MIDLANDS SURGICAL ANATOMY TEACHING SERIES

MSATS HANDOUT 2021/22

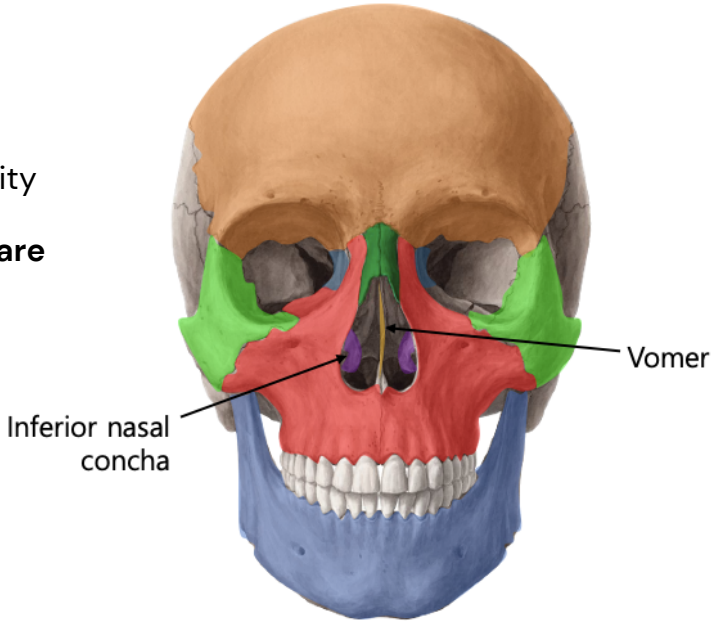
High Yield | Surgical Relevance | CPD Accredited

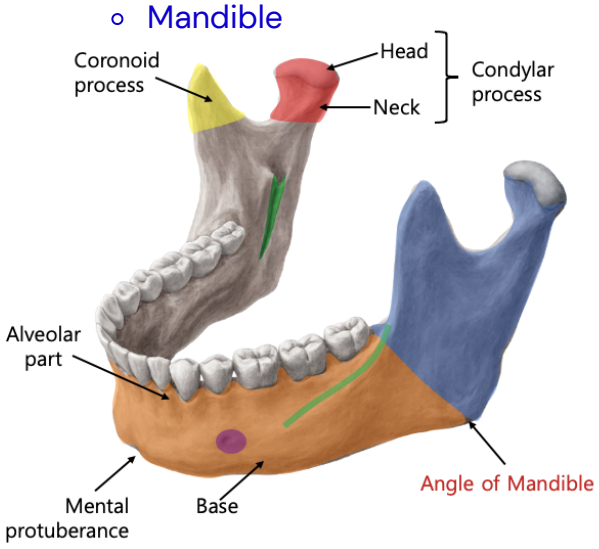
FACE ANATOMY

***Objectives**: Understand the bony anatomy of the viscerocranium and structure of the TMJ. Explain the gross anatomy of the muscles of facial expression & mastication, salivary glands of the face and important neurovascular structures of the face. Apply anatomical knowledge in context of common procedures within ENT 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)

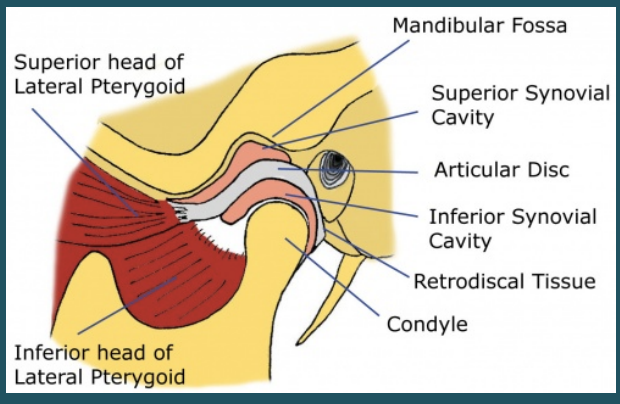
- **Components:**
  - Body of mandible
    - Base of mandible – mental protuberance & tubercles
    - Alveolar part of mandible – contains teeth
  - Ramus of mandible
    - Condylar & Coronoid processes
  - Angle of mandible
- **Mental foramen -** Contain mental a, v & n
- **Oblique foramen** – extends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

