

INTERNATIONAL SURGICAL
ANATOMY TEACHING
SERIES



ISATS HANDOUT 2026/27

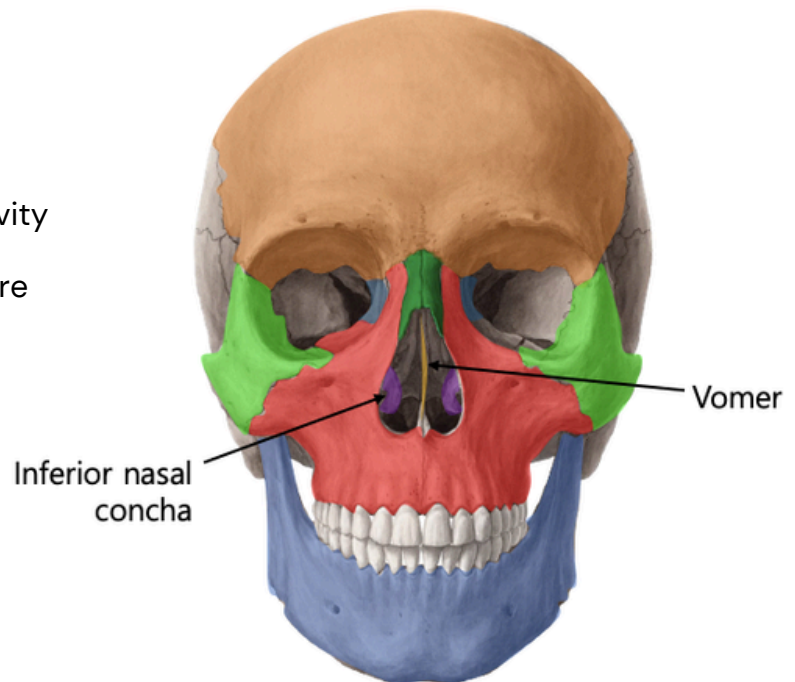
Face & Dental

FACE & DENTAL ANATOMY

Objectives: Understand the bony anatomy of the viscerocranium, mandible and TMJ. Explain the gross anatomy of the muscles of facial expression & mastication. Trace important neurovascular structures in the face. Understand the gross anatomy of the oral cavity and palate. Apply anatomical knowledge in context of common procedures within Maxillofacial surgery.

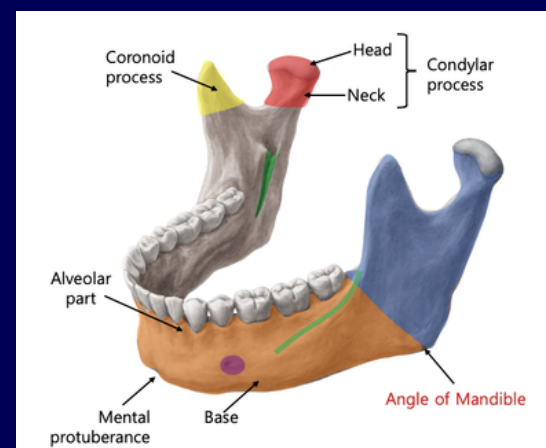
Bony Anatomy of The Face

- **Cranium**
 - **Neurocranium**
 - Calvaria – superior skull cap
 - Cranial base – floor of cranial cavity
 - **Viscerocranium** – facial skeleton
- Bones of the facial skeleton (all bones are paired except for the vomer)
 - Frontal bone
 - Nasal bone
 - Palatine bone
 - Maxilla
 - Zygomatic bone
 - Lacrimal bone
 - Inferior nasal concha
 - Vomer
 - Mandible



Mandible (Lower Jaw)

- **Components:**
 - **Body of mandible**
 - Base of mandible – mental protuberance & tubercles
 - Alveolar part of mandible – contains teeth
 - **Ramus of mandible**
 - Condylar & Coronoid processes
 - Angle of mandible
- **Mental foramen** – Contain mental a, v & n
- **Oblique foramen** – extends from ramus to body of mandible



Maxilla (Upper Jaw)

- Paired maxillae – forms upper jaw (space between orbit and upper teeth)
- **Anatomical relations**
 - Superiorly – rim of orbit
 - Laterally – zygomatic bone
 - Inferiorly – opening of oral cavity
- **Alveolar processes** --> contains arcade and forms upper jaw

