INTERNATIONAL SURGICAL ANATOMY TEACHING SERIES

ISATS HANDOUT 2025/26

Face & Dental

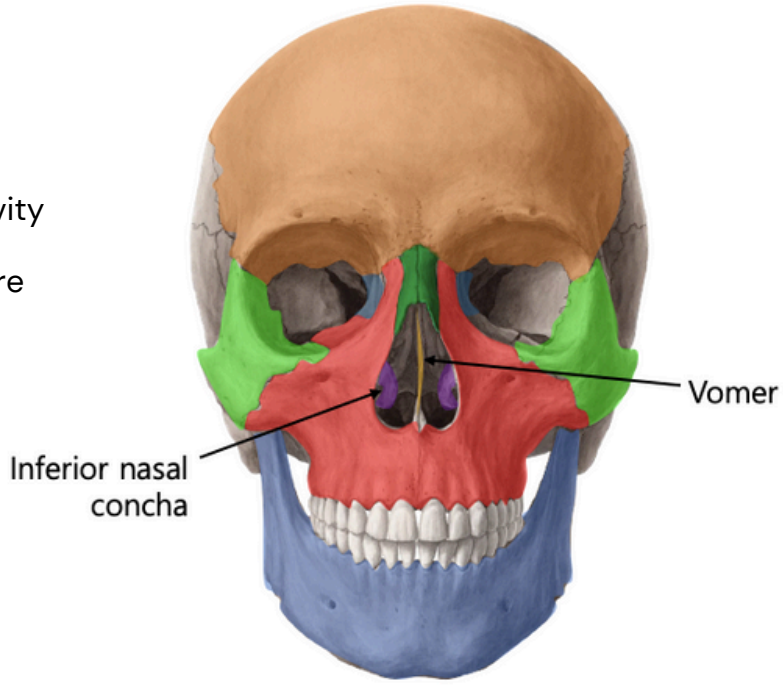
High Yield I Surgical Relevance I Approved for CPD Hours