Temperomandibular Joint (TMJ)

- TMJ - modified hinge synovial joint
- Articulations of mandible & cranium (temporal bone)
  - Mandibular fossa
  - Articular tubercle (temporal bone)
  - Head of mandible (condyle)
- **Function**: 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

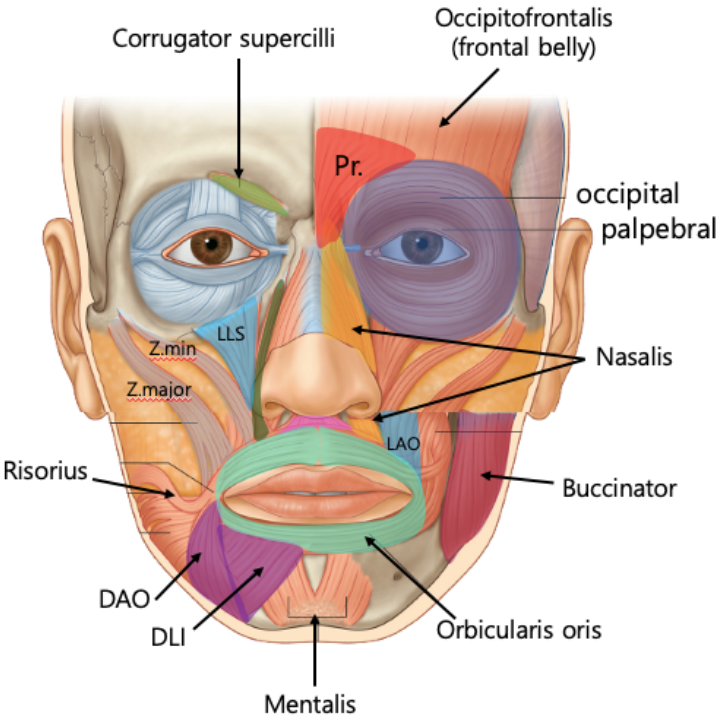


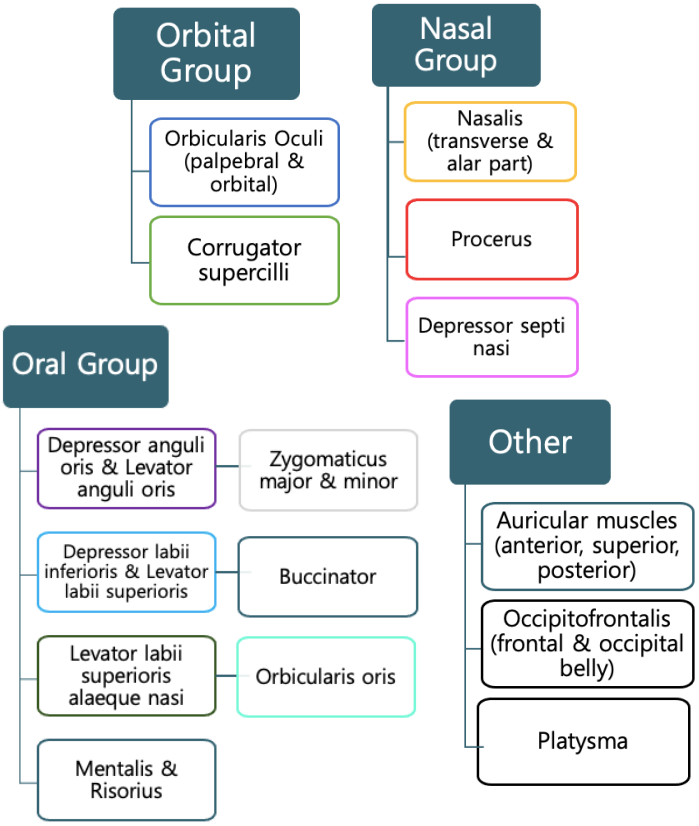
FACE ANATOMY

***Objectives**: Understand the bony anatomy of the viscerocranium and structure of the TMJ. Explain the gross anatomy of the muscles of facial expression & mastication, salivary glands of the face and important neurovascular structures of the face. Apply anatomical knowledge in context of common procedures within ENT surgery.*

