioning.

They are in the submucosa or mucosa of the oral epithelium lining the tongue, palate, cheeks, and lips, and open into the oral cavity directly or via small ducts.

They are 1 to 2 mm in diameter and unlike the major glands, they are not encapsulated by connective tissue, only surrounded by it. The gland has usually a number of acini connected in a tiny lobule. Their secretion is mainly mucous in nature and have many functions such as coating the oral cavity with saliva.

They are divided to 5 groups:

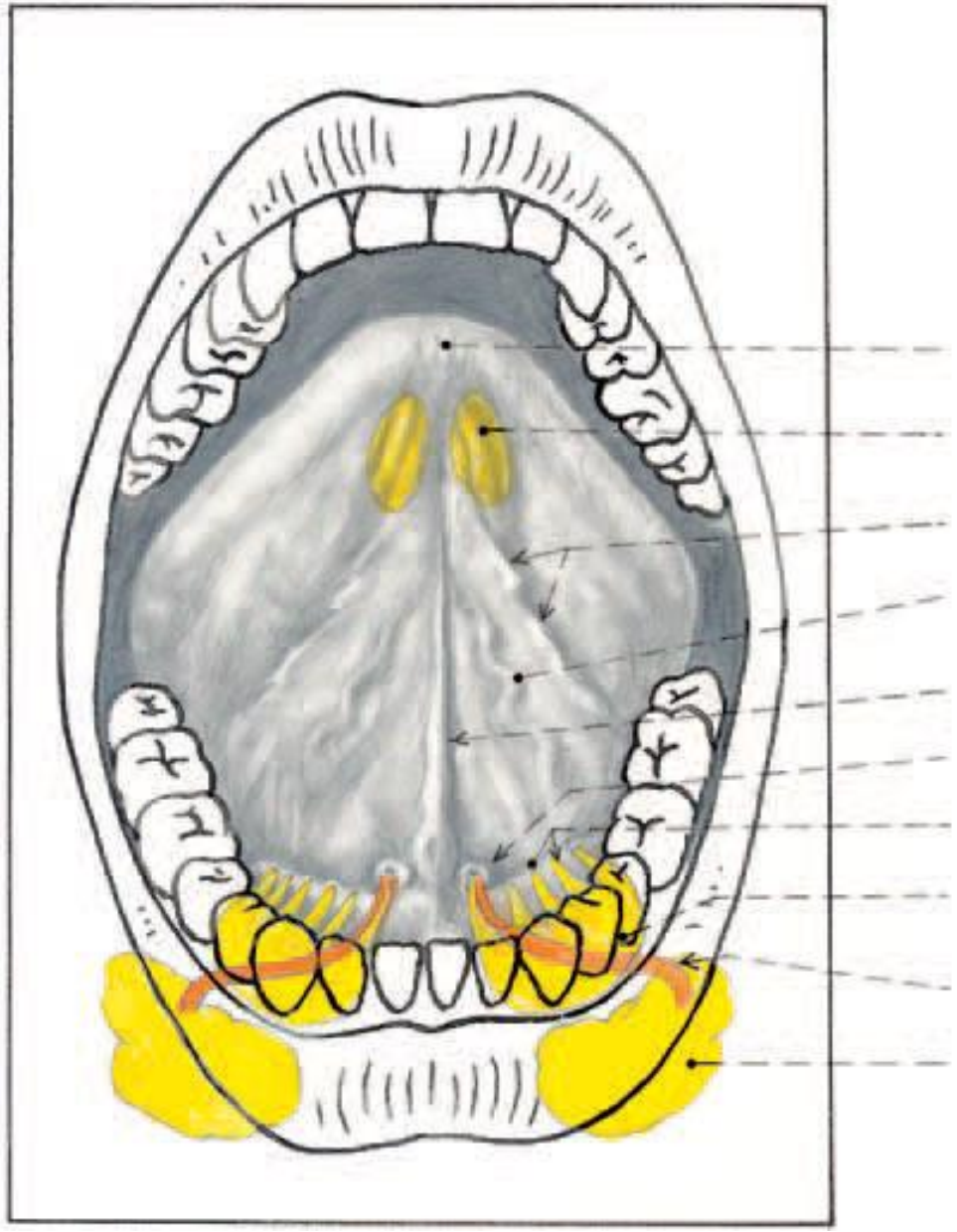
Labial, buccal and molar (retromolar) groups drain into the oral vestibule. Palatine and lingual drains into the oral cavity proper.