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.*

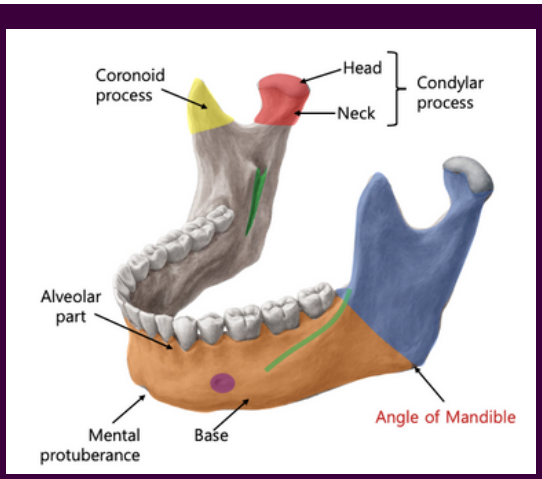
Bony Anatomy of The Face

- **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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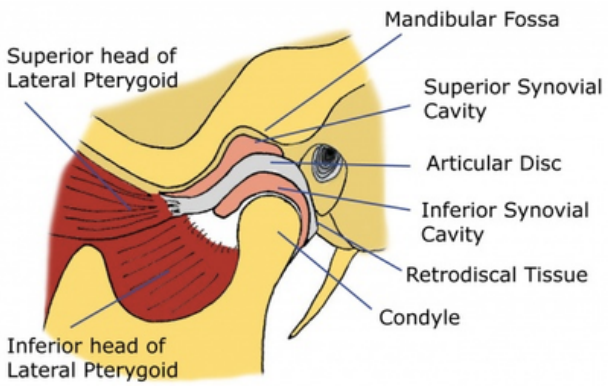
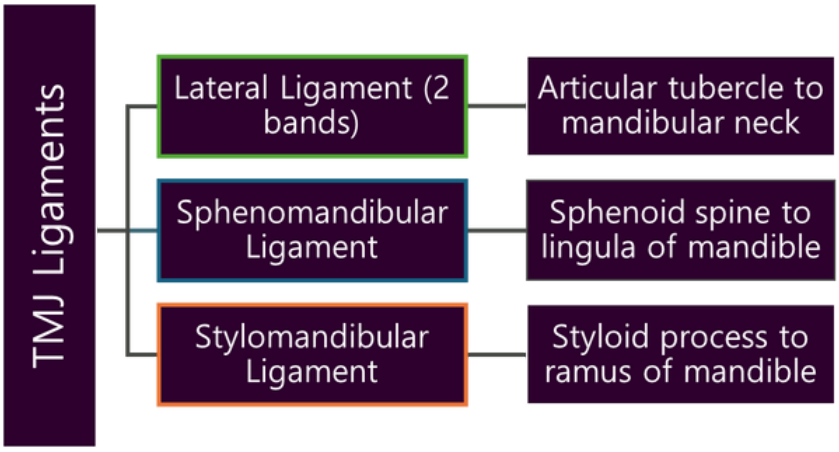
Temporomandibular Joint (TMJ)

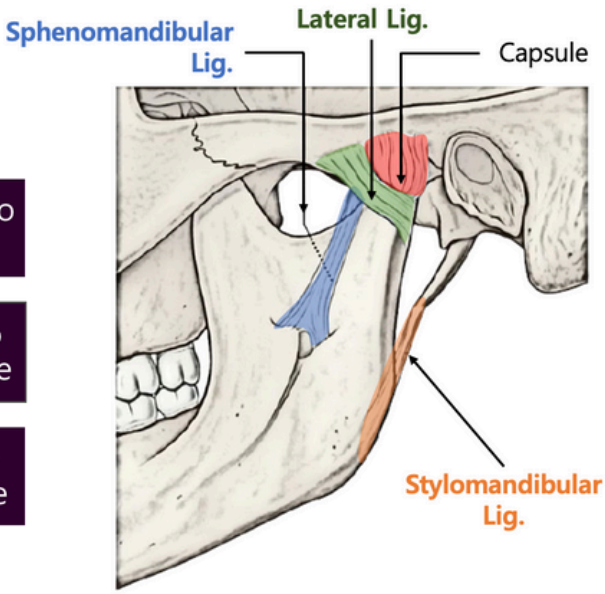
- TMJ - modified hinge synovial joint
- Articulations of mandible & cranium (temporal bone)
  - Mandibular fossa
  - Articular tubercle (temporal bone)
  - Head of mandible (condyle)
- **Movment**: protrusion, retraction, elevation, depression.

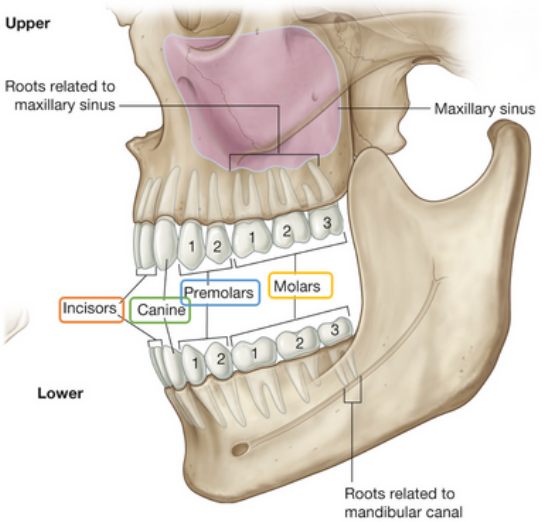


Ligaments:

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 arcades
  - Incisor - X2
  - Canine - X1
  - Pre-molar - X2
  - Molar - X3