Muscles of Facial Expression

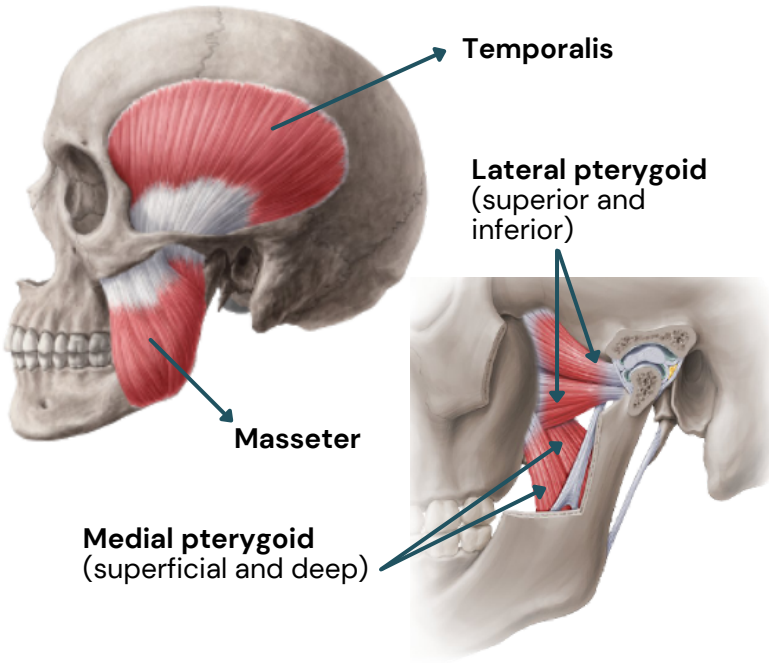
- Originate from bone or fascia
- Insert onto skin
- Innervation: **facial nerve (CNVII)**





Muscles of Mastication

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

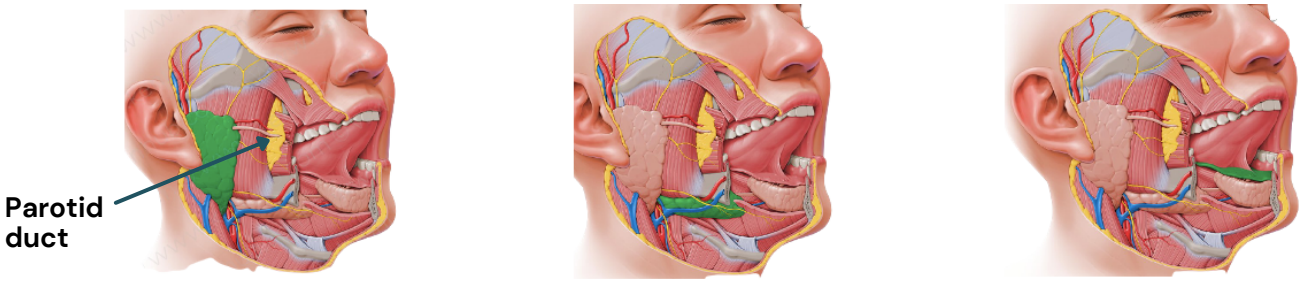


FACE ANATOMY

***Objectives**: Understand the bony anatomy of the viscerocranium and structure of the TMJ. Explain the gross anatomy of the muscles of facial expression & mastication, salivary glands of the face and important neurovascular structures of the face. Apply anatomical knowledge in context of common procedures within ENT surgery.*

