



Musculoskeletal System

Sub-System

Anatomy

Lecture Title

SKULL/ part 3

Lecture Date

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Temporomandibular joint – TMJ

| | |
|---------------------|---|
| Articulation | head of mandible with the mandibular fossa of temporal bone |
| Type of Joint | Synovial joint |
| Movements it allows | Hinge and gliding movement |

- Joint between the head of mandible with the mandibular fossa of temporal bone .
- TMJ is divided into two cavities by fibrocartiligenous disk (Articular disk) .
- Head of mandible and mandibular fossa are Covered by fibrocartilage

Fibrous capsule

- funnel shaped
- Wide(lax) above and *narrow(tight) bellow* → because it's completely surrounding head of mandible (tightened around the neck of mandible)
- Strengthened lateral by the temporomandibular ligament
- Attachments :
 - ✓ Medial and lateral : margins of mandibular fossa
 - ✓ Above : articular tubercle (**When moving –Protruding – the mandible , the articular tubercle acts as a break and stops it)**
 - ✓ Bellow : upper neck of mandible

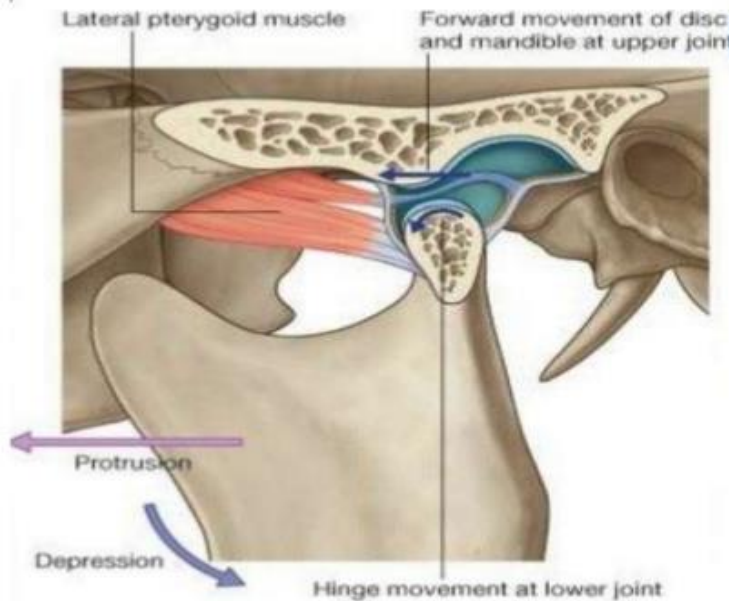
Nerve Supply of TMJ

- Auriculotemporal nerve from v3

Articular disk

- Oval in shape
- Convex superiorly – Concave inferiorly
- Divides the joint into two cavities : upper and lower cavities

Movements



Upper cavity :

- Permits gliding movement only (forward , backward)
 - ✓ Forward : mainly by lateral pterygoid muscle , assisted by medial pterygoid muscles .

Lateral pterygoid muscle → (protruder of mandible)

Origin : greater wing of sphenoid (upper head) + lateral surface of lateral pterygoid plate (lower head)

Medial pterygoid muscle →

Origin : medial surface of lateral pterygoid plate .

Insertion : neck

- ✓ Backward : by posterior deep fibers of temporalis .

Function of temporalis → mastication ?????

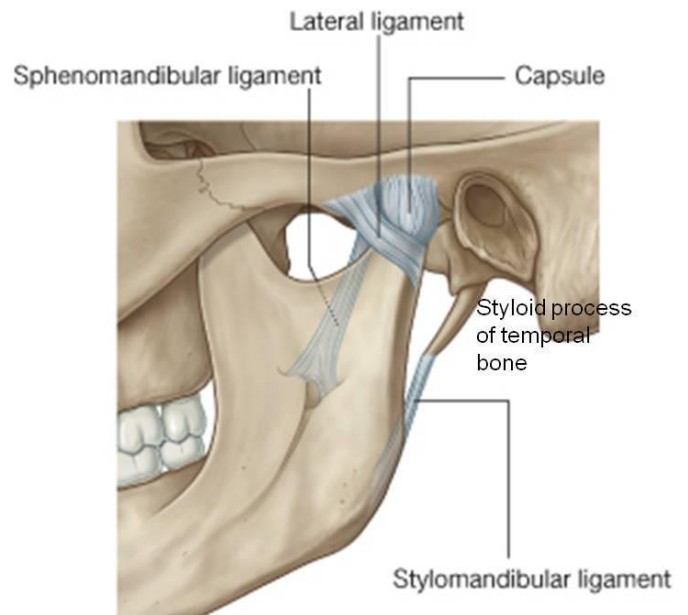
Lower cavity :