Lingual minor salivary glands

Von Ebner's glands: are glands found in a trough circling the circumvallate papillae on the dorsal surface of the tongue near the terminal sulcus. They secrete a purely serous fluid that begins lipid hydrolysis. They also facilitate the perception of taste through secretion of digestive enzymes and proteins. The arrangement of these glands around the circumvallate papillae provides a continuous flow of fluid over the great number of taste buds lining the sides of the papillae, and is important for dissolving the food particles to be tasted.

Apical (anterior) lingual gland: a small mixed (seromucous) gland deeply placed near the apex of the
tongue on each side of the frenulum linguae. They are found on the under surface of the apex of the tongue, and are covered by a bundle of muscular fibers derived from the *Styloglossus* and *Longitudinalis inferior mm.*



Innervation of parotid gland

Gland and duct	Autonomic innervation	Blood supply
Parotid gland •Parotid duct (Stensen's duct)	Glossopharyngeal n. (CN IX) •Preganglionic parasympathetic fibers arise from the inferior salivatory nucleus in the medulla and travel with the inferior petrosal n. (from CN IX) to the otic ganglion •Postganglionic parasympathetic fibers arise in the otic ganglion and travel with the auriculotemporal nerve (of CN V_3) to the parotid gland	Glandular branches from the external carotid a. and superficial temporal a. Veins drain into the external jugular vein.

Innervation of the submandibular gland

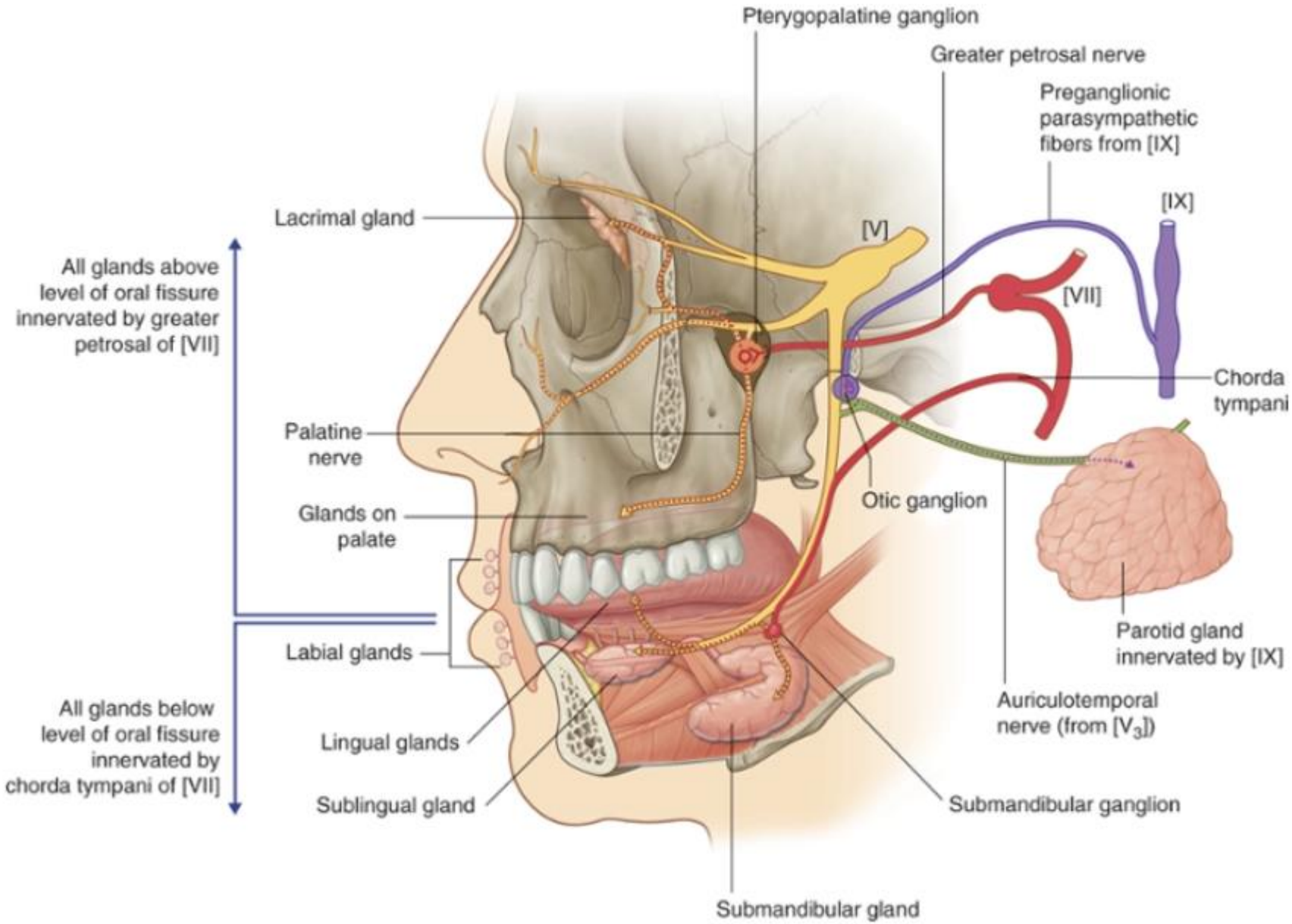
Gland and duct	Autonomic innervation	Blood supply
Submandibular gland, Submandibular duct (Wharton's duct)	**Facial n. (CN VII)** **Preganglionic parasympathetic fibers arise from the superior salivatory nucleus in the pons. In the facial canal it gives rise to two parasympathetic branches:** the greater petrosal n. and **the chorda tympani n.** The greater petrosal n. joins the deep petrosal n. (sympathetic) to form the nerve of the pterygoid canal (Vidian n.). It then travels to the pterygopalatine ganglion. **The chorda tympani joins the lingual n. and travels to the submandibular ganglion.** Postganglionic parasympathetic fibers from the pterygopalatine ganglion travel with CN V_2 to the nasal, palatine, pharyngeal and superior labial glands. Other postganglionic parasympathetic fibers travel via CN V_2 to the lacrimal n. (of CN V_1) to the lacrimal gland. **Postganglionic parasympathetic fibers from the submandibular ganglion travel to the submandibular and sublingual glands.**	**Glandular branches from the facial and lingual arteries.** **Veins drain into lingual and facial veins.**