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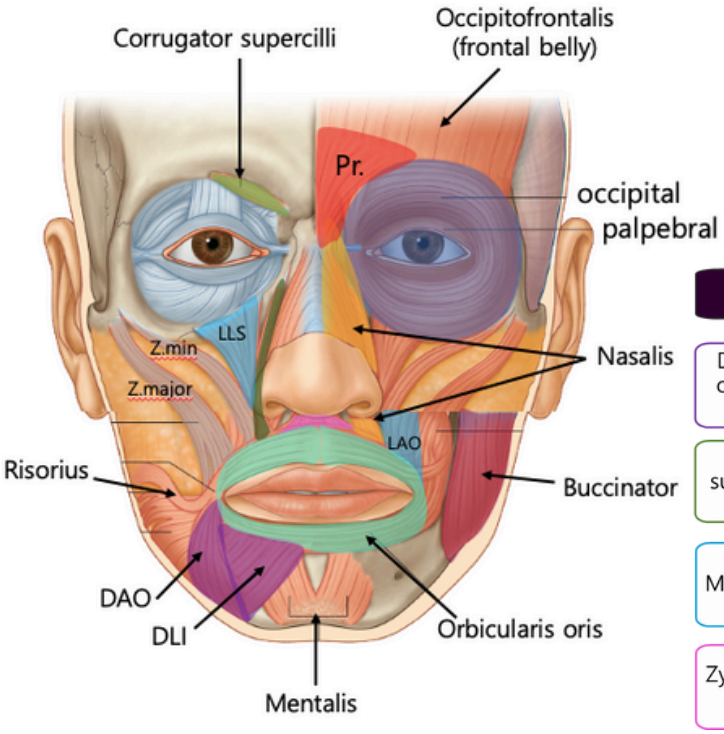
Muscles of Facial Expression

- 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

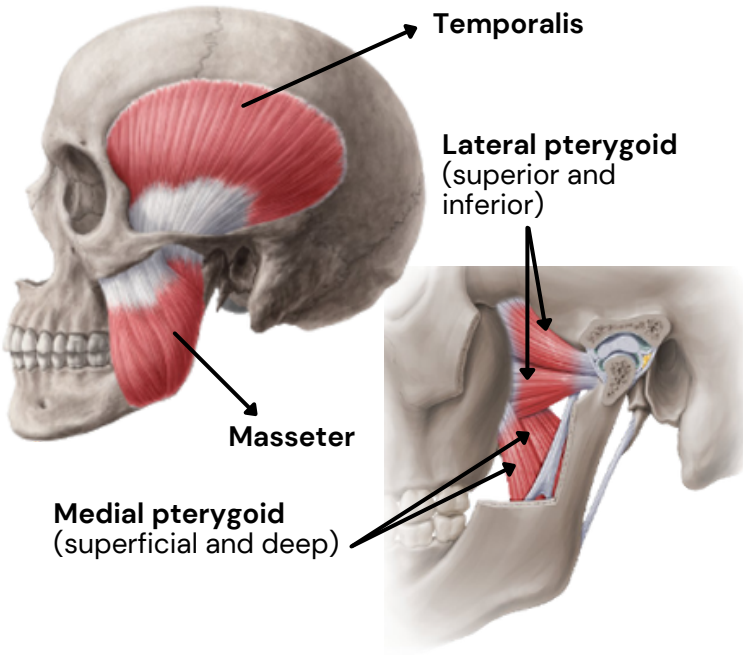
- Depressor anguli oris & Depressor labii inferioris
- Levator anguli oris & Levator labii superioris
- Levator labii superioris alaeque nasi
- Orbicularis oris
- Mentalis & Risorius
- Buccinator
- Zygomaticus major & minor

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)