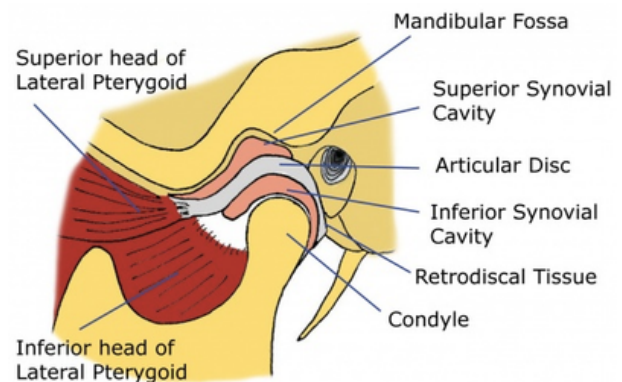


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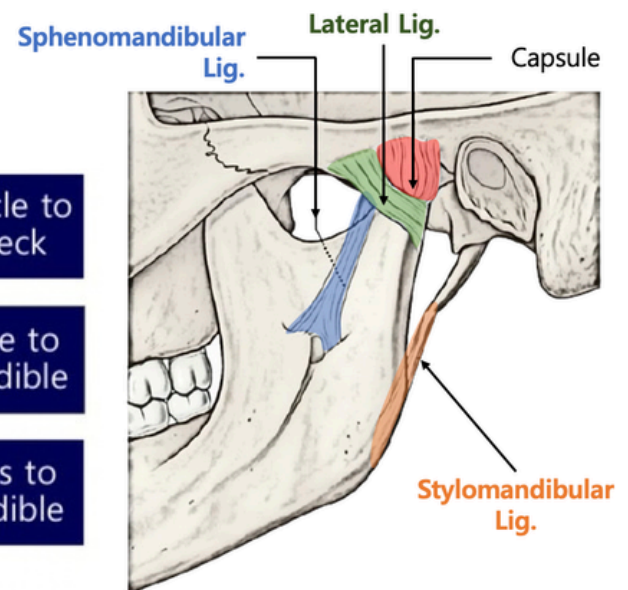
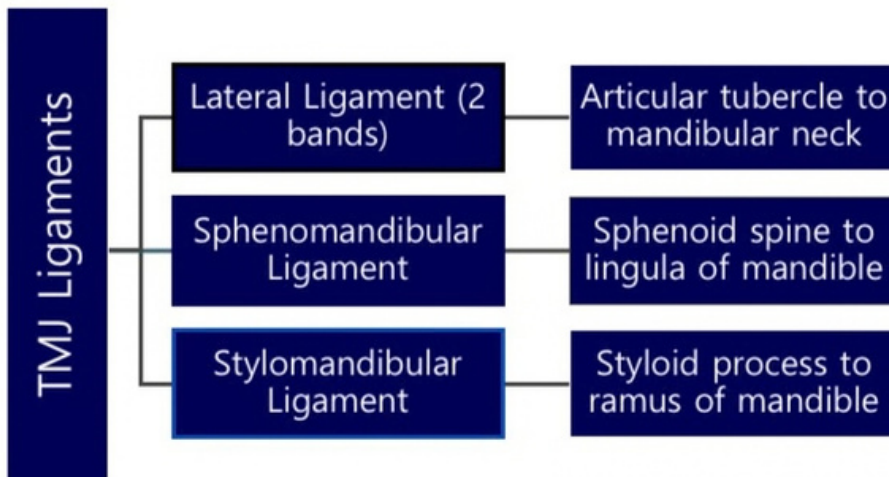
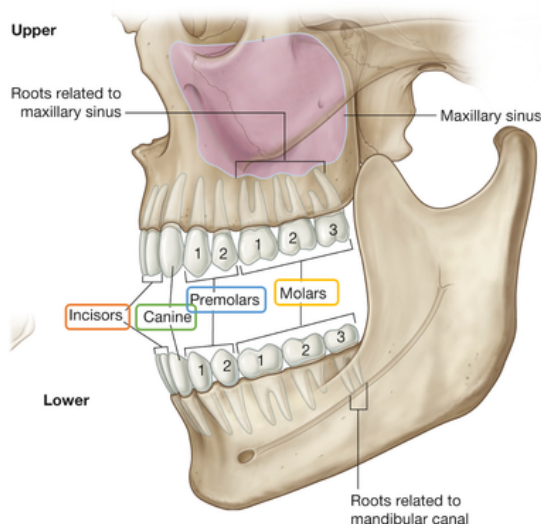
Temporomandibular Joint (TMJ)

- TMJ – modified hinge synovial joint
- Articulations of mandible & cranium (temporal bone)
 - Mandibular fossa
 - Articular tubercle (temporal bone)
 - Head of mandible (condyle)
- **Movement:** protrusion, retraction, elevation, depression.