- hinge like rotation - *Works like door handle* –
 - ✓ Elevation → grinding – eating –
 - ✓ Depression → open mouth

***In conclusion we have two joints in one : an upper gliding joint and inferior hinge joint separated by articular disk**

Ligaments

1. fibrous Capsule : the toughest and strengthens better
2. Temporomandibular ligament :
extending forward and backward ,
strengthens the joint laterally .
Runs backward from articular tubercle to the neck .
3. Sphenomandibular ligament : medially ,
Originate from the spine of sphenoid bone . Inserted to the lingula (internal surface of ramus of mandible) .
4. Stylomandibular ligament : (lateral posterior)
Runs posteriorly from styloid process to the angle on mandible .

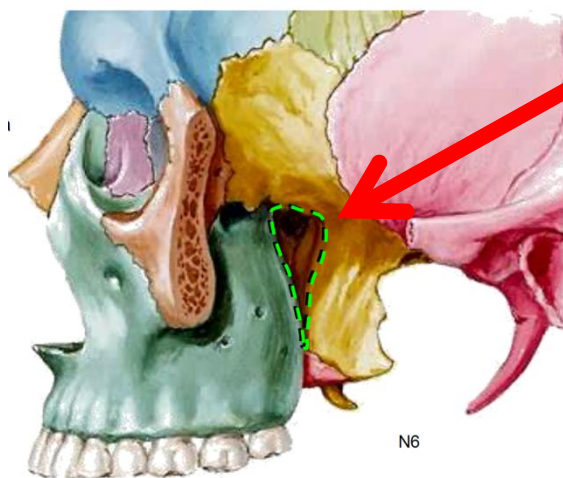
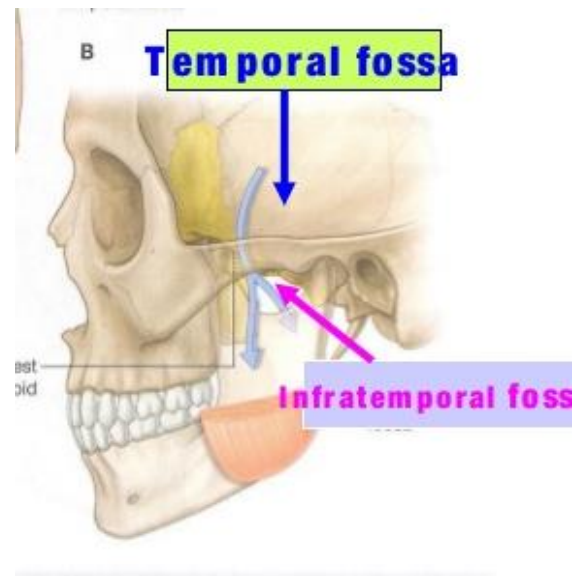


CLINICAL ASPECT :

Adult patient with a **headache** , after taking history , it turns out that the patient recently got tooth/cavity filling , the filling level is above the required level → starts coming in contact with the joint (TMJ) → therefore the pain here is coming from the **auriculotemporal nerve** .

- This pain may occur in cases of : 1) unsuitable denture → dislocation of TMJ 2) tooth filling

- ✓ How do we expose the infra-temporal fossa ?
-Remove ramus of mandible + maxilla .