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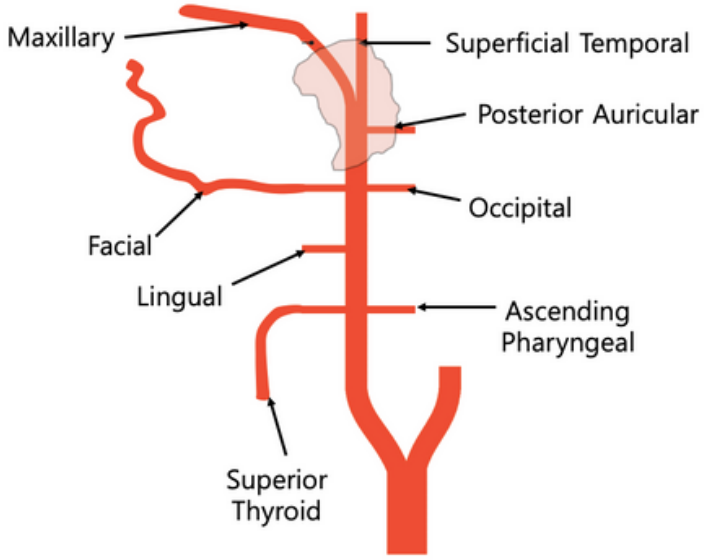
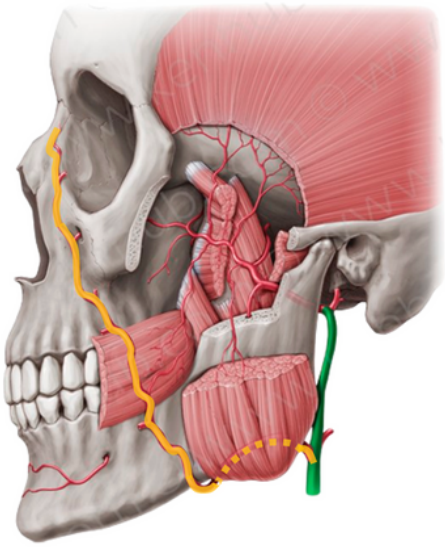
Arterial Supply of the Face - ECA

- 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 **A**natomists **L**ike **F**reaking **O**ut **P**oor **M**edical



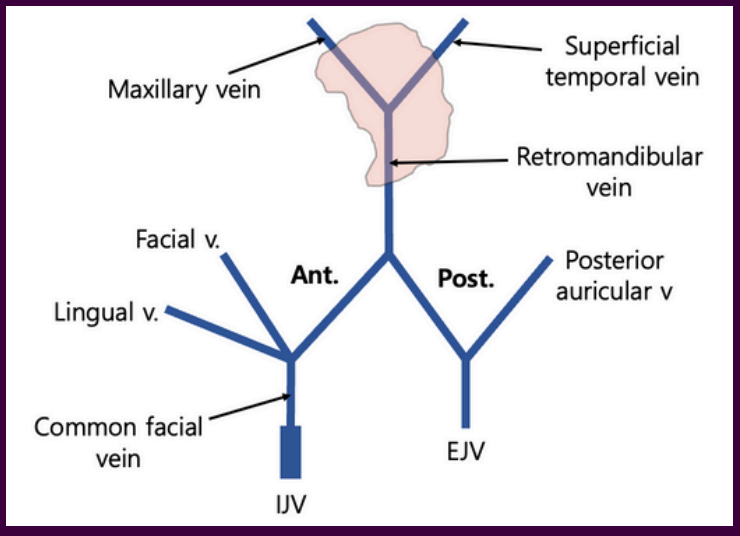


Course of the Facial Artery

Branches from anterior surface of ECA → Passes through deep neck structures → Posterior to submandibular gland → Curves across inferior border of mandible & enters face → Extends upwards and medially – tortuous course → Terminates as **angular artery** at medial corner of eye

