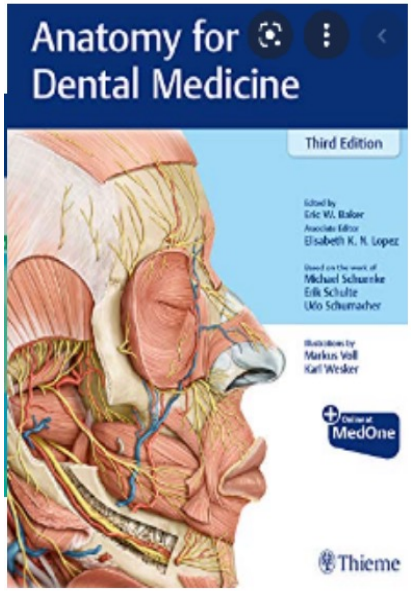
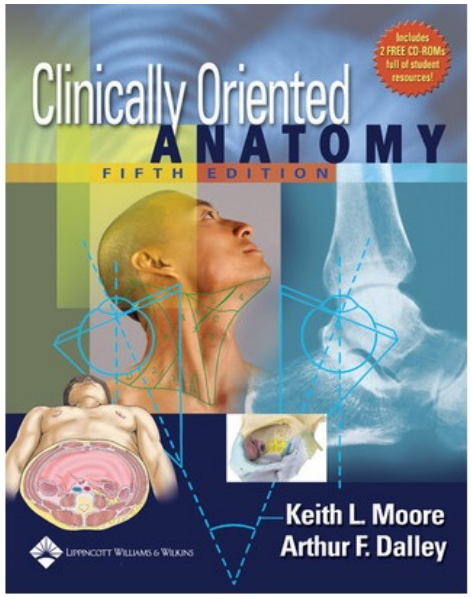
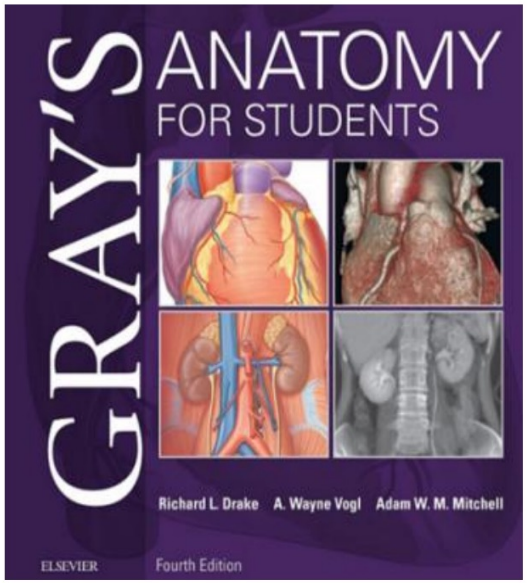
Head muscles, overview

Omid Moztarzadeh

Literature:







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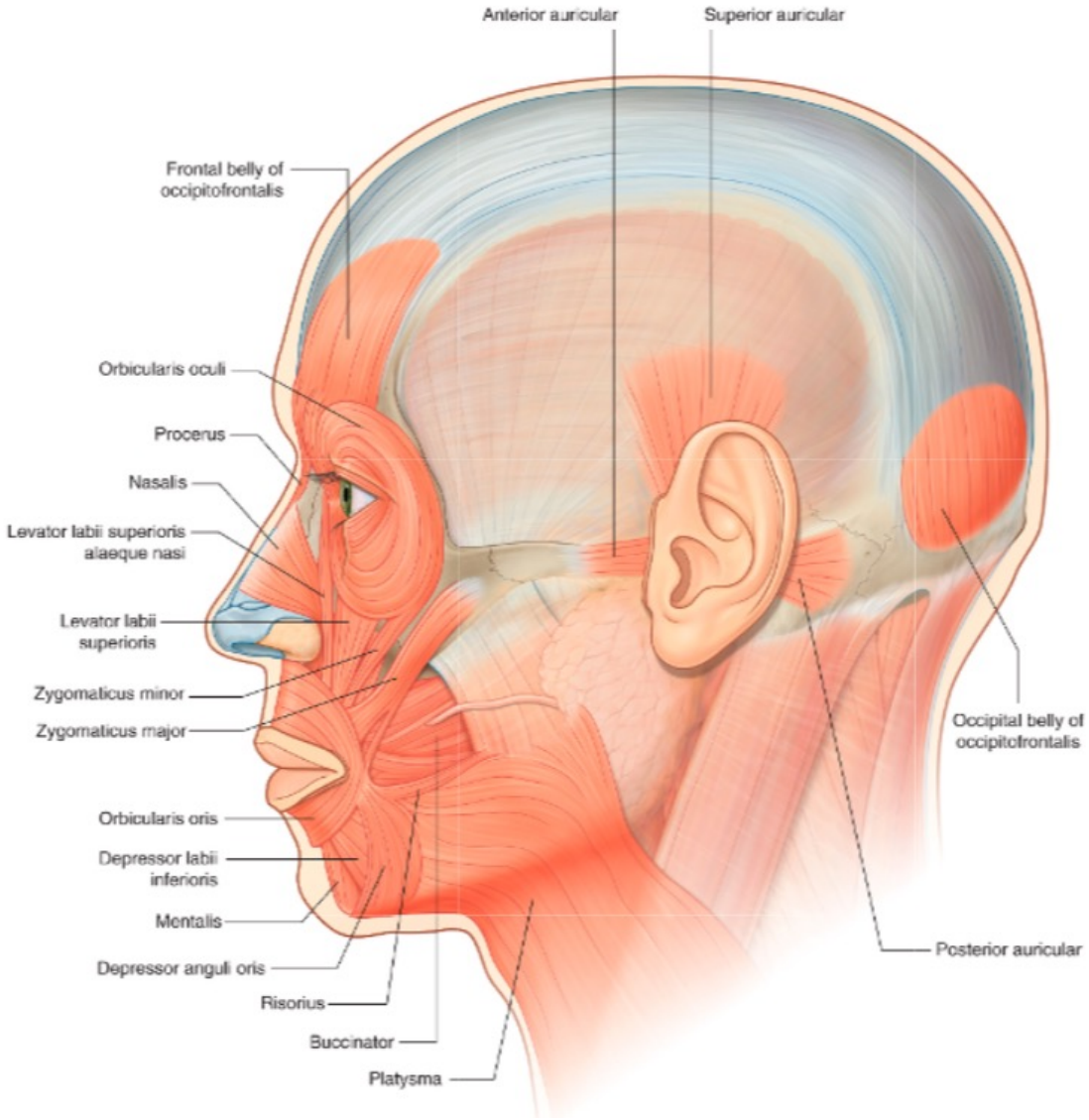
Muscles of facial expression- Mimic muscles

A face-to-face meeting is an important initial contact between individuals. Part of this exchange is the use of facial expressions to convey emotions.

The muscles of the face develop from the **second pharyngeal arch** and are innervated by branches of the **facial nerve [VII].** They are in the superficial fascia, with origins from either bone or fascia, and insertions into the skin.

Because these muscles control expressions of the face, they are sometimes referred to as **muscles of "facial expression."** They also act as sphincters and dilators of the orifices of the face (i.e., the orbits, nose, and mouth).



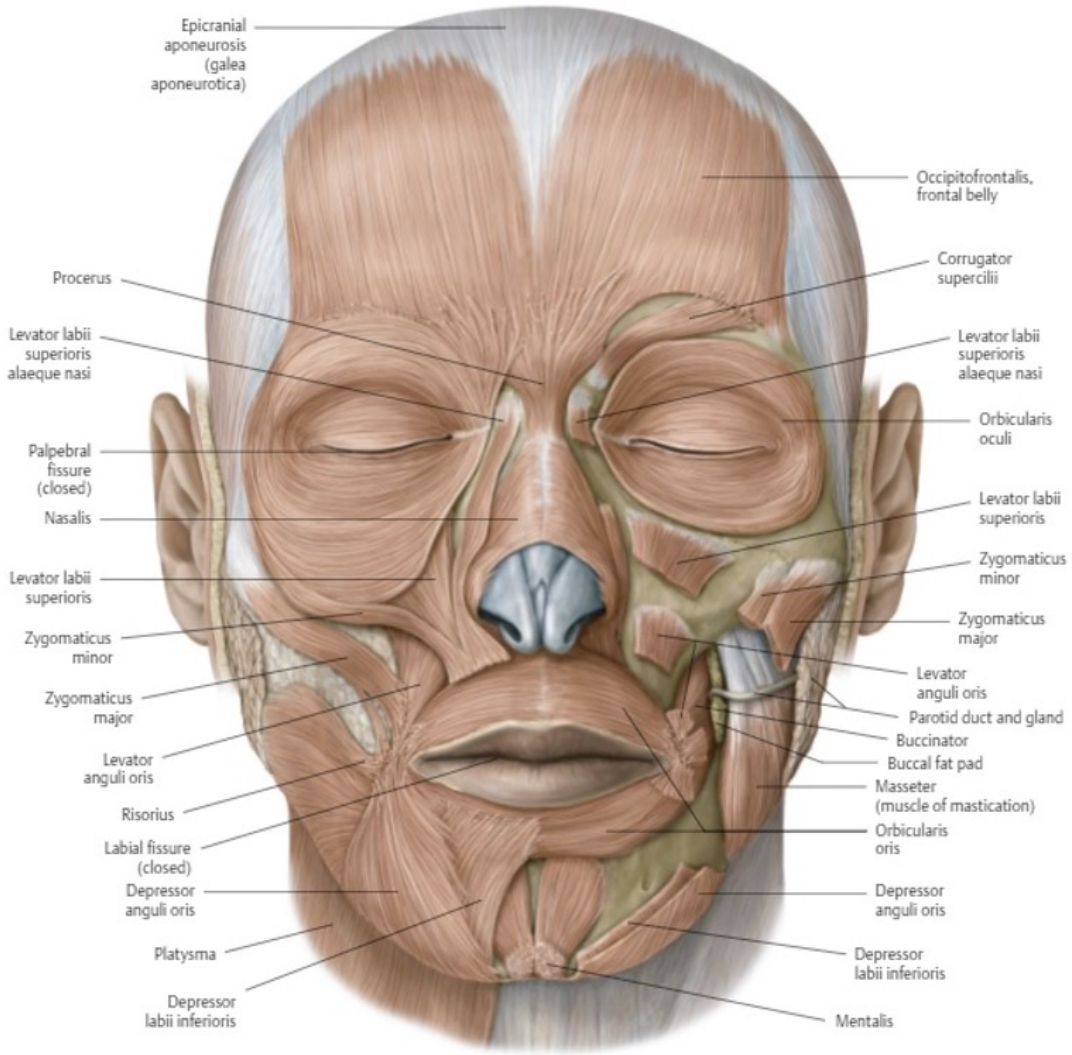
Muscles of facial expression- Mimic muscles