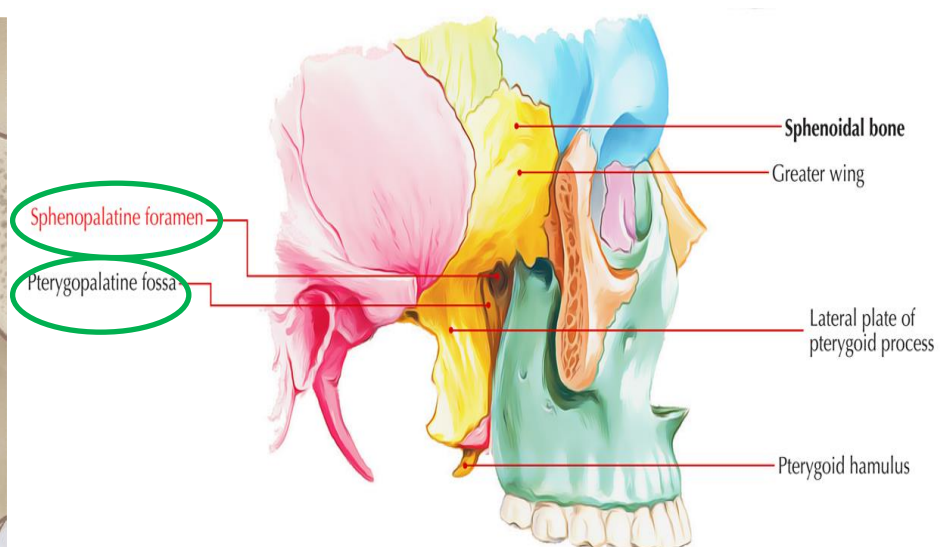
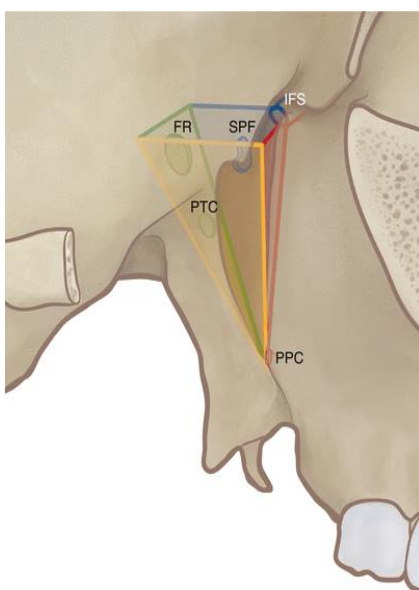


Pterygomaxillary fissure .

Not mentioned by the doctor ;

Pterygomaxillary fissure connects the **infratemporal fossa** with the **pterygopalatine fossa**.

Pterygopalatine fossa



- Small pyramidal space
- Deep to the infraorbital fossa

○ BORDERS:

- ✓ Anterior: maxilla
- ✓ Roof(superior) : greater wing of sphenoid bone
- ✓ Posterior: pterygoid process of sphenoid bone
- ✓ Medial : perpendicular plate of palatine bone
- ✓ Lateral : pterygomaxillary fissure

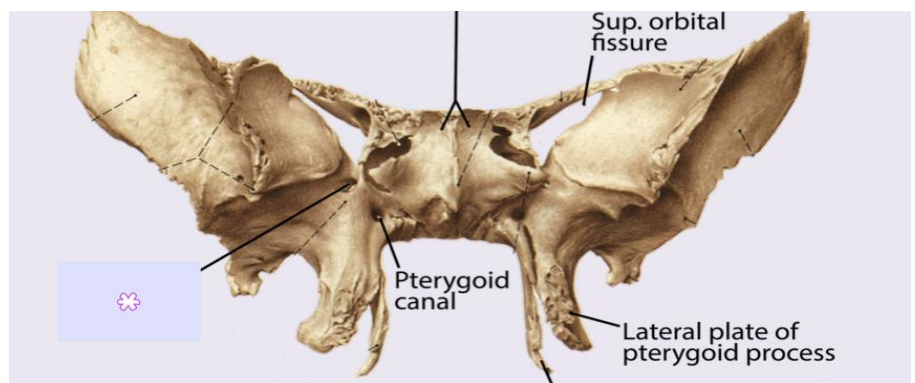
○ COMMUNICATIONS:

- ✓ Laterally with **infratemporal fossa** via pterygomaxillary fissure
- ✓ Medially with **nasal cavity** via sphenopalatine foramen
- ✓ Posteriorly with **middle cranial fossa** via foramen rotundum and pterygoid canal
- ✓ Anteriorly with **floor of orbit** via inferior orbital fissure.

➤ **RECALL : Maxillary nerve (V2)** passes through Foramen rotundum.

NOTE :

- **Infra orbital nerve/artery/vein** pass through **Inferior orbital fissure**
- **Supra orbital nerve** passes through **superior orbital fissure**.



- ✓ Inferiorly with **palate** via palatine canal

➤ **Desending palatine nerve**

- ✓ branches into **greater palatine nerve** anterior (**hard palate**) and **lesser palatine nerve** posterior (**soft palate**).
- ✓ passes through palatine canal to the palate
- ✓ sensory nerves
- **Palate has 2 parts :**
Anterior 2/3rds → hard
Posterior 1/3rd → soft

○ CONTENTS:

1. Maxillary nerve :

- Passes through foramen rotundum.
- Gives branches to (nose, Palate , ...)

2. Third part of Maxillary artery