Ligaments:

1. **Lateral ligament:** articular tubercle to mandible neck
2. **Sphenomandibular ligament:** sphenoid spine to mandible ramus
3. **Stylomandibular ligament:** styloid process to angle of mandible



Teeth & Gingivae

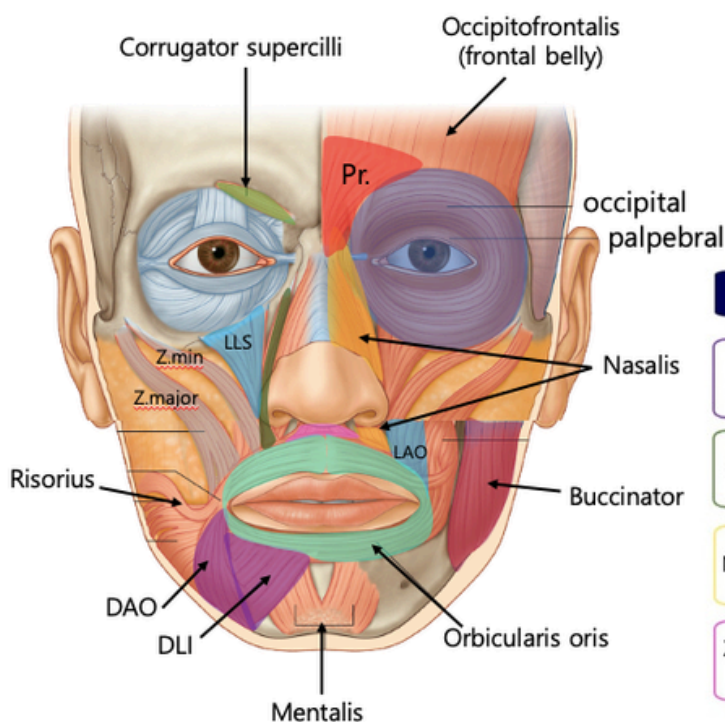
- Teeth – attached to alveoli (sockets) of alveolar arches of the mandible & maxilla
- Gingivae (gums) – oral mucosa that surround teeth & cover adjacent regions of alveolar bone
- 32 teeth – 16 upper and lower arches
 - Incisor – X2
 - Canine – X1
 - Pre-molar – X2
 - Molar – X3

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Muscles of Facial Expression

- Originate from bone or fascia
- Insert onto skin
- Innervation: **facial nerve (CNVII)**



Orbital Group

Orbicularis Oculi (palpebral & orbital)

Corrugator supercilli

Nasal Group

Nasalis (transverse & alar part)

Procerus

Depressor septi nasi

Oral Group

Depressor anguli oris & Depressor labii inferioris

Levator labii superioris alaeque nasi

Mentalis & Risorius

Zygomaticus major & minor

Levator anguli oris & Levator labii superioris

Orbicularis oris

Buccinator

Other Group

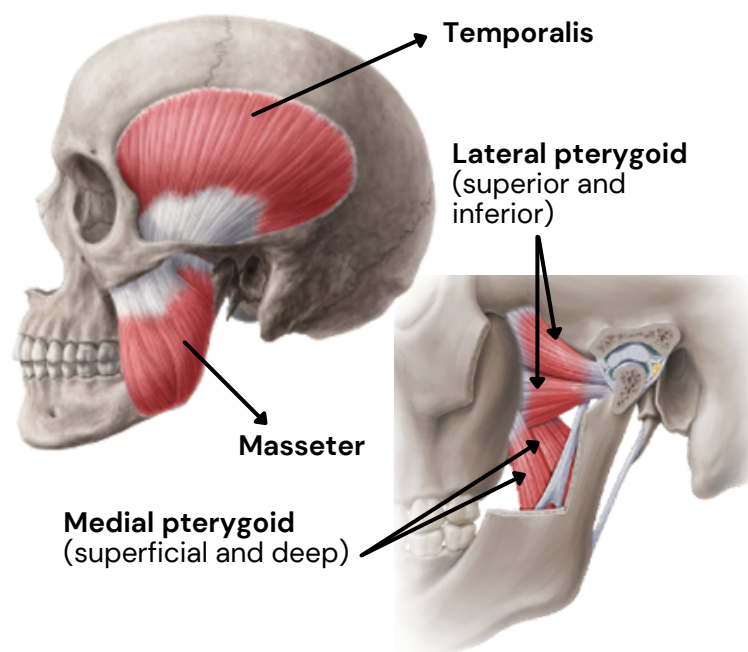
Auricular muscles (anterior, superior, posterior)

Occipitofrontalis (frontal & occipital belly)

Platysma

Muscles of Mastication

Muscle	Function	Innervation
Masseter	Protrusion, Elevation of mandible	CNV3 (masseteric nerve)
Temporalis	Elevation & retraction of mandible	CNV3 (deep temporal nerves)
Medial Pterygoid	Elevation, side-to-side movement (unilateral), protrusion (bilateral)	CNV3 (nerve to medial pterygoid)
Lateral Pterygoid	Protrusion, depression & side-to-side movements (unilateral),	CNV3 (nerve to lateral pterygoid)