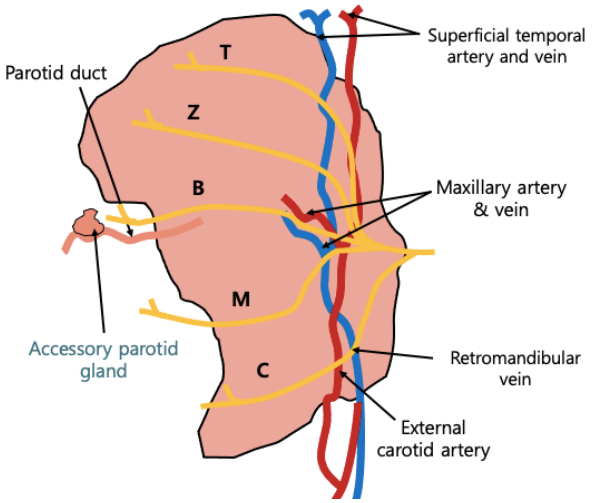
Salivary Glands of The Face

Parotid	Submandibular	Sublingual
Superficial & deep lobes (parotid region)	Submandibular triangle (inferior & posterior to mylohyoid muscle)	Between mouth floor and mylohyoid muscle
Secretions: mostly serous	Secretions: mixed (80% serous, 20% mucous)	Secretions: mostly mucous
Duct: Stensen's (parotid) duct	Duct: Wharton's duct	Duct: Bartholin's duct



Parotid Gland

- Largest of 3 salivary gland (lies in buccal region)
- **Structure**
  - Bilateral and lobular
  - Extends from zygomatic arch to inferior border of mandible.
- **Parotid duct course**
  a. Anterior parotid gland
  b. Medial border of masseter
  c. Buccal fat
  d. Buccinator muscle
  e. 2nd upper molar



Important Anatomical Relations

External Carotid Artery	Retromandibular vein	Facial nerve (CNVII)
• Terminates into superficial temporal & maxillary artery branches	• Formed from superficial temporal & maxillary veins	• 5 terminal branches within parotid gland

FACE ANATOMY

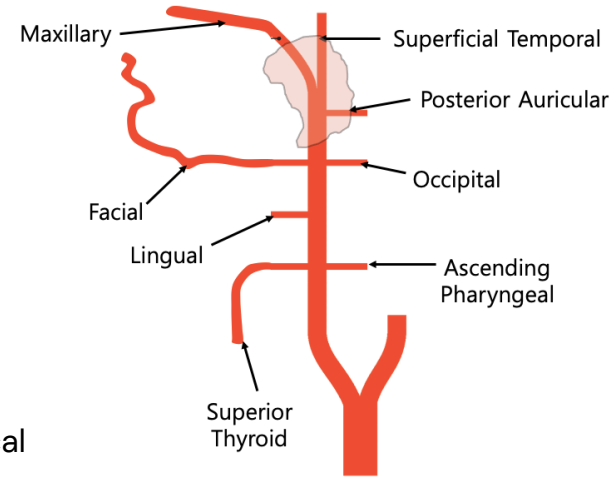
***Objectives**: Understand the bony anatomy of the viscerocranium and structure of the TMJ. Explain the gross anatomy of the muscles of facial expression & mastication, salivary glands of the face and important neurovascular structures of the face. Apply anatomical knowledge in context of common procedures within ENT surgery.*

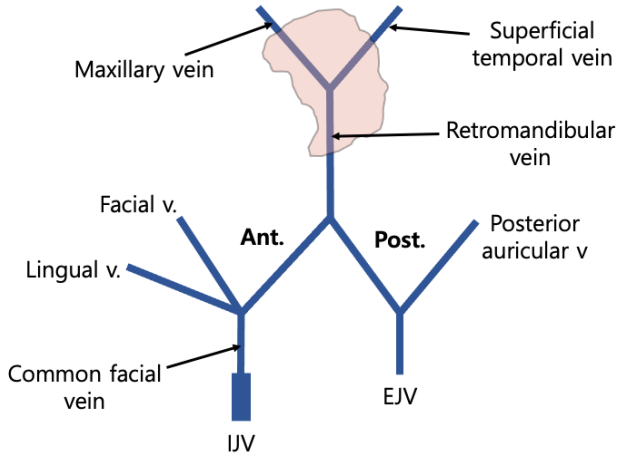
Arterial Supply of the Face

- 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	Superficial temporal	Maxillary