The muscles of facial expression are the superficial layer of muscles that **arise either directly from the periosteum or from adjacent muscles** and **insert onto other facial muscles or directly into the connective tissue of the skin**. Because of their cutaneous attachments, the muscles of facial expression are able to move the facial skin.

They also serve a **protective function** (especially for the eyes) and are active during food ingestion (closing the labial fissure).

As these muscles are located in the subcutaneous fat, and because the **superficial body fascia is absent** in the face means that facial lacerations, following a blow to the face for example, tend to gape widely. This necessitates careful suturing of these lacerations to approximate the edges of the wound and to prevent scarring.

The loose nature of the connective tissue also provides a place for **blood and fluid to accumulate**, leading to **swelling and bruising of the face**. Such swelling may also be apparent following an inflammatory insult, such as a bee sting.



Pus or blood can enter the eyelieds and the root of the nose bc. The frontalis inserts into the skin and subcutaneous tissue and does not attached to the bone. Black eye can result from an injury to the scalp and/or forehead.Ecchymosis or purple patches develop as a result of extravasation of blood into the subcutaneous tissue and skin of eyelids and surrounding regions.

Orbital group

Orbicularis oculi is a large muscle that completely surrounds each orbital orifice and extends into each eyelid. It closes the eyelids - a protective reflex against foreign matter and spreading lacrimal secretions across the cornea If the action of the orbicularis oculi is lost because of facial nerve paralysis, the loss of this protective reflex will be accompanied by drying of the cornea from prolonged exposure to the air.

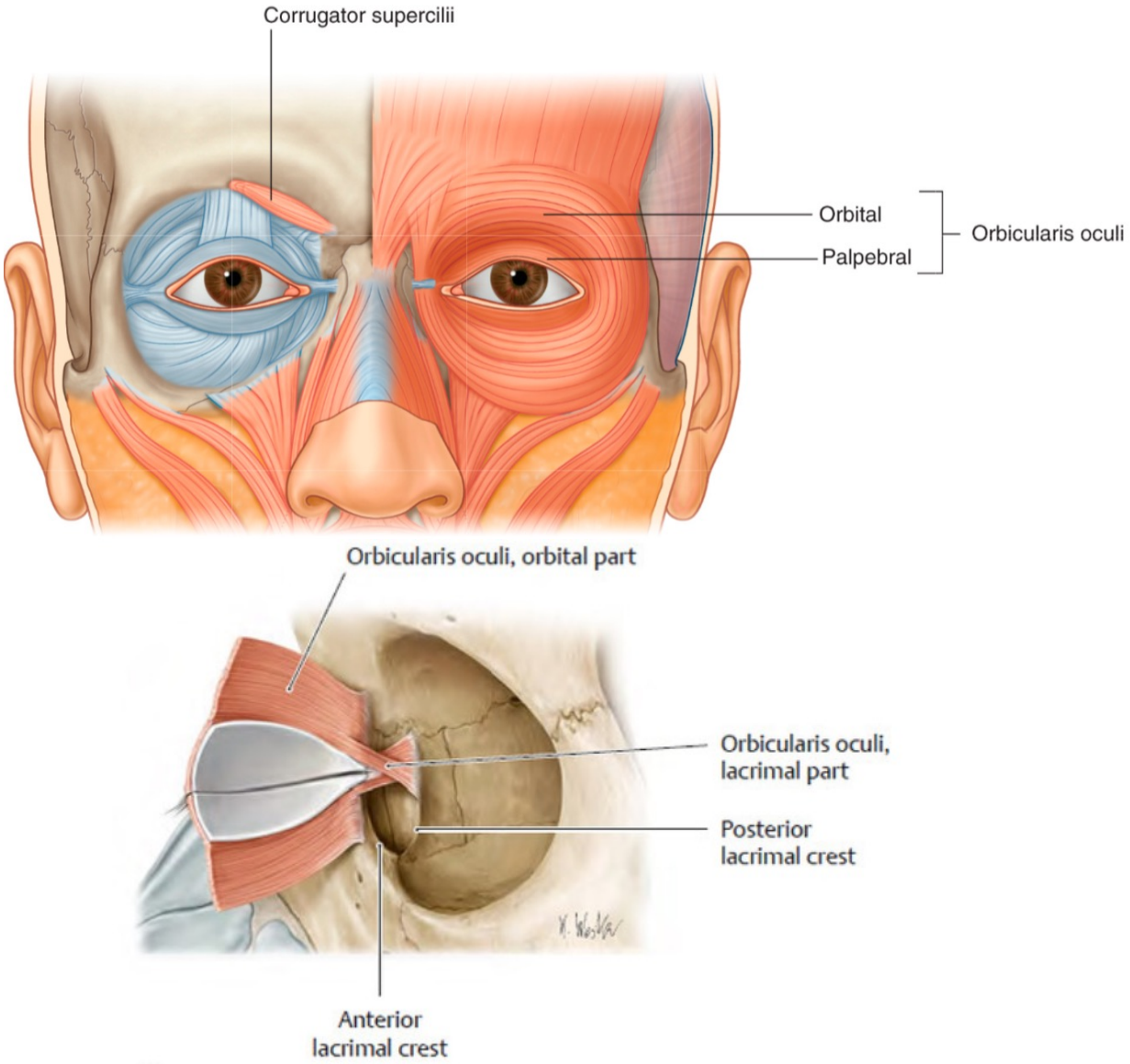
- **The outer orbital part** is a broad ring that encircles the orbital orifice and extends outward beyond the orbital rim - closes the eye more forcefully and produces some wrinkling on the forehead.

- **The inner palpebral part** is in the eyelids and consists of muscle fibers originating in the medial corner of the eye that arch across each lid to attach laterally - closes the eye gently.

- **small lacrimal part** of the orbicularis oculi muscle is deep, medial in position, and attaches to posterior lacrimal crest posterior to the lacrimal sac - Pulls eyelids medially

Corrugator supercilii

is deep to the eyebrows and the orbicularis oculi muscle and is active when frowning. It arises from the medial end of the superciliary arch, passing upward and laterally to insert into the skin of the medial half of the eyebrow. It draws the eyebrows toward the midline, causing vertical wrinkles above the nose.



Nasal group

Nasalis, is active when the nares are flared. It consists of :