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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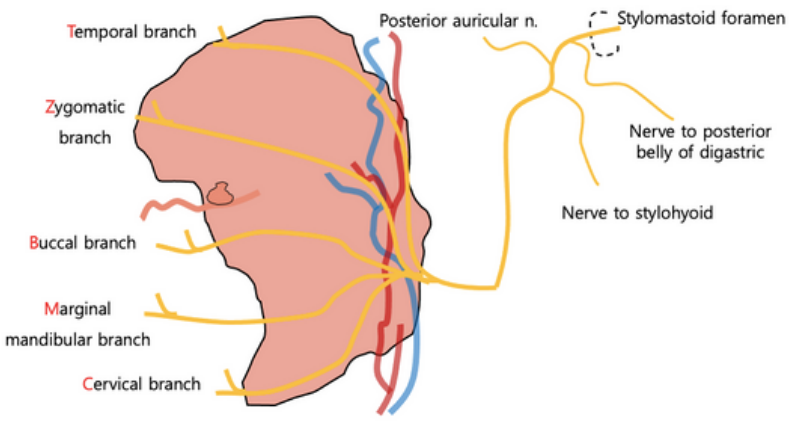
Facial Nerve (CNVII)

- 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)

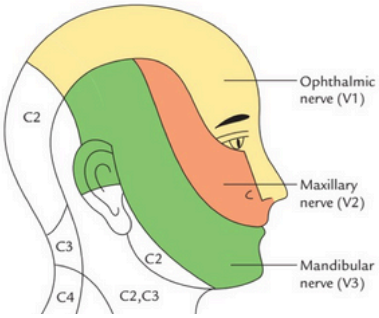
- **Exit skull** - superior orbital fissure
- **Main branches:** frontal, nasocilliary, lacrimal
- **Supply**: Orbit, superior eyelids, forehead, scalp and anterior nose

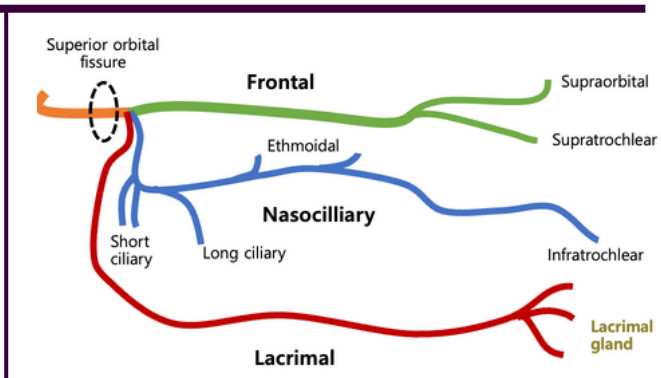
Maxillary Nerve (V2)

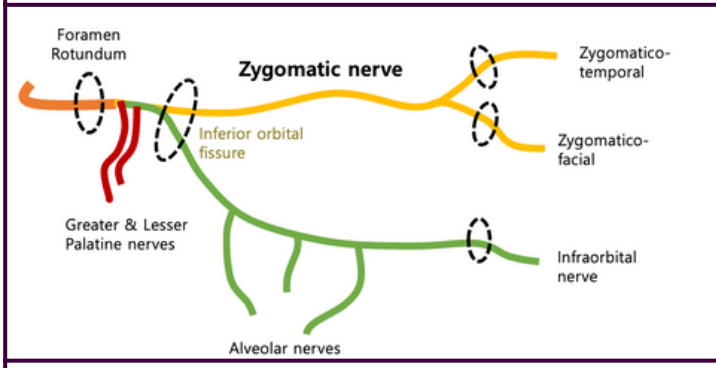
- **Exit skull** - foramen rotundum
- **Main branches:** zygomatic, greater & lesser palatine, infraorbital, alveolar
- **Supply**: temple, lower eyelid, cheek, upper lip

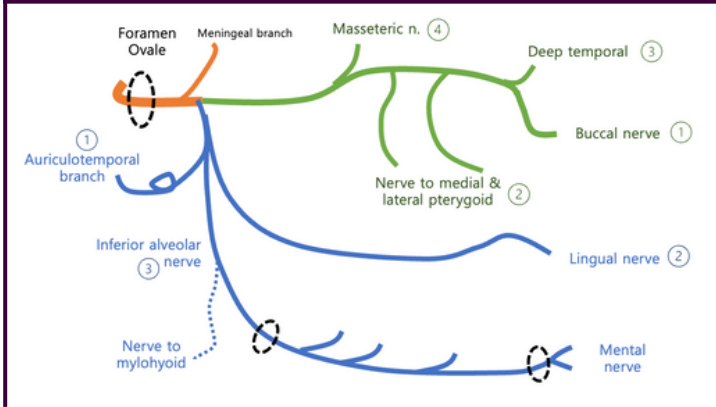
Mandibular Nerve (V3)