FACE & DENTAL ANATOMY

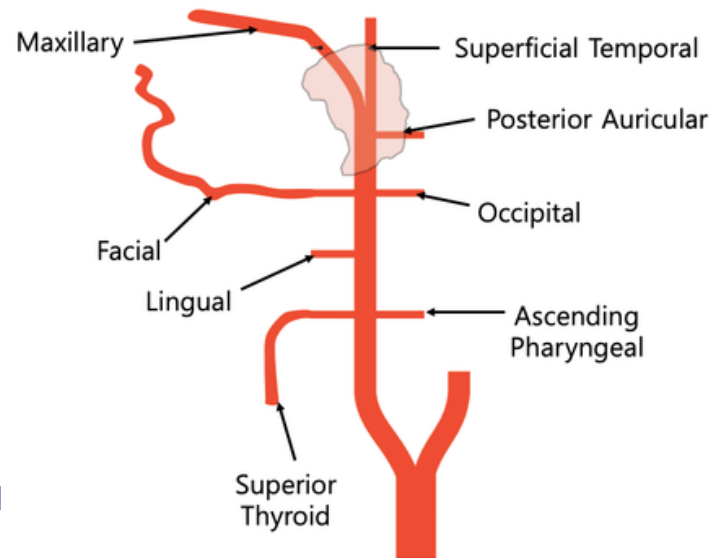
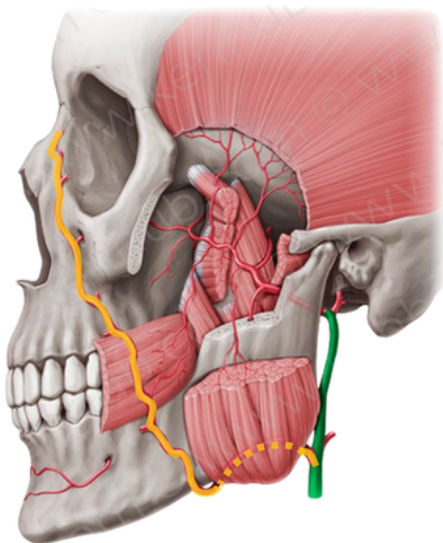
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Arterial Supply of the Face – ECA

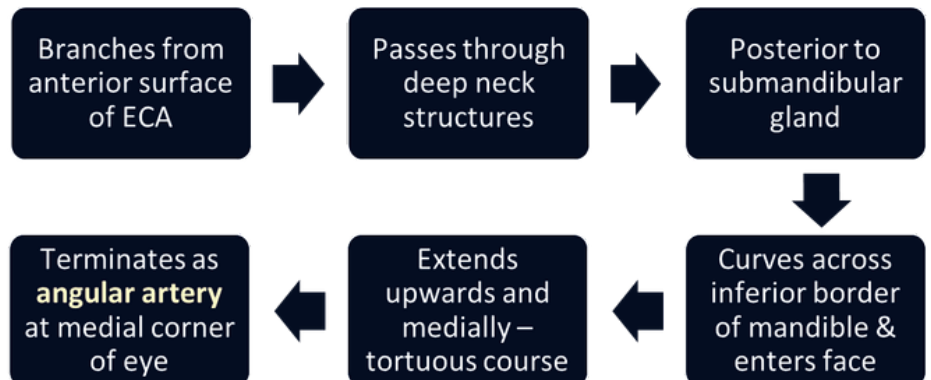
- 8 branches
- Supply head, face and meninges
- Terminal branches: superficial temporal and maxillary artery (within the parotid gland)

Superior Thyroid	Ascending Pharyngeal	Lingual	Facial
Occipital	Posterior auricular	Maxillary	Superficial temporal

Some Anatomists Like Freaking Out Poor Medical

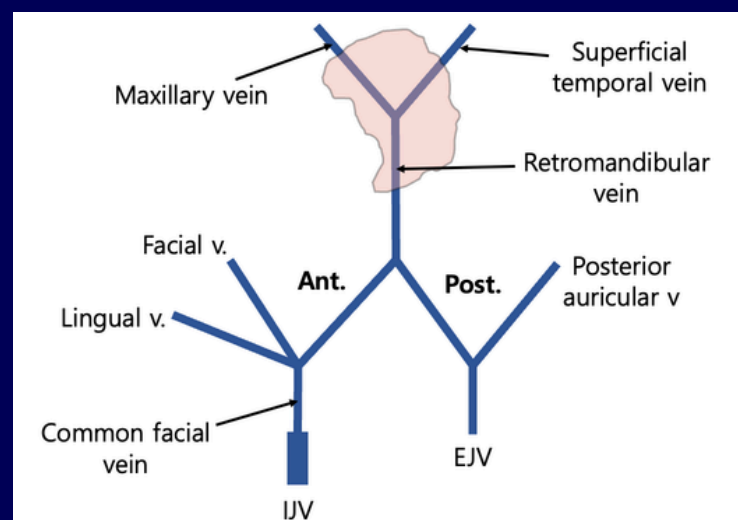


Course of the Facial Artery



Venous Drainage of the Face

- Retromandibular – formed from superficial temporal + maxillary vein
- **Anterior branch**
 - Drain into common facial vein
 - Drains into IJV
- **Posterior branch**
 - Joins with posterior auricular vein
 - Drains into EJV