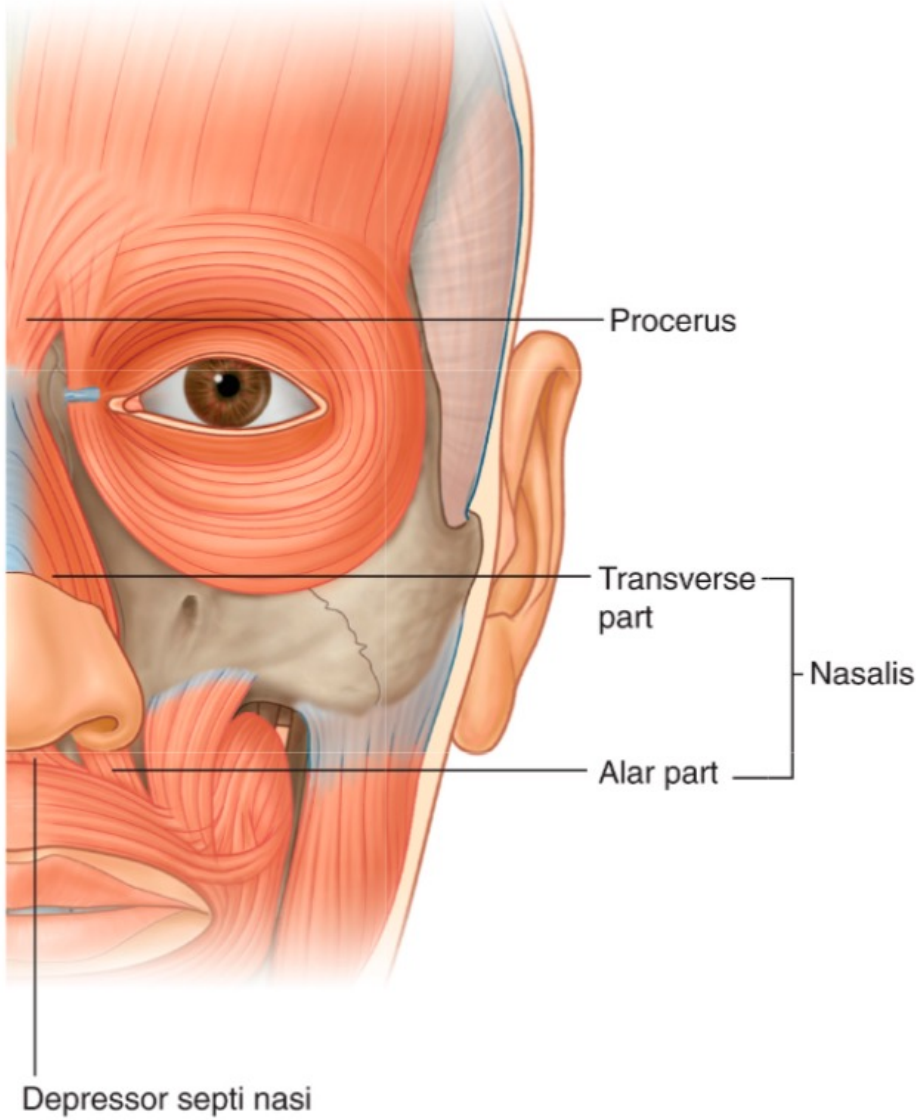
- The **transverse part** of the nasalis compresses the nares (the compressor naris)—it originates from the maxilla and its fibers pass upward and medially to insert, along with fibers from the same muscle on the opposite side, into an aponeurosis across the dorsum of the nose.

- The **alar part** of the nasalis (the dilator naris) - draws the alar cartilages downward and laterally, so opening the nares—it originates from the maxilla, below and medial to the transverse part, and inserts into the alar cartilage.

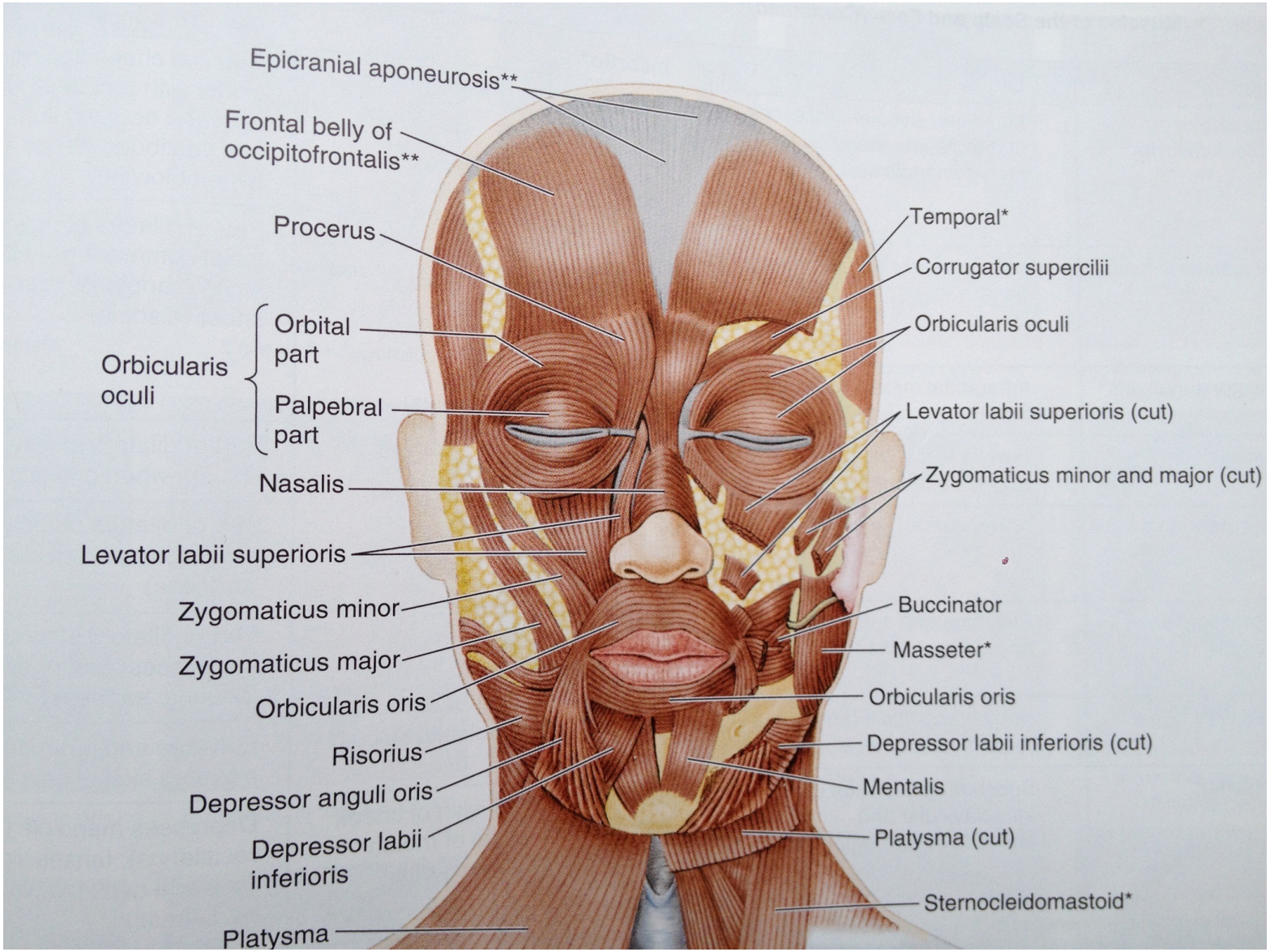
Procerus is a small muscle superficial to the nasal bone and is active when an individual frowns . It arises from the nasal bone and the upper part of the lateral nasal cartilage and inserts into the skin over the lower part of the forehead between the eyebrows. It may be continuous with the frontal belly of the occipitofrontalis muscle of the scalp. The procerus draws the medial border of the eyebrows downward to produce transverse wrinkles over the bridge of the nose.

Depressor septi nasi another muscle that assists in widening the nares. Its fibers arise from the maxilla above the central incisor tooth and ascend to insert into the lower part of the nasal septum.

The depressor septi nasi pulls the nose inferiorly, so assisting the alar part of the nasalis in opening the nares.



Corrugator supercilii draws eyebrows medially and inferiorly- vertical wrinkles above nose (concern or worry)
Procerus depresses medial end of eyebrows,wrinkle skin over dorsum of nose(dislike)


Epicranial aponeurosis**
Frontal belly of occipitofrontalis**
Procerus
Orbicularis oculi
Orbital part
Palpebral part
Nasalis
Levator labii superioris
Zygomaticus minor
Zygomaticus major
Orbicularis oris
Risorius
Depressor anguli oris
Depressor labii inferioris
Platysma
Temporal*
Corrugator supercilii
Orbicularis oculi
Levator labii superioris (cut)
Zygomaticus minor and major (cut)
Buccinator
Masseter*
Orbicularis oris
Depressor labii inferioris (cut)
Mentalis
Platysma (cut)
Sternocleidomastoid*

Oral group

The muscles in the oral group move the lips and cheek. Many of these muscles intersect just lateral to the corner of the mouth on each side - termed the **modiolus**.

Clinical notes:

Facelift surgery aims to lift up and pull back the skin in the lower half of the face and neck to make the face more taught.

Botox It is used in many therapies including strabismus, uncontrolled blinking as well as to relax facial muscles to improve the cosmetic appearances of lines and wrinkles.