- **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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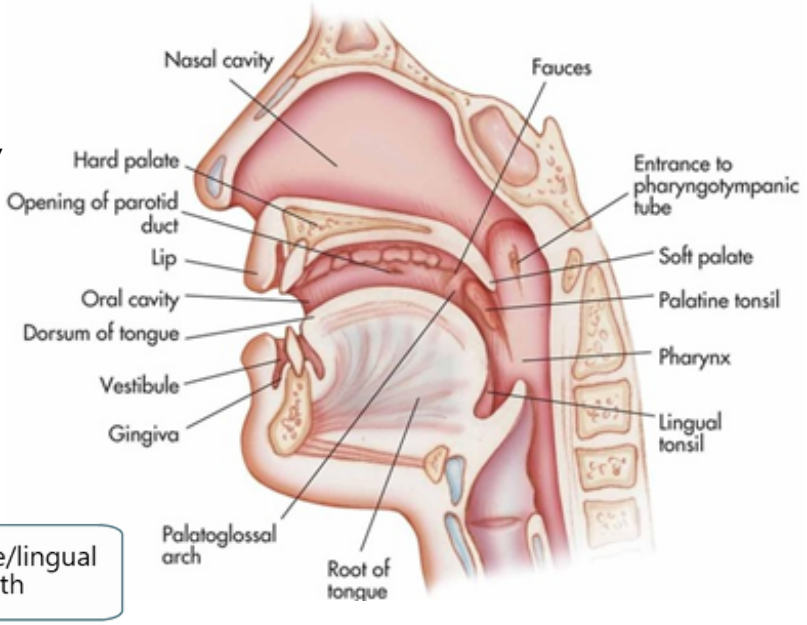
Oral Cavity

- **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



Vestibule

- Space between lips/cheeks and gums/teeth
- Oral fissure controlled by orbicularis oris

Oral Cavity Proper

- Posterior to palatine/lingual surface of teeth
- Roof: hard and soft palate
  Lateral: cheeks, buccinator
  Floor: mylohyoids, geniohyoids
  Content: tongue & salivary glands