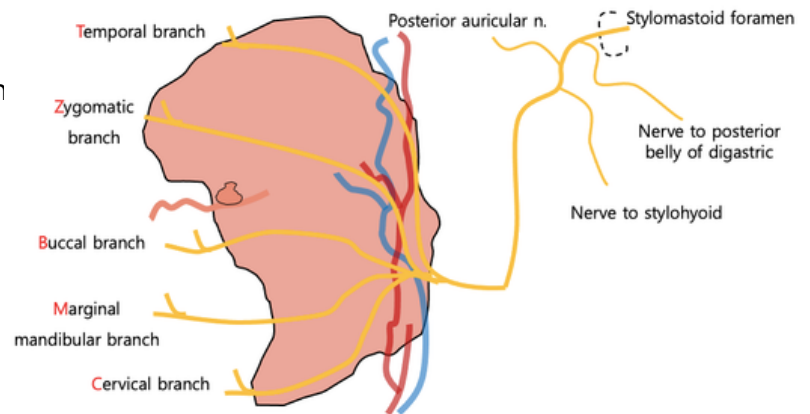


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Facial Nerve (CNVII)

- Facial nerve penetrates space between superficial & deep lobes of parotid gland
- Divides into temporofacial branch + cervicofacial branch
- 5 terminal branches
 - Temporal
 - Zygomatic
 - Buccal
 - Marginal mandibular
 - Cervical



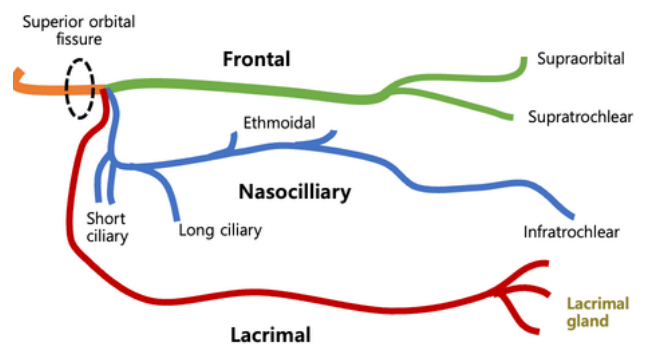
Intracranial → Stylomastoid foramen → 3 Extracranial branches → Parotid → 5 terminal branches

Trigeminal Nerve (CNV)

- Trigeminal nerve – provides cutaneous sensory innervation to most of the face

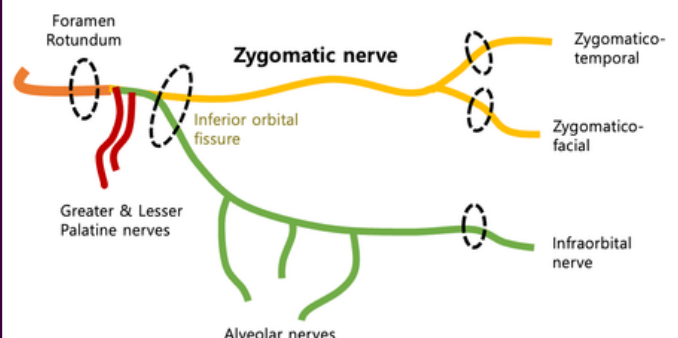
Ophthalmic Nerve (V1)

- **Exit skull** – superior orbital fissure
- **Main branches:** frontal, nasociliary, lacrimal
- **Supply:** Orbit, superior eyelids, forehead, scalp and anterior nose



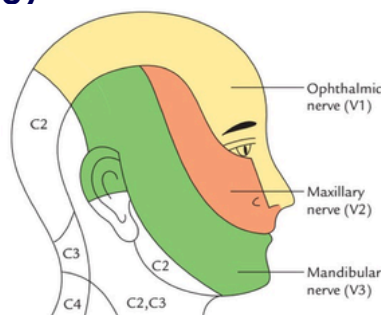
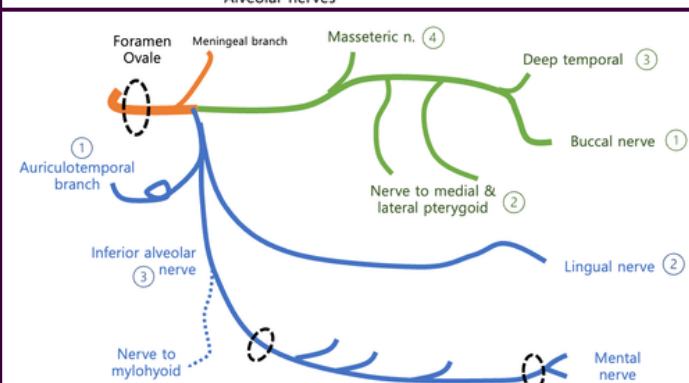
Maxillary Nerve (V2)