Innervation of the sublingual gland

Gland and duct	Autonomic innervation	Blood supply
Sublingual **Multiple small ducts that open on the sublingual fold or into the submandibular duct**	**Facial n. (CN VII)** **Preganglionic parasympathetic fibers arise from the superior salivary nucleus in the pons. In the facial canal it gives rise to two parasympathetic branches:** the greater petrosal n. and **the chorda tympani n.** The greater petrosal n. joins the deep petrosal n. (sympathetic) to form the nerve of the pterygoid canal (Vidian n.). It then travels to the pterygopalatine ganglion. **The chorda tympani joins the lingual n. and travels to the submandibular ganglion.** Postganglionic parasympathetic fibers from the pterygopalatine ganglion travel with CN V_2 to the nasal, palatine, pharyngeal and superior labial glands. Other postganglionic parasympathetic fibers travel via CN V_2 to the lacrimal n. (of CN V_1) to the lacrimal gland. **Postganglionic parasympathetic fibers from the submandibular ganglion travel to the submandibular and sublingual glands.**	**Glandular branches of sublingual a.**

Innervation of the minor salivary glands

Gland and duct	Autonomic innervation	Blood supply
Minor salivary glands **Small ducts open directly on the mucosa of the oral cavity and oropharynx**	**Facial n. (CN VII)** **Preganglionic parasympathetic fibers arise from the superior salivary nucleus in the pons. In the facial canal it gives rise to two parasympathetic branches: the greater petrosal n. and the chorda tympani n.** **The greater petrosal n. joins the deep petrosal n. (sympathetic) to form the nerve of the pterygoid canal (Vidian n.). It then travels to the pterygopalatine ganglion.** **The chorda tympani joins the lingual n. and travels to the submandibular ganglion.** **Postganglionic parasympathetic fibers from the pterygopalatine ganglion travel with CN V_2** to the nasal**, palatine, pharyngeal and superior labial glands.** Other postganglionic parasympathetic fibers travel via CN V_2 to the lacrimal n. (of CN V_1) to the lacrimal gland. **Postganglionic parasympathetic fibers from the submandibular ganglion travel to the submandibular and sublingual glands.**	


Pterygopalatine ganglion
Greater petrosal nerve
Preganglionic parasympathetic fibers from [IX]
[IX]
Lacrimal gland
[V]
[VII]
All glands above level of oral fissure innervated by greater petrosal of [VII]
Chorda tympani
Palatine nerve
Otic ganglion
Glands on palate
Parotid gland innervated by [IX]
Labial glands
Auriculotemporal nerve (from [V3])
All glands below level of oral fissure innervated by chorda tympani of [VII]
Lingual glands
Sublingual gland
Submandibular ganglion
Submandibular gland