Some **A**natomists **L**ike **F**reaking **O**ut **P**oor **M**edical **S**tudents



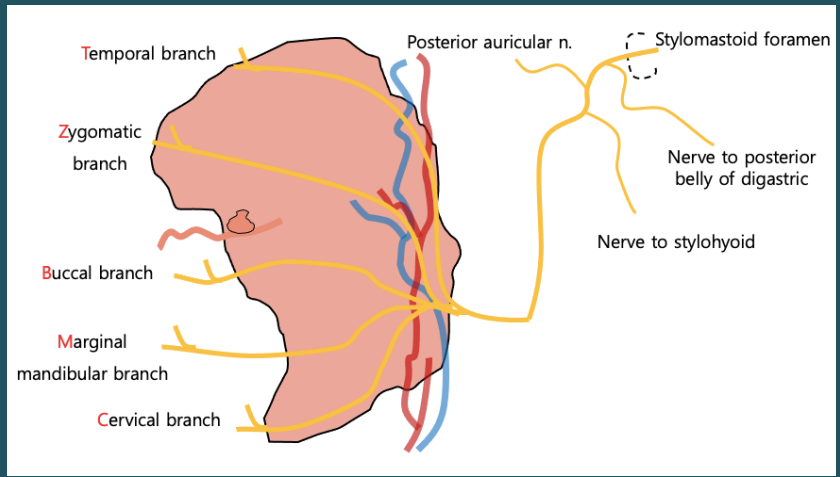


Venous Drainage of the Face

- 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

Facial Nerve (CNVII)

1. Facial nerve penetrates space between superficial & deep lobes of parotid gland
2. Divides into temporofacial branch + cervicofacial branch
3. 5 terminal branches



Innervation of Parotid Gland

- Somatic - auriculotemporal nerve
- Sympathetic - superior cervical ganglion -> post-ganglionic fibres travel with ECA branches
- Parasympathetic: pre-ganglionic fibres -> otic ganglion -> post-ganglionic fibres travel with auriculotemporal nerve

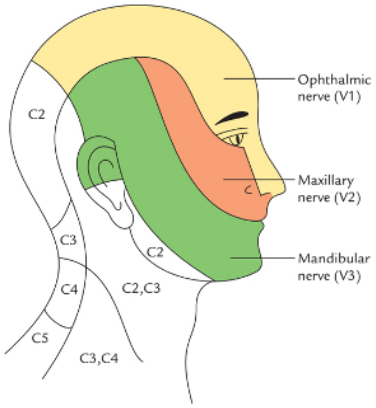
Intracranial → Stylomastoid foramen → 3 Extracranial branches → Parotid → 5 terminal branches

FACE ANATOMY

***Objectives**: Understand the bony anatomy of the viscerocranium and structure of the TMJ. Explain the gross anatomy of the muscles of facial expression & mastication, salivary glands of the face and important neurovascular structures of the face. Apply anatomical knowledge in context of common procedures within ENT surgery.*

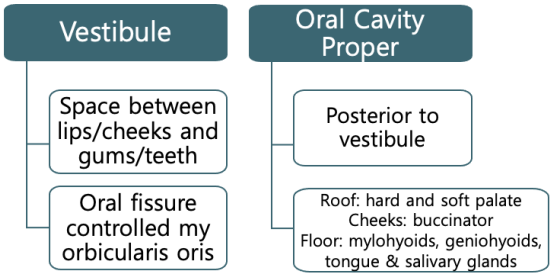
Trigeminal Nerve (CNV)