- **Exit skull** – foramen rotundum
- **Main branches:** zygomatic, greater & lesser palatine, infraorbital, alveolar
- **Supply:** temple, lower eyelid, cheek, upper lip



Mandibular Nerve (V3)

- **Exit skull** – foramen ovale
- **Main branches:** auriculotemporal, lingual, inferior alveolar, buccal, nerves to muscles of mastication
- **Supply:** anterior ear, temples, chin & lower lip, muscles of mastication

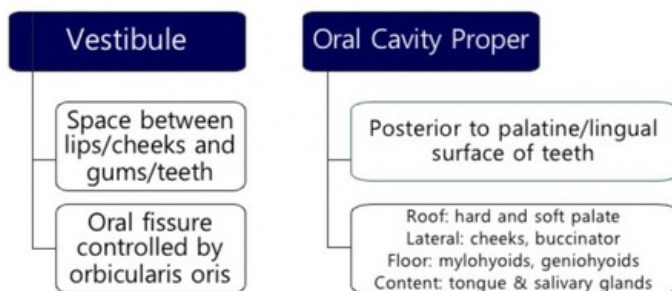
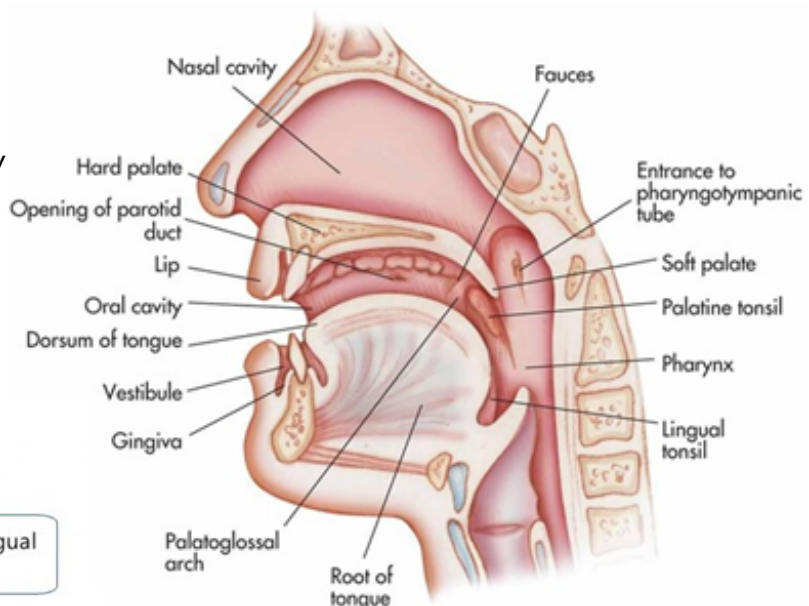


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Oral Cavity

- **Oral cavity**
 - Extends between oral fissure anteriorly to oropharyngeal isthmus posteriorly (opening of oropharynx)
- Function: digestion, communication, breathing
- Divisions – communicate via space behind 3rd molar



Hard & Soft Palate

- Palate – roof of oral cavity and floor of nasal cavity

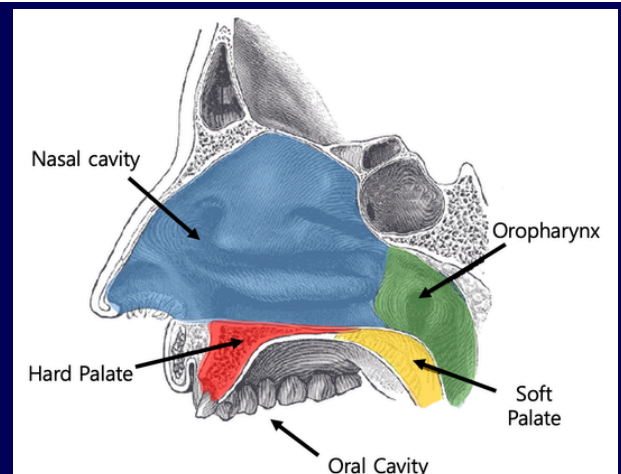
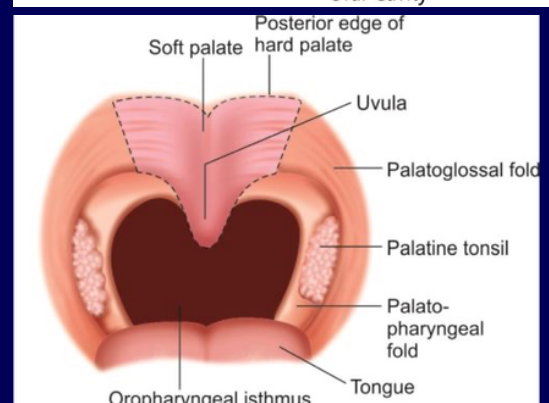
Hard Palate