Hard & Soft Palate

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

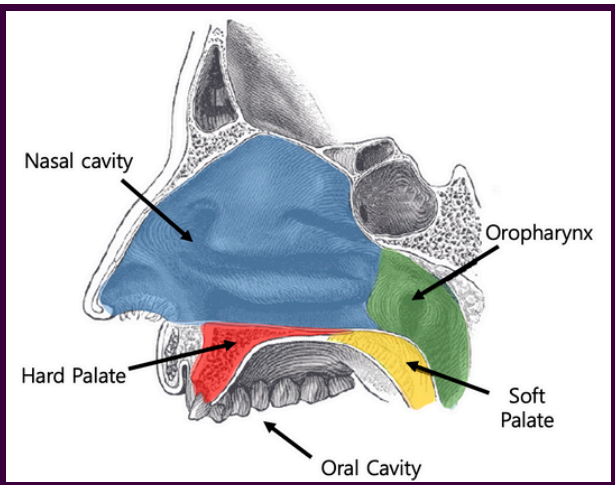
Hard Palate

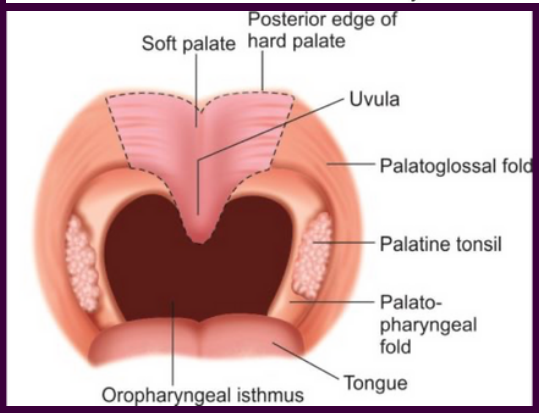
- Separates oral cavity from nasal cavity
- Bony structures: palatine process of maxilla, horizontal plate of palatine bones
- Mucosa of hard palate – contain **palatine rugae**

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

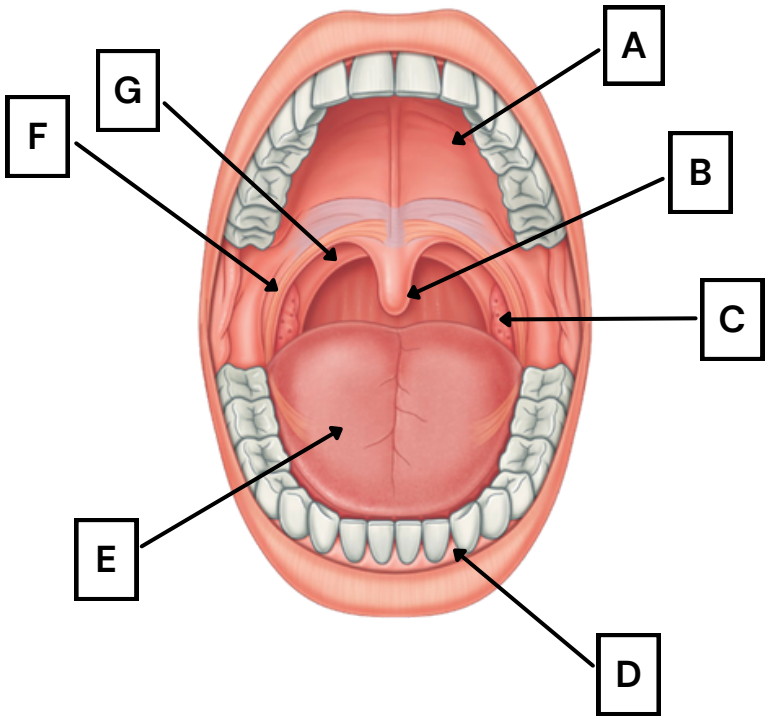




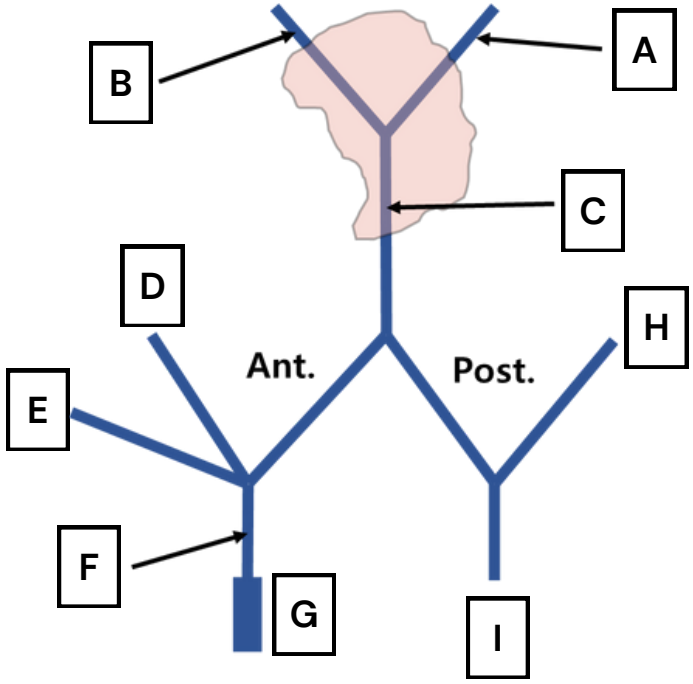
FACE & DENTAL ANATOMY

Test yourself

1) Label the parts of the oral cavity on the following diagram:



2) Label the venous structures on the following diagram:



FACE & DENTAL ANATOMY

Test yourself

MCQ 1

A 35-year-old man presents to the emergency department after a facial trauma. The patient reports loss of sensation in his upper lip. Further testing reveals damage to the maxillary nerve (V2). Which of the following symptoms would also likely fit this diagnosis?