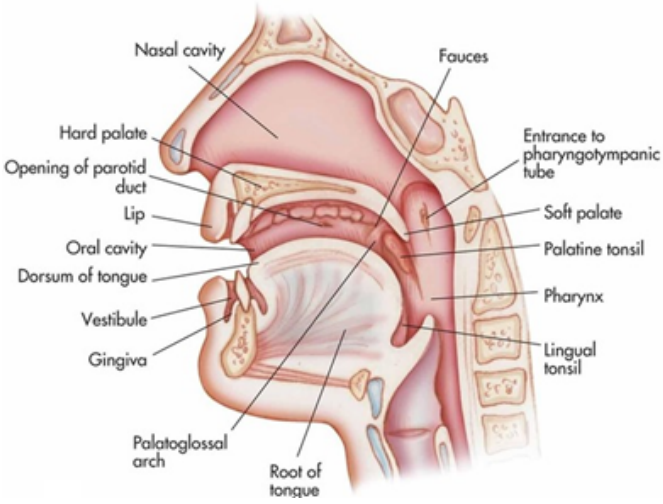
Trigeminal Nerve	Foramen to exit skull	Branches	Supply
Opthalmic nerve (V1)	Superior orbital fissure	Frontal, nasocillairy, lacrimal	Orbit, superior eyelid, forehead, scalp and anterior nose
Maxillary nerve (V2)	Foramen rotundum	Zygomatic, greater & lesser palatine, infraorbital, alveolar nerves	Temples, lower eye lid, cheek, upper lip
Mandibular nerve (V3)	Foramen ovale	Auriculotemporal, lingual, inferior alveolar, buccal & mastication m.	Anterior ear, tympanic membrane, temple area, chin & lower lip



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

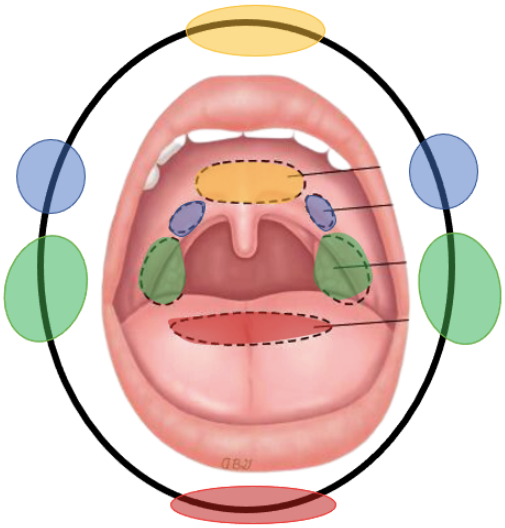




Tonsils

- Lymphatic tissue within pharynx
- MALT – mucosa-associated lymphoid tissue
- Drain to deep cervical, jugulodigastric or retropharyngeal LNs

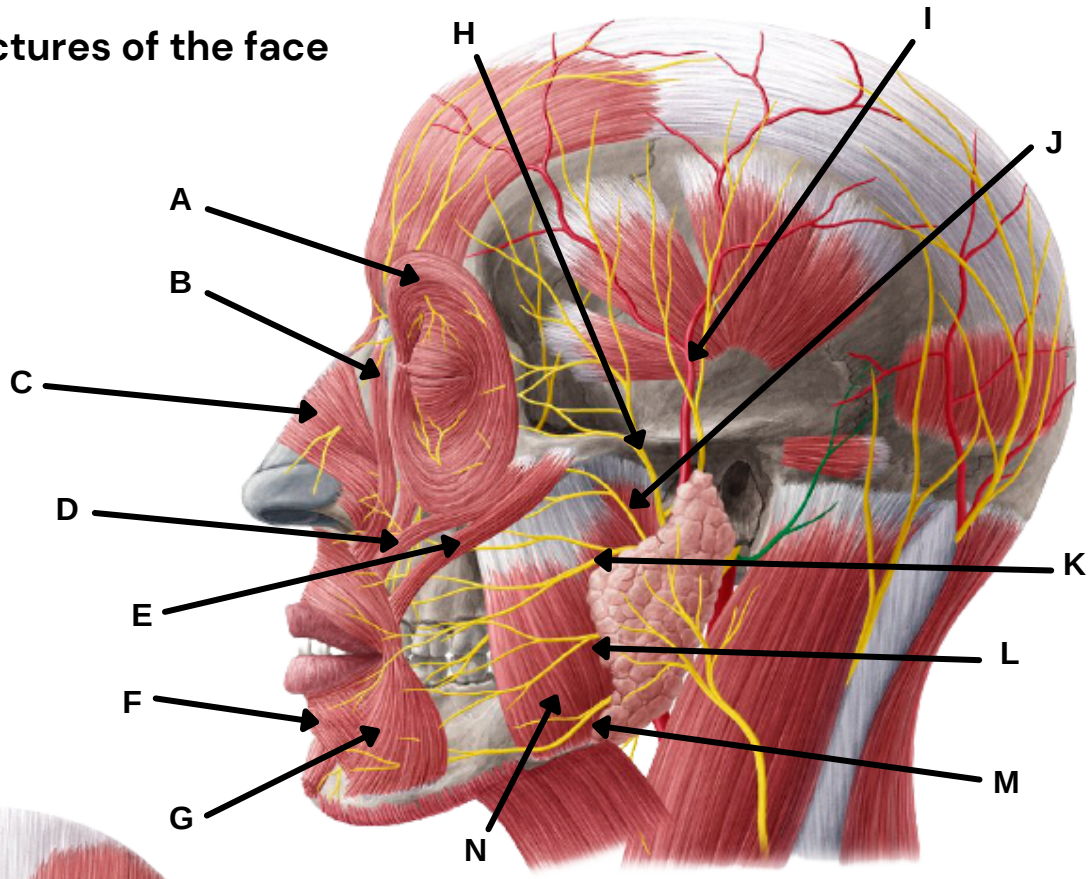
Tonsil	Structure	Innervation
Lingual (Inferior)	Submucosa of posterior 1/3 of tongue	Glossopharyngeal (CNIX)
Pharyngeal (Superior)	Mucosa of roof of nasopharynx (midline)	Vagus (CNX) & Glossopharyngeal (CNIX)
Tubal (Lateral)	Opening of eustachian tube	Maxillary (CNV2) & Glossopharyngeal (CNIX)
Palatine (Lateral)	Lateral oropharynx wall between palatoglossal & palatopharyngeal arches	Maxillary (CNV2) & Glossopharyngeal (CNIX)