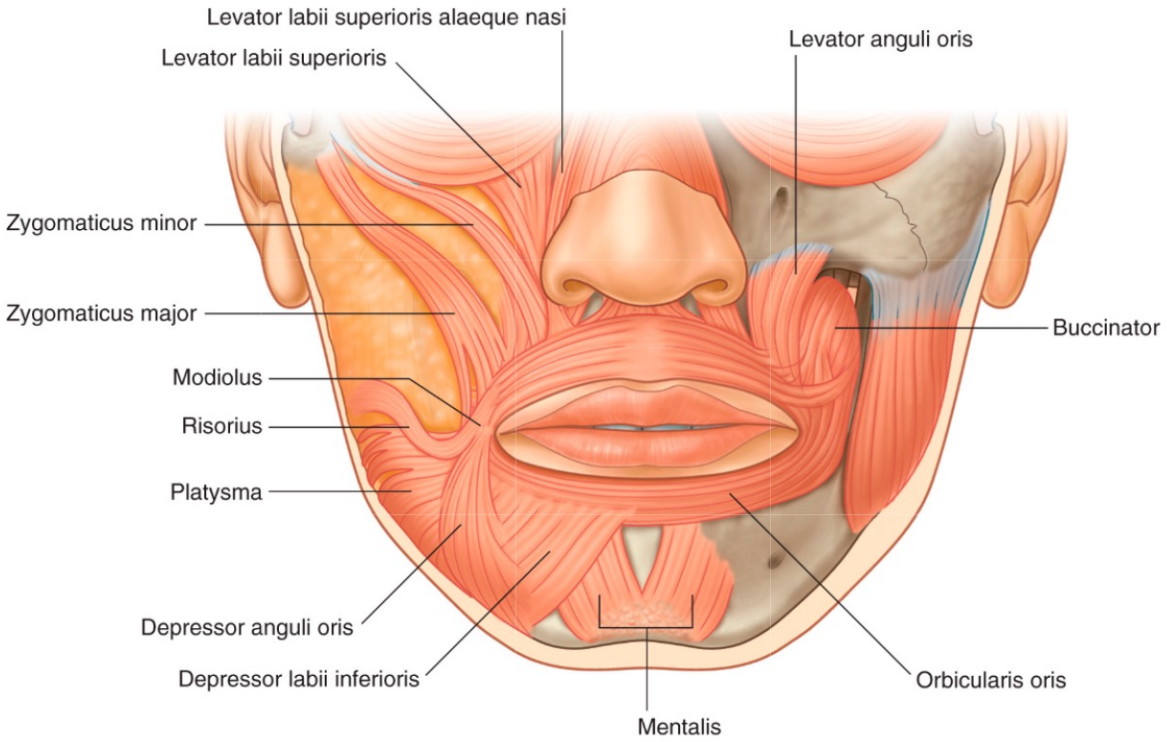
Orbicularis oris:

Labial part (inner – on the lips);

Marginal part (outer – at the bones).

The **orbicularis oris** is a complex muscle consisting of fibers that completely encircle the mouth. Its function is apparent when pursing the lips, as occurs during whistling. Some of its fibers originate near the midline from the maxilla superiorly and the mandible inferiorly, whereas other fibers are derived from both the buccinator, in the cheek, and the numerous other muscles acting on the lips. It inserts into the skin and mucous membrane of the lips, and into itself.

Contraction of the orbicularis oris narrows the mouth and closes the lips.



Oral group

Buccinator

The buccinator forms the muscular component of the cheek and is used every time air expanding the cheeks is forcefully expelled. It is in the space between the mandible and the maxilla, **deep** to the other facial muscles in the area.

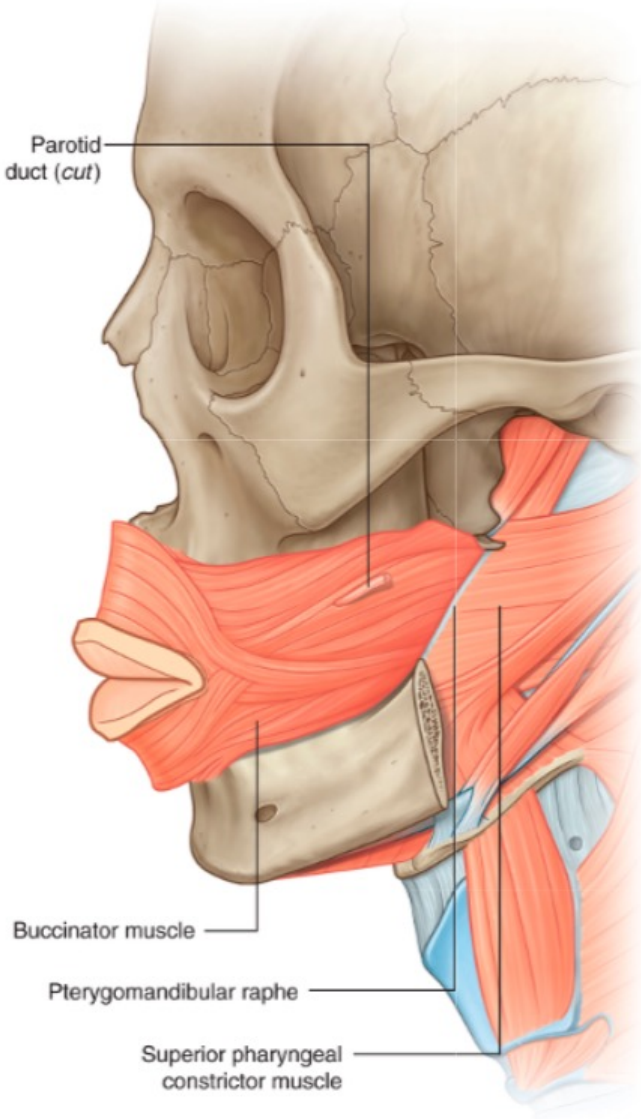
The Buccinator is covered by the buccopharyngeal fascia!

The buccinator arises from the posterior part of the maxilla and mandible opposite the molar teeth and the **pterygomandibular raphe**, which is a tendinous band between the pterygoid hamulus superiorly and the mandible (retromolar triangle) inferiorly and is a point of attachment for the buccinator and superior pharyngeal constrictor muscles.

The fibers of the buccinator pass toward the corner of the mouth to insert into the lips, blending with fibers from the orbicularis oris in a unique fashion. Central fibers of the buccinator cross so that lower fibers enter the upper lip and upper fibers enter the lower lip. The highest and lowest fibers of the buccinator do not cross and enter the upper and lower lips, respectively.

Contraction of the buccinator presses the cheek against the teeth. This keeps the cheek taut and aids in mastication by preventing food from accumulating between the teeth and the cheek. The muscle also assists in the forceful expulsion of air from the cheeks.

through the buccinator pass the duct of the parotid salivary gland **(ductus parotideus) + n. buccalis** (sensory innervation of the facial mucosa)

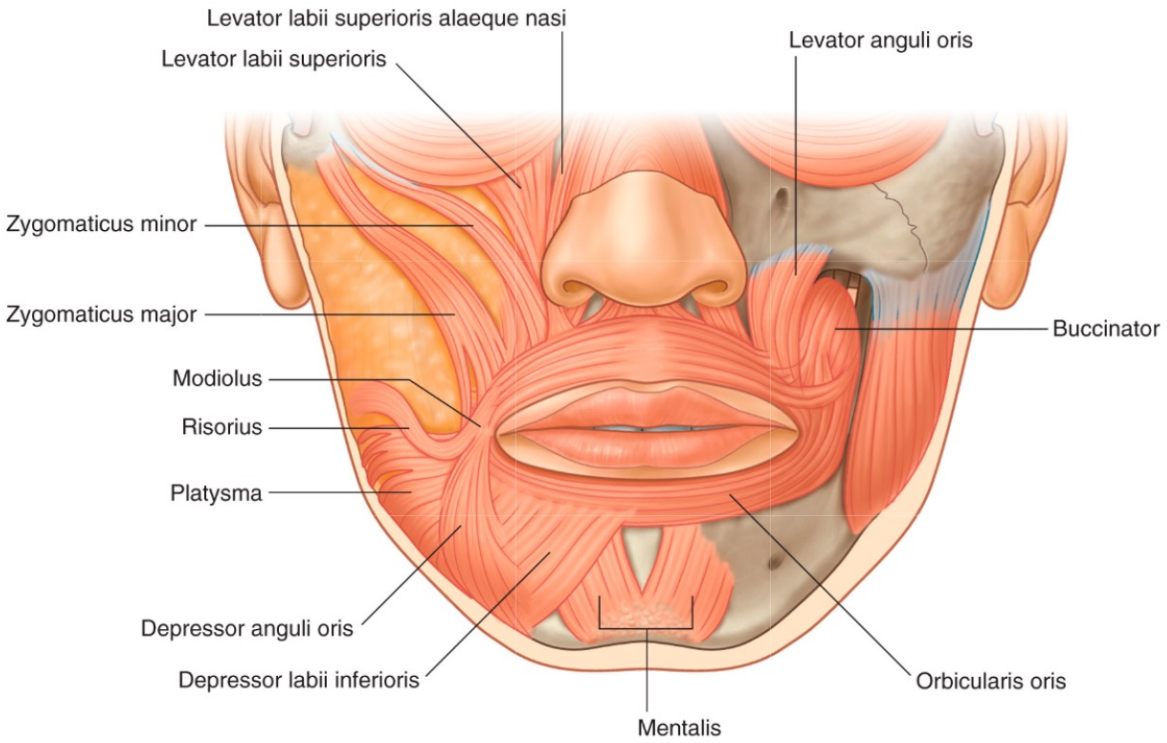


Lower group of oral muscles

- The **depressor anguli oris** is active during frowning. It arises along the side of the mandible below the canine, premolar, and first molar teeth and inserts into skin and the upper part of the orbicularis oris near the corner of the mouth. It depresses the corner of the mouth.

- The **depressor labii inferioris** arises from the front of the mandible, deep to the depressor anguli oris. Its fibers move superiorly and medially, some merging with fibers from the same muscle on the opposite side and fibers from the orbicularis oris before inserting into the lower lip. It depresses the lower lip and moves it laterally.