- Separates oral cavity from nasal cavity
- Bony structures: palatine process of maxilla, horizontal plate of palatine bones
- Mucosa of hard palate – contain **palatine rugae**

Soft Palate

- Continues posteriorly from hard palate
- Covered by mucosa continuous with pharynx, oral & nasal cavities.
- Formed of 5 muscle covered in mucous membrane (CNX except tensor veli palatini – CNIX)
- Central midline process – **uvula**

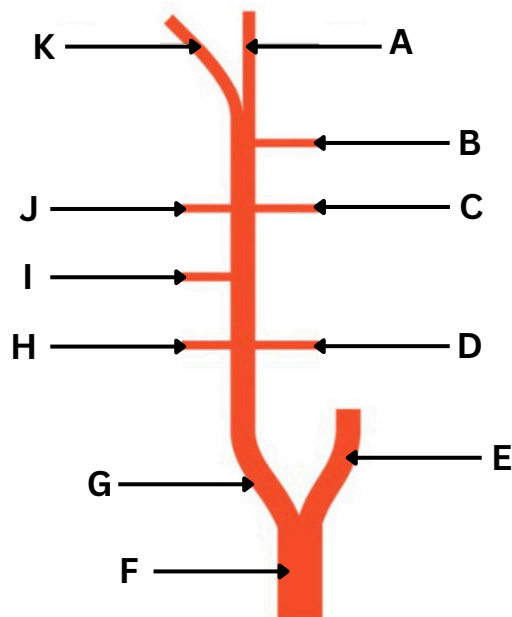
A: greater and lesser palatine arteries
V: pterygoid venous plexus
N: sensory (CNV2) – lesser and greater palatine nerves



FACE & DENTAL ANATOMY

Test yourself

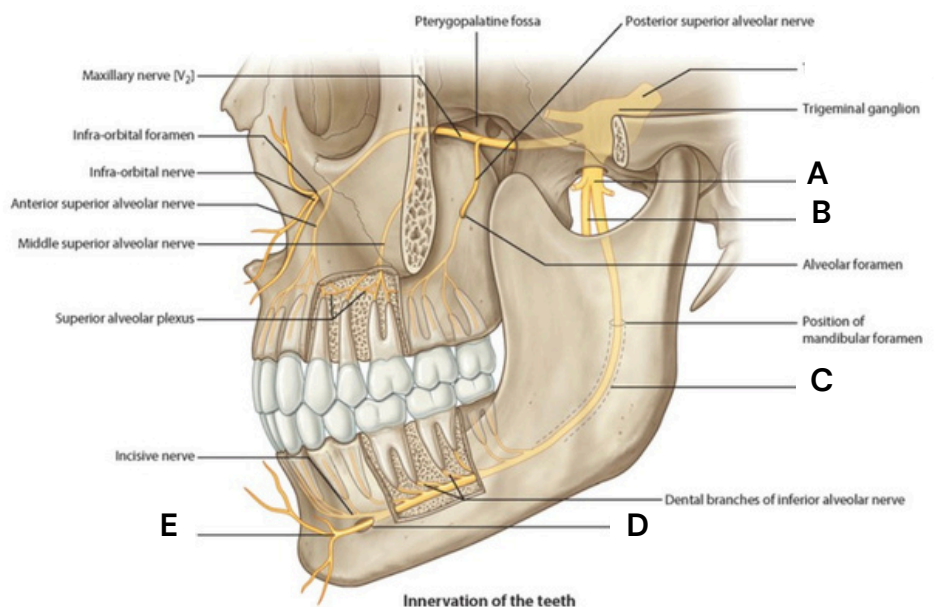
1) Label the branches of the external carotid artery:



- A)
- B)
- C)
- D)
- E)
- F)
- G)
- H)
- I)
- J)
- K)

2) Label the missing structures on the following diagram:

- A)
- B)
- C)
- D)
- E)



FACE & DENTAL ANATOMY

Test yourself

MCQ 1

A patient presents following trauma to the infratemporal fossa. On examination, they have difficulty opening their mouth due to impaired depression of the mandible. Which muscle has been affected?

- A. Masseter
- B. Temporalis
- C. Lateral pterygoid
- D. Medial pterygoid
- E. Buccinator

MCQ 2

When performing a parotidectomy, care must be taken to avoid the retromandibular vein. What two veins form the retromandibular vein?