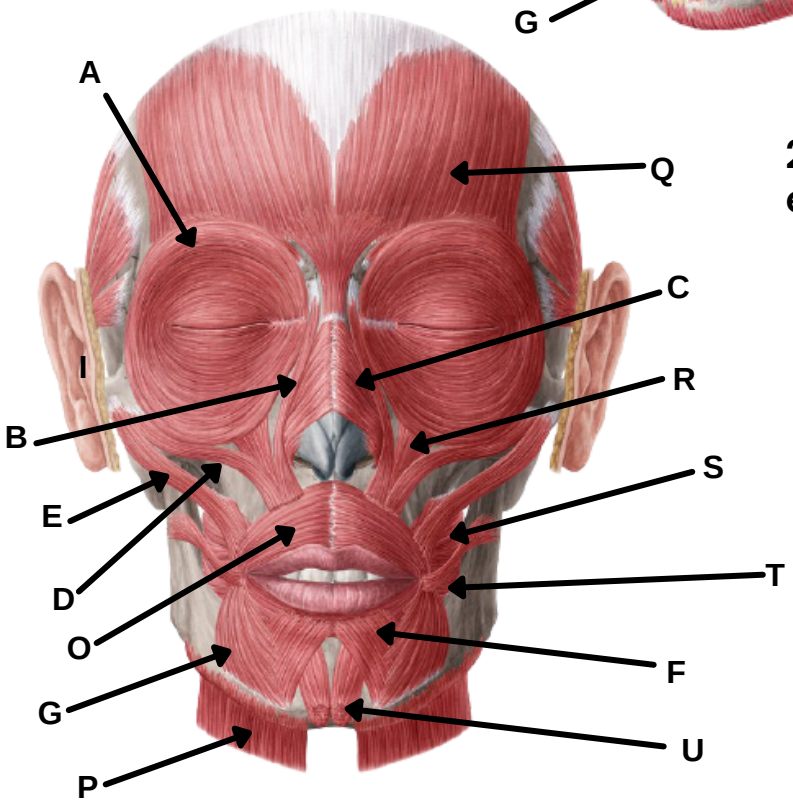
FACE ANATOMY

Test yourself...

1) Label the structures of the face



2) Label the muscles of facial expression:



FACE ANATOMY

Test yourself...