- The **mentalis** helps position the lip when drinking from a cup or when pouting. It is the deepest muscle of the lower group arising from the mandible just inferior to the incisor teeth, with its fibers passing downward and medially to insert into the skin of the chin. It raises and protrudes the lower lip as it wrinkles the skin of the chin – Draws in ***sulcus mentalolabialis***



Upper group of oral muscles

- The **risorius** helps produce a grin. It is a thin, superficial muscle that extends laterally from the corner of the mouth in a slightly upward direction. Contraction of its fibers pulls the corner of the mouth laterally and upward.

- The **zygomaticus major** and **zygomaticus minor** help produce a smile.

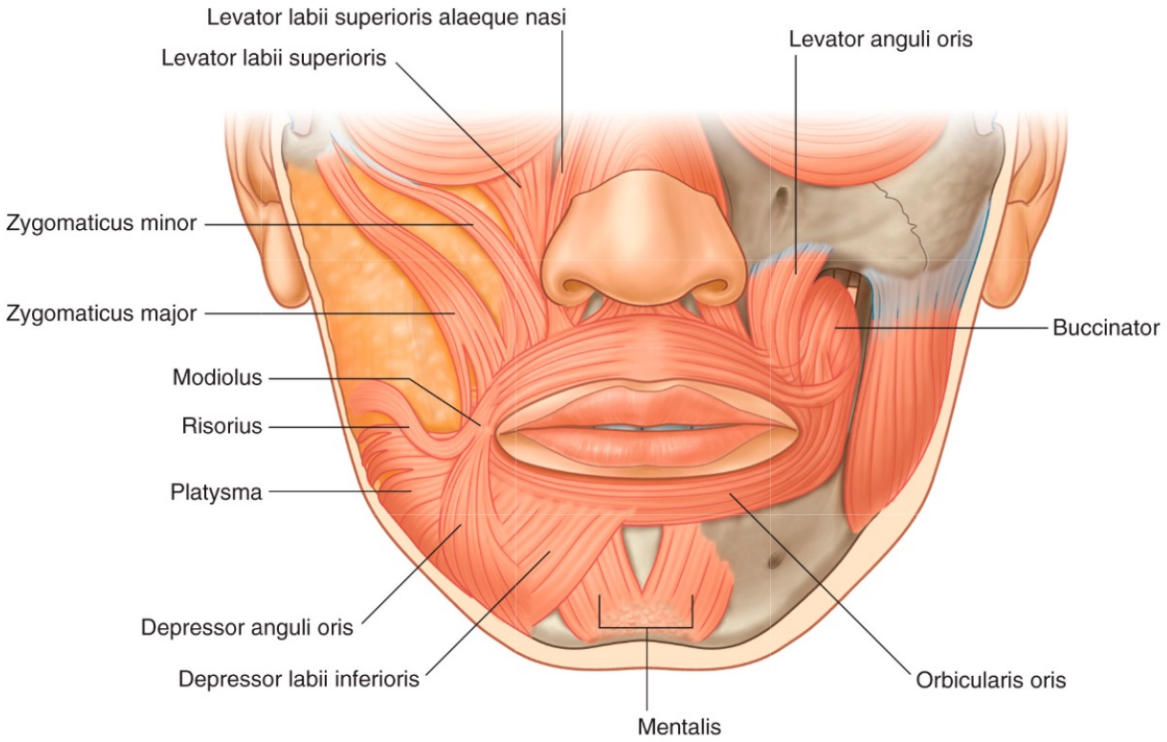
The zygomaticus major is a superficial muscle that arises deep to the orbicularis oculi along the posterior part of the lateral surface of the zygomatic bone, and passes downward and forward, blending with the orbicularis oris and inserting into skin at the corner of the mouth.

The zygomaticus minor arises from the zygomatic bone anterior to the origin of the zygomaticus major, parallels the path of the zygomaticus major, and inserts into the upper lip medial to the corner of the mouth. Both zygomaticus muscles raise the corner of the mouth and move it laterally.

- The **levator labii superioris** deepens the furrow between the nose and the corner of the mouth during sadness . It arises from the maxilla just **superior to the infraorbital foramen**, and its fibers pass downward and medially to blend with the orbicularis oris and insert into the skin of the upper lip.

- The **levator labii superioris alaeque nasi** is medial to the levator labii superioris, arises from the maxilla next to the nose, and inserts into both the alar cartilage of the nose and skin of the upper lip. It may assist in flaring the nares.

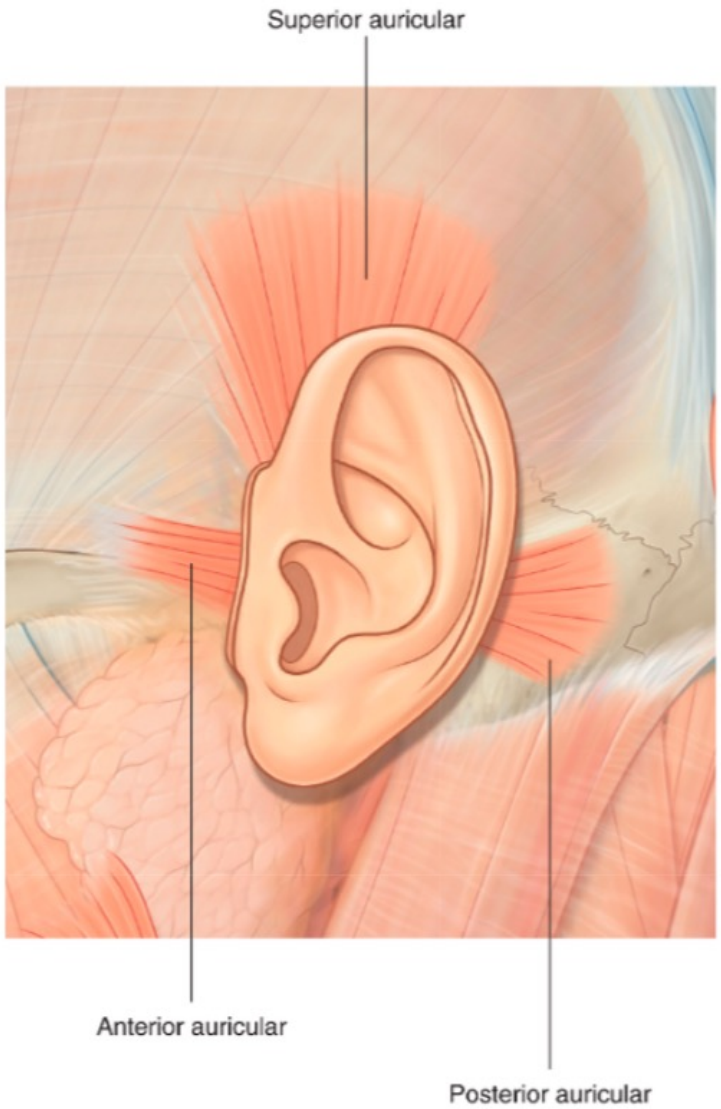
- The **levator anguli oris** is more deeply placed and covered by the other two levators and the zygomaticus muscles. It arises from the maxila **(canine fossa)**, just inferior to the infraorbital foramen and inserts into the skin at the corner of the mouth. It elevates the corner of the mouth and may help deepen the furrow between the nose and the corner of the mouth during sadness.