- A. Superficial temporal vein and maxillary vein
- B. Facial vein and lingual vein
- C. Posterior auricular vein and facial vein
- D. Common facial vein and external jugular vein
- E. Maxillary vein and posterior auricular vein

MCQ 3

A laceration across the inferior border of the mandible, anterior to the masseter, results in arterial spurting. Which vessel is damaged?

- A. Superficial temporal artery
- B. Maxillary artery
- C. Facial artery
- D. Lingual artery
- E. Ascending pharyngeal artery

MCQ 4

Where does the inferior alveolar nerve enter the mandible to supply lower teeth and gingivae?

- A. Mental foramen
- B. Infraorbital foramen
- C. Foramen ovale
- D. Mandibular foramen
- E. Incisive foramen

MCQ 5

Which of the following is a terminal branch of the external carotid artery given off within the parotid gland?

- A. Superficial temporal artery
- B. Facial artery
- C. Lingual artery
- D. Occipital artery
- E. Superior thyroid artery

MCQ 6

Which ligament of the temporal mandibular joint attached from the sphenoid spine to the lingula of the mandible?

- A. Lateral ligament
- B. Sphenomandibular ligament
- C. Stylomandibular ligament
- D. Capsular ligament
- E. Pterygomandibular ligament

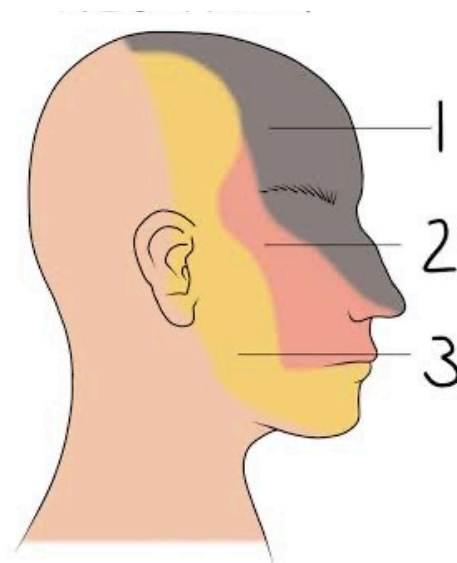
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Test yourself

OSCE Station – Case Based Discussion

A 58-year-old woman is referred to the oral and maxillofacial surgery outpatient clinic with a 4-month history of recurrent right-sided facial pain. She initially consulted her dentist because the pain appeared to originate from her upper teeth, but dental examination and radiographs revealed no abnormalities.

She describes sudden, severe, electric shock-like pain affecting her right cheek and upper lip, lasting a few seconds at a time. Episodes are triggered by brushing her teeth, washing her face and applying face cream. Neurological examination reveals normal facial sensation and motor function.



Q1. What is the most likely diagnosis based on this presentation?

Q2. Which division of the trigeminal nerve is primarily involved in this patient's symptoms, and through which cranial foramen does it exit the skull?

Q3. What clinical features would suggest a secondary cause of trigeminal neuralgia rather than classical trigeminal neuralgia?

Q4. What is the first-line pharmacological treatment for trigeminal neuralgia?

Q5. What surgical intervention may be considered in patients with trigeminal neuralgia who do not respond to medical management?

Answers:
Labelling: 1) A – Superficial Temporal, B – Posterior Auricular, C – Occipital, D – Inferior Alveolar Nerve, E – Mental Foramen, F – Mental Nerve
MCQs: 1) C 2) A 3) C 4) D 5) A 6) B
OSCEs: 1) Trigeminal neuralgia. This is suggested by recurrent, unilateral, severe, electric shock-like facial pain lasting seconds, triggered by normally harmless stimuli such as light touch or brushing the teeth. 2) The maxillary division (V2) of the trigeminal nerve, which exits the skull through the foramen rotundum. V2 provides sensory innervation to the cheek, upper lip, upper teeth and maxillary sinus. 3) Features suggesting secondary trigeminal neuralgia include persistent facial sensory loss, abnormal trigeminal reflexes, other cranial nerve deficits, bilateral symptoms or onset at a younger age. Potential secondary causes include multiple sclerosis and space-occupying lesions affecting the trigeminal nerve. A normal neurological examination does not completely exclude a secondary cause.
 4) Carbamazepine, a voltage-gated sodium channel blocker that reduces abnormal neuronal firing, is recommended by NICE as first-line pharmacological treatment. 5) Microvascular decompression may be considered, particularly when MRI demonstrates neurovascular compression of the trigeminal nerve. This involves surgically separating the compressing blood vessel from the nerve, often using an insulating material. Other options include percutaneous ablative procedures and stereotactic radiosurgery, depending on the patient's suitability and specialist assessment.