MCQ 1

A 30-year-old female presents to the emergency department with knife lacerations to the face. On examination, one laceration is a deep wound to the superior aspect of the chin. Which artery is most likely damaged by this lesion?

A. Superficial temporal artery
B. Facial artery
C. Angular artery
D. Mental artery
E. Buccal artery

MCQ 2

What type of cartilage is present at the temperomandibular joint (TMJ)?

A. Fibrocartilage
B. Hyaline cartilage
C. There is no cartilage at the TMJ
D. Fibrous cartilage
E. Elastic cartilage

MCQ 3

What is the gold standard investigation for diagnosing Sialolithiasis?

A. Ultrasound
B. CT head with contract
C. MRI
D. CT angiogram
E. X-ray saliogram

MCQ 4

Paralysis of which nerve would result in paralysis of the buccinator muscle and the superior portion of the orbicularis oris muscle?

A. CNVII
B. Buccal branch of CNV3
C. Buccal branch of CNVII
D. Zygomaticofacial nerve of CNV2
E. Marginal mandibular branch of CNVII

MCQ 5

Pre-ganglionic parasympathetic fibres supplying the parotid gland synapse at which ganglion in the face?

A. Ciliary ganglion
B. Geniculate ganglion
C. Submandibular ganglion
D. Otic ganglion
E. Pterygopalatine ganglion

MCQ 6

The anterior branch of the retromandibular vein drains into which of the following veins before eventually draining into the internal jugular vein?

A. Lingual vein
B. Common facial vein
C. Facial vein
D. Posterior auricular vein
E. External jugular vein

FACE ANATOMY

Test yourself...

OSCE Station - Case Based Discussion

A 65-year-old man presents with acute pain on the right side of the face. He is being treated for hypertension. He smokes half a pack of cigarettes every day. He complains of intense and constant pain on the right side of his face.

Head and neck examination reveals a circumscribed swelling in the left pre-auricular area extending to the mandibular angle. The patient has never experienced this before. Gentle manipulation of the left parotid gland results in expression of a purulent exudate from the opening of Stensen's duct opposite the upper first molar tooth.
(BMJ Best Practice Case History)

Q1. Which specific features in this patient's clinical presentation suggests this may be due to an infective/inflammatory cause?

Q2. What would be your most likely differential diagnosis and why?

Q3. What investigations would confirm your diagnosis?

Q4. What are the treatment options?

Q5. How can a sialolith (salivary stone) predispose a patient to inflammation and infection of the parotid gland?

Answers
Labels 1 & 2: A = orbicularis oculi, B = levator labii superioris alaeque nasi, C = nasalis , D = zygomaticus minor, E = zygomaticus major, F = depressor labii inferioris, G = depressor anguli inferioris, H = temporal branch of CNVII, I = superficial temporal artery, J = zygomatic branch of CNVII, K = buccal branch of CNVII, L = marginal mandibular branch of CNVII, M = cervical branch of CNVII, N = masseter, O = orbicularis oris, P = platysma, Q = occipitofrontalis, R = levator labii superioris, S = buccinator, T = risorius, U = mentalis
MCQs: 1 = D, 2 = A, 3 = E, 4 = C, 5 = D, 6 = B
OSCEs:
1) Acute onset facial pain, facial swelling, purulent exudates of pus from parotid duct opening.
2) Diagnosis: Sialadenitis (inflammation and swelling of the salivary gland often due to bacterial or viral infection, obstruction or autoimmune causes). Other differentials: TB, sarcoidosis, mumps, parotid tumour, dental abscess.
3) Culture and sensitivities from the purulent exudate, bloods (FBC, U&E, CRP and other inflammatory markers), facial radiograph, ultrasound of the affect gland.
4) Tx of acute bacterial sialadenitis - broad spectrum IV or oral antibiotics, supportive treatment (hydration, analgesia), prescribe oral corticosteroid if soft tissue swelling is significant. In selected patients, surgical incision and drainage may be required.
5) Mechanical obstruction due to a salivary duct stone can reduce the salivary output and impede salivary flow - this predisposes patients to bacterial infections.