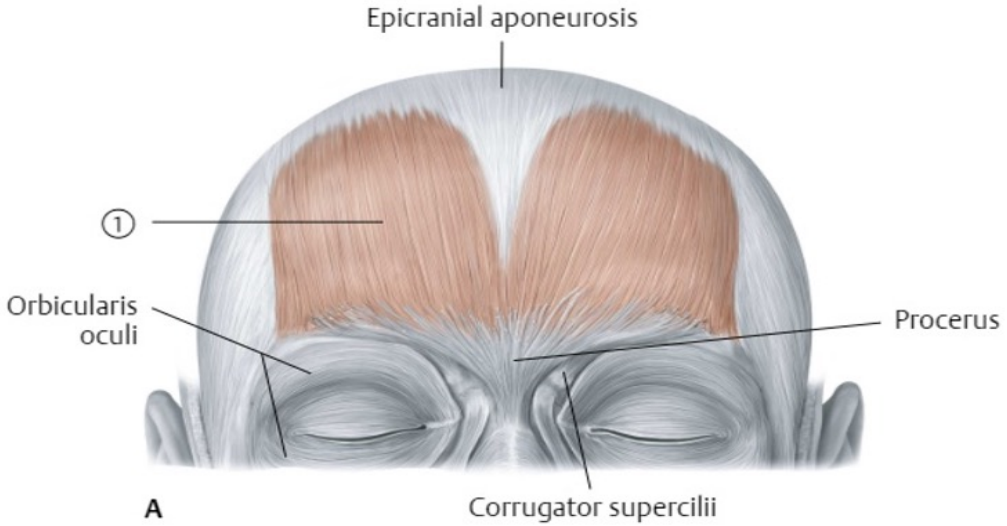
Auricular muscles

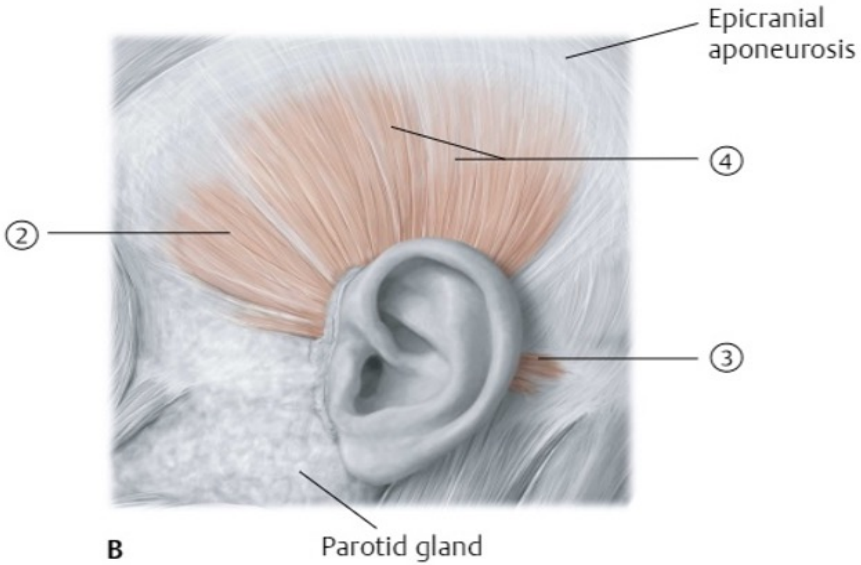
Three of these muscles, “other muscles of facial expression,” are associated with the ear—the anterior, superior, and posterior **auricular muscles**:

- **The anterior auricular muscle** is anterolateral and pulls the ear upward and forward.
- **The superior auricular muscle** is superior and elevates the ear.
- **The posterior auricular muscle** is posterior and retracts and elevates the ear.



The muscles of the calvaria that arise from the epicranial aponeurosis (temporoparietalis and occipitofrontalis) are collectively known as the "epicranial muscles." The occipitofrontalis has two bellies: frontal (frontalis) and occipital (occipitalis).



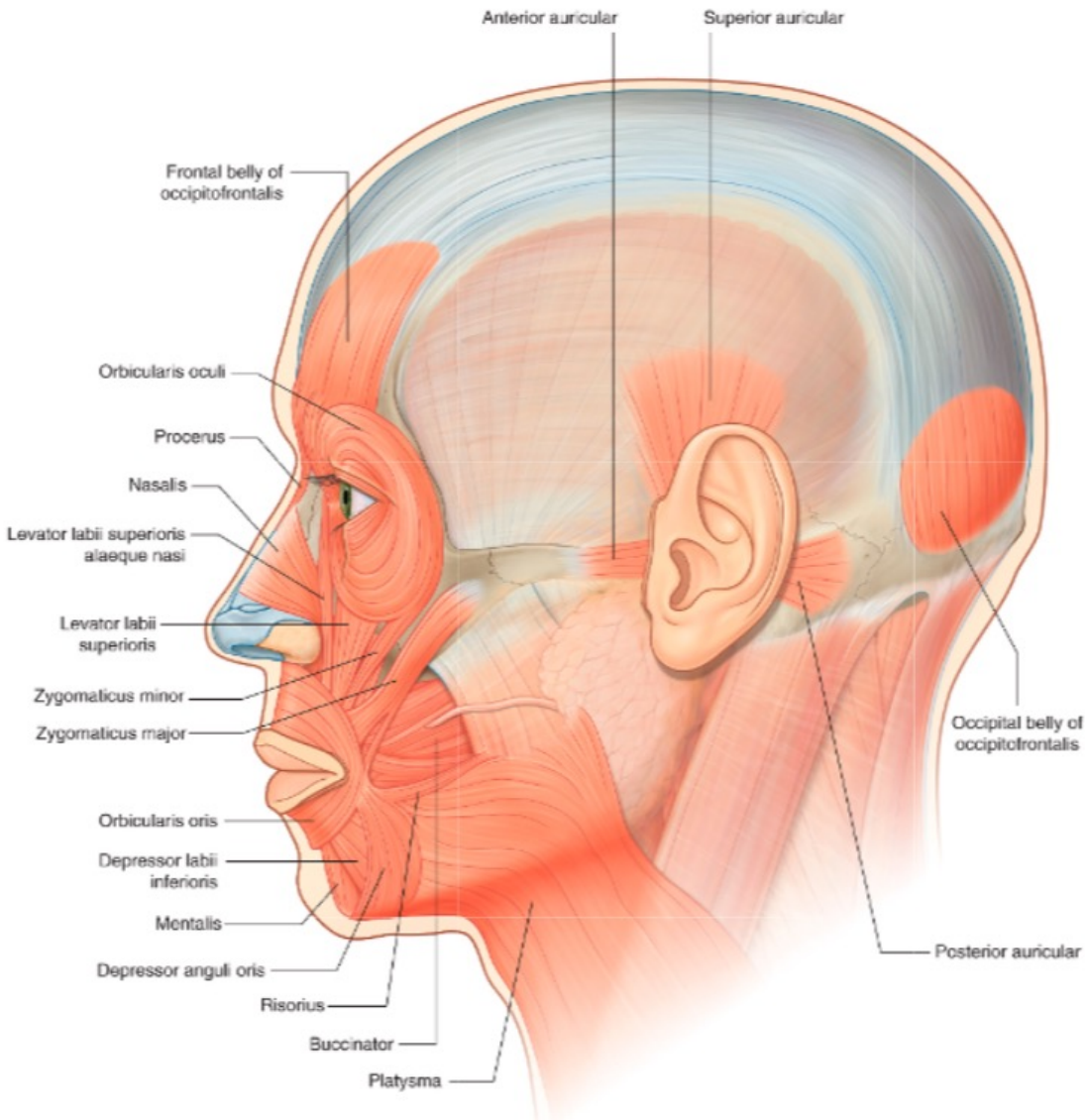


M. occipitofrontalis

is associated with the scalp. It consists of a frontal belly anteriorly and an occipital belly posteriorly. An aponeurotic tendon connects the two:

- **The frontal belly** covers the forehead and is attached to the skin of the eyebrows.
- **The occipital belly** arises from the posterior aspect of the skull and is smaller than the frontal belly.

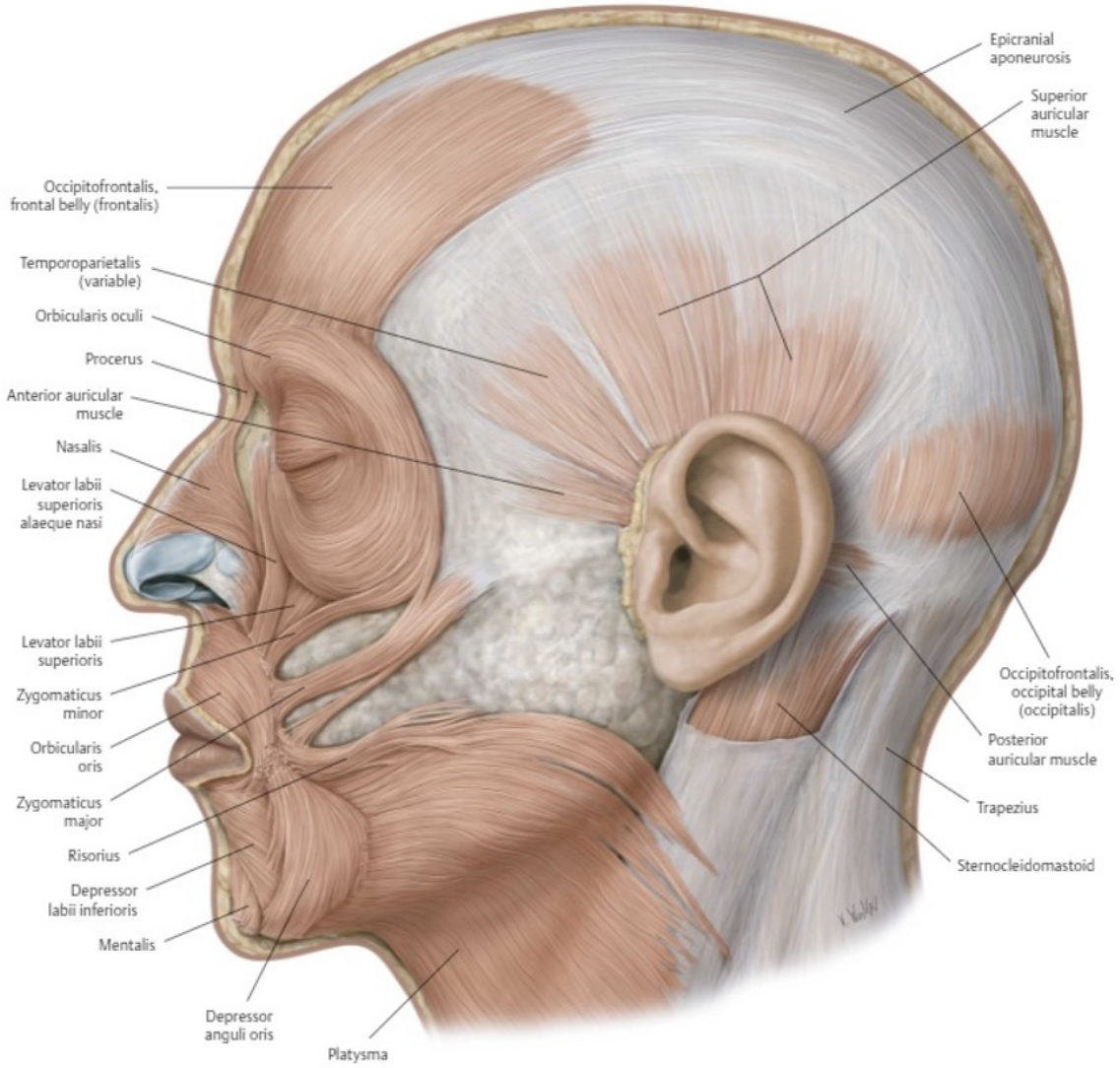
The occipitofrontalis muscles move the scalp and forms horizontal wrinkle of the forehead.