A. Loss of sensation in the lower lip
B. Difficulty chewing
C. Loss of sensation in the cheeks
D. Inability to close the eye
E. Difficulty swallowing

MCQ 2

The skull is made of the neurocranium and viscerocranium. Which of the following bones are NOT part of the viscerocranium?

A. Ethmoid bone
B. Frontal bone
C. Inferior turbinate bone
D. Lacrimal bone
E. Palatine bone

MCQ 3

Which branch of the trigeminal nerve has motor supply?

A. Ophthalmic branch
B. Maxillary branch
C. Mandibular branch anterior division
D. Mandibular branch posterior division
E. Frontal branch

MCQ 4

Which of the following is NOT a branch of the ophthalmic nerve (of CNV)?

A. Frontal nerve
B. Nasocilliary nerve
C. Lacrimal nerve
D. Zygomatic nerve
E. Supraorbital nerve

MCQ 5

Which of the following arteries is a direct branch (Defined as directly branching from) of the external carotid artery?

A. Occipital artery
B. Ophthalmic artery
C. Middle meningeal artery
D. Inferior thyroid artery
E. Sphenopalatine artery

MCQ 6

The mandibular nerve (V3) is the only branch of the trigeminal nerve that provides motor innervation to a muscle group. To which facial muscle group does it provide motor innervation?

A. Muscles of facial expression
B. Muscles of mastication
C. Tongue muscles
D. Pharyngeal muscles
E. Muscles of the soft palate

FACE & DENTAL ANATOMY

Test yourself

OSCE Station - Case Based Discussion

Simon (55-year-old male) presents to ED after a brawl in which he sustained a direct blow to his right eye. He complains of reduced visual acuity in the affected eye and has difficulty opening his eye during examination. On examination, you note proptosis of the affected eye and resistance on retropulsion of the globe. You consult the maxillo-facial surgeons who advised that he requires an emergency procedure followed by further investigations. During your secondary survery, you note Simon also has a dislocated jaw.

Q1. What acute syndrome is Simon likely to have sustained and what is the emergency procedure indicated?

Q2. What ligament is sacrificed in this emergency procedure?

Q3. Simon has also sustained a TMJ dislocation. What nerve is targeted for anaesthesia to numb the inferior jaw? Where does this nerve enter the mandible?

Q4. What are the movements used to reduce an anterior TMJ dislocation?

Q5. After the reduction, Simon has difficulty opening and closing his jaw. What muscles are involved with these movements?

Answers:
Labelling: 1) A: Hard palate, B: Uvula, C: Palatine tonsil, D: Gingivae, E: Tongue, F: Palatoglossal arch, G: Palatopharyngeal arch
2) A: Superficial temporal vein, B: Maxillary vein, C: Retromandibular vein, D: Facial vein, E: Lingual vein, F: Common facial vein, G: Internal jugular vein, H: Posterior auricular vein, I: External jugular vein
H: Occipitofrontalis
MCQs: 1) C 2) A 3) C 4) D 5) A 6) B
OSCEs:
1) Orbital compartment syndrome; Lateral canthotomy 2) Lateral canthal ligament 3) Inferior alveolar nerve; Mandibular foramen
4) Pressure is applied by the thumbs to push the mandible downward and then backward while maintaining the mouth slightly open
5) Muscles of mastication: Temporalis, masseter, medial and lateral pterygoid