Platysma

The **platysma** is a large, thin sheet of muscle in the superficial fascia of the neck. It arises below the clavicle in the upper part of the thorax and ascends through the neck to the mandible. At this point, the more medial fibers insert on the mandible, whereas the lateral fibers join with muscles around the mouth.

The platysma tenses the skin of the neck and can move the lower lip and corners of the mouth down.



Masticatory muscles

Muscle	origin	insertion	Function	Innervation
M. TEMPORALIS	Inf. Temporal line and temporal fossa	CORONOID (MUSCULAR) PROCESS	ELEVAION (ALL PARTS) PROTRACTION (ANT. PART) RETRACTION (POST. PART)	ANT. AND POST. DEEP TEMPORAL NN.
M. PTERYGOIDEUS LATERALIS	Superior head – infratemporal crest of greater wing of sphenoid bone	ARTICULAR CAPSULE AND DISC	BILATERAL ACTION – PROTRACTION, INITIATES DEPRESSION UNILATERAL ACTION – LATEROPULSION TO THE OPPOSITE SIDE	N. PTERYGOIDEUS LATERALIS
	Inferior head- lateral plate of pterygoid proces of sphenoid bone	PTERYGOID FOVEA		
M. PTERYGOIDEUS MEDIALIS	Superficial head – maxillary tuberosity and pyramidal process of palatine bone	PTERYGOID TUBEROSITY	BILATERAL ACTION – ELEVATION UNILATERAL ACTION- LATEROPULSION	N. PTERYGOIDEUS MEDIALIS
	Deep head – Pterygoid fossa			
M. MASSETER	Superficial head – ZYGOMATIC PROCESS OF MAXILLAE & INFERIOR MARGIN OF ANT 2/3 OF ZYGOMATIC ARCH	MASSETERIC TUBEROSITY	ELEVATION (ALL PARTS) PROTRACTION (SUPERFICIAL PART) RETRACTION (DEEP PART)	MASSETERIC N.
	DEEP HEAD- INFERIOR MARGIN OF POST. 1/3 OF ZYGOMATIC ARCH AND ALL ITS INTERNAL SURFACE	EXTERNAL SURFACE OF RAMUS OF MANDIBLE		

Masticatory muscles

***Table 6.6* Masseter and temporalis muscles**

Muscle		Origin	Insertion	Innervation*	Action
Masseter	① Superficial head	Zygomatic bone (maxillary process) and zygomatic arch (lateral aspect of anterior ⅔)	Mandibular angle and ramus (inferior lateral surface)	Masseteric n. (anterior division of CN V_3)	*Bilateral:* Elevates mandible, also assists in protraction *Unilateral:* Lateral movement of mandible (chewing)
	Middle head	Zygomatic arch (medial aspect of anterior ⅔)	Mandibular ramus (central part of lateral surface)		
	② Deep head	Zygomatic arch (deep surface of posterior ⅓)	Mandibular ramus (superior lateral surface) and inferior coronoid process		
Temporalis	③ Superficial head	Temporal fascia	Coronoid process of mandible (apex, medial surface, and anterior surface of mandibular ramus)	Deep temporal nn. (anterior division of CN V_3)	*Vertical (anterior) fibers:* Elevate mandible *Horizontal (posterior) fibers:* Retract (retrude) mandible *Unilateral:* Lateral movement of mandible (chewing)
	④ Deep head	Temporal fossa (inferior temporal line)			

* The muscles of mastication are innervated by motor branches of the mandibular nerve (CN V_3), the 3rd division of the trigeminal nerve (CN V).

Masticatory muscles

Table 6.7 **Lateral and medial pterygoid muscles**

Muscle		Origin	Insertion	Innervation	Action
Lateral pterygoid	⑤ Superior (upper) head	Greater wing of sphenoid bone (infratemporal crest)	Mandible (pterygoid fovea) and temporomandibular joint (articular disk)	Lateral pterygoid nerve (anterior division of CN V_3)	*Bilateral:* Protrudes mandible (pulls articular disk forward) and opens mouth. *Unilateral:* Alternating actions, along with ipsilateral medial pterygoid, result in side-to-side movements necessary for grinding.
	⑥ Inferior (lower) head	Lateral pterygoid plate (lateral surface)	Mandible (pterygoid fovea and condylar process) and neck of mandible		
Medial pterygoid	⑦ Superficial (external) head	Maxilla (maxillary tuberosity) and palatine bone (pyramidal process)	Pterygoid rugosity on medial surface of the mandibular angle	Medial pterygoid nerve (trunk of CN V_3)	*Bilateral:* Elevation of mandible; also acts with lateral pterygoid to assist in protrusion of mandible. *Unilateral:* Acts with ipsilateral lateral pterygoid to protrude mandible and produce medial movement toward the opposite side. Alternating actions between right and left sides results in side-to-side chewing movements.
	⑧ Deep (internal) head	Medial surface of lateral pterygoid plate and pterygoid fossa			

Temporalis and masseter

A Superficial dissection.

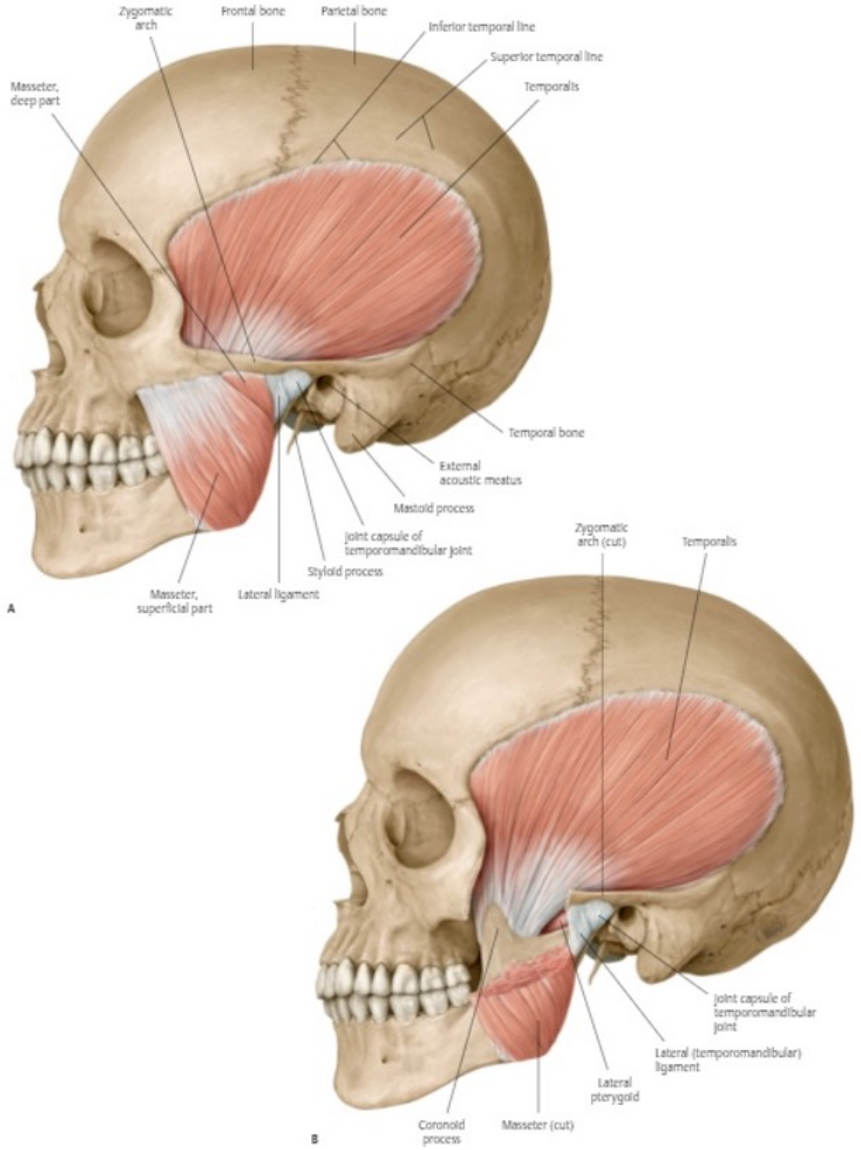
B Deep dissection. The masseter and zygomatic arch have been partially removed to show the full extent of the temporalis.

The temporalis m. is the most powerful muscle of mastication, doing approximately half the work. It works with the masseter (consisting of a superficial, an intermediate, and a deep part) to elevate the mandible and close the mouth.

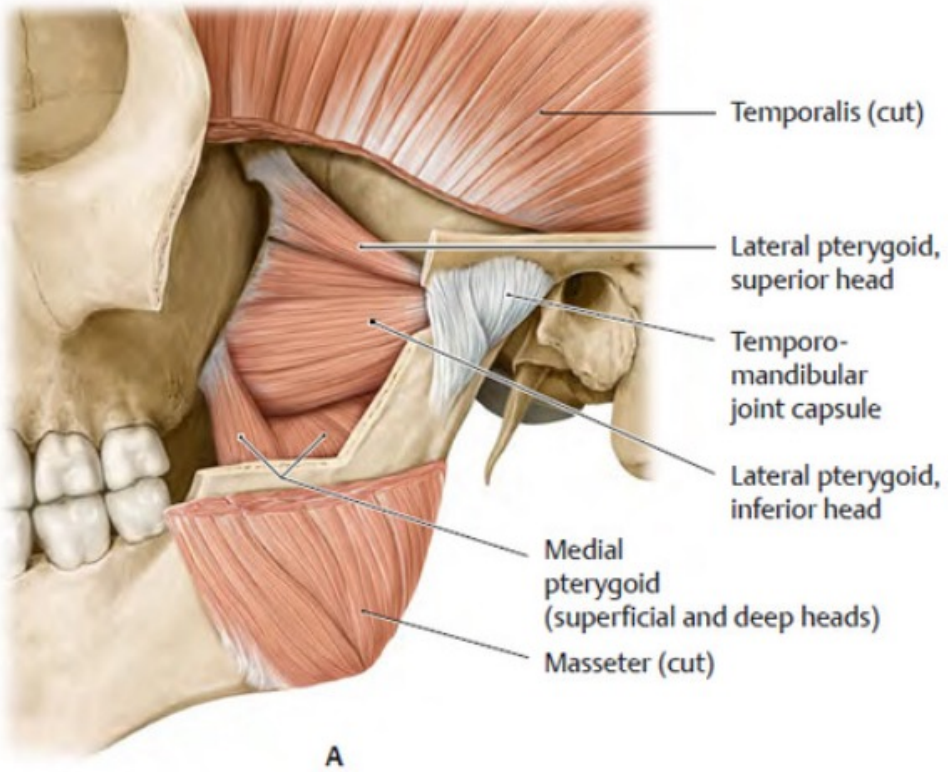
These muscles, along with the other muscles of mastication, may become hypertrophied in *bruxism*, a condition in which an individual clenches or grinds their teeth. The muscles may be tender and painful, especially during chewing. Spasm of the muscles causes *trismus* (restricted mouth opening) and it may be difficult for the dentist to retract the cheek (due to masseter hypertrophy and spasm). Other symptoms of bruxism include temporomandibular joint pain, excessive tooth wear, and tooth fracture.

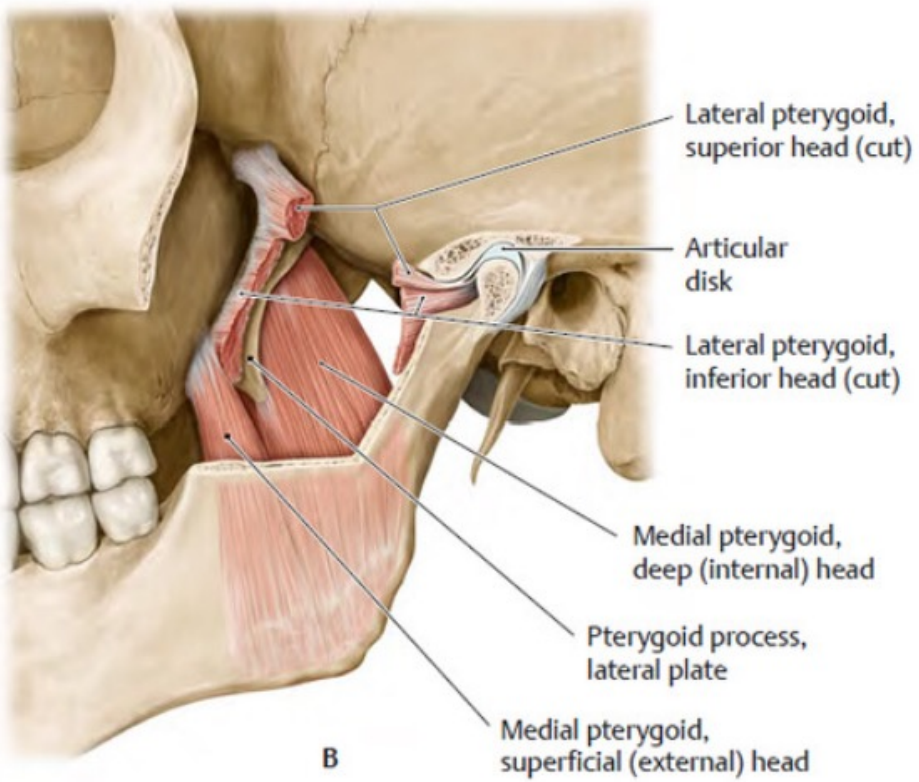
The masseter m. The most obvious muscle of mastication is the masseter muscle, since it is the most superficial and one of the strongest.

To perform an extraoral examination ask the patient to clench his or her teeth several times



A The coronoid process of the mandible has been removed here along with the lower part of the temporalis so that both pterygoid muscles are observed.
B Here the temporalis has been completely removed, and the inferior head of the lateral pterygoid has been windowed. The *lateral* pterygoid initiates depression of the mandible, which is then continued by the suprahyoid and infrahyoid muscles and gravity. The lateral pterygoid functions as the guide muscle of the temporomandibular joint.
The *medial* pterygoid runs almost perpendicular to the lateral pterygoid and contributes to the formation of a muscular sling that partially encompasses the mandible. Note how the inferior head of the lateral pterygoid originates between the two heads of the medial pterygoid.

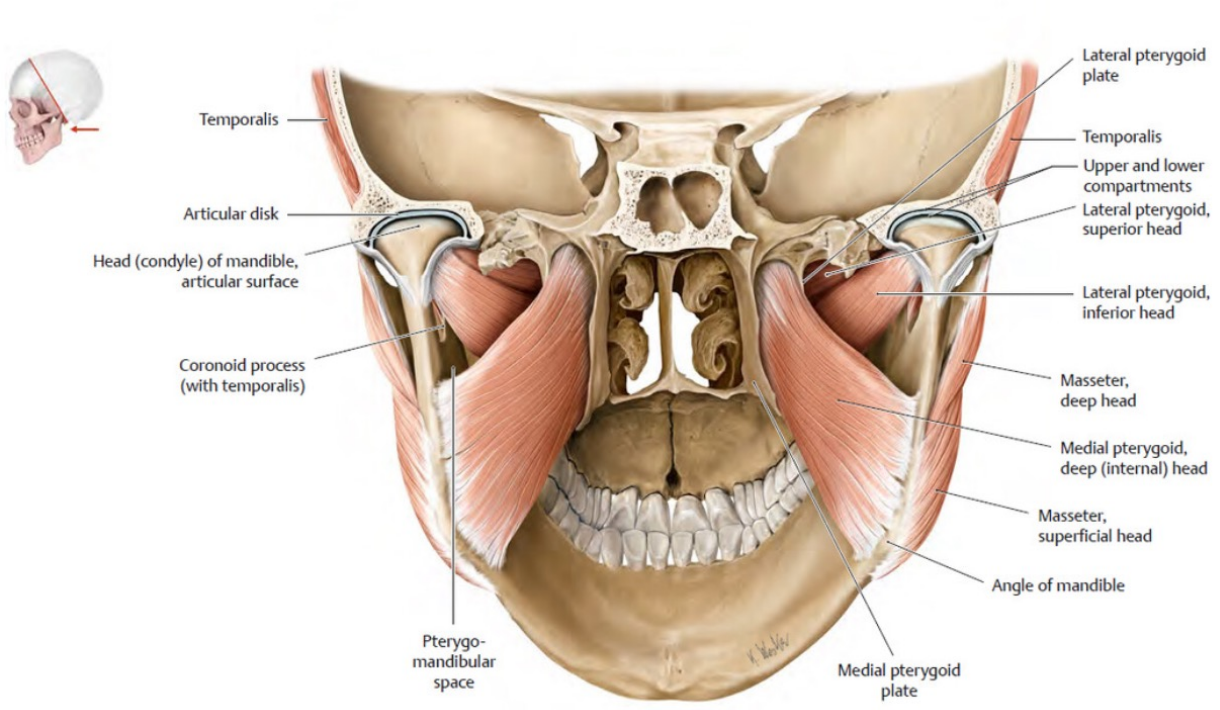




Oblique posterior view

The masseter and *medial* pterygoid form a **muscular sling** in which the mandible is suspended. By combining the actions of both muscles into a functional unit, this sling enables **powerful closure of the jaws and side-to-side movements when acting unilaterally**.

Note: The space between the medial border of the mandible and the medial pterygoid is referred to as the **pterygomandibular space**. It is important as it is the target area for administering local anesthesia to the inferior alveolar nerve!



Thank you for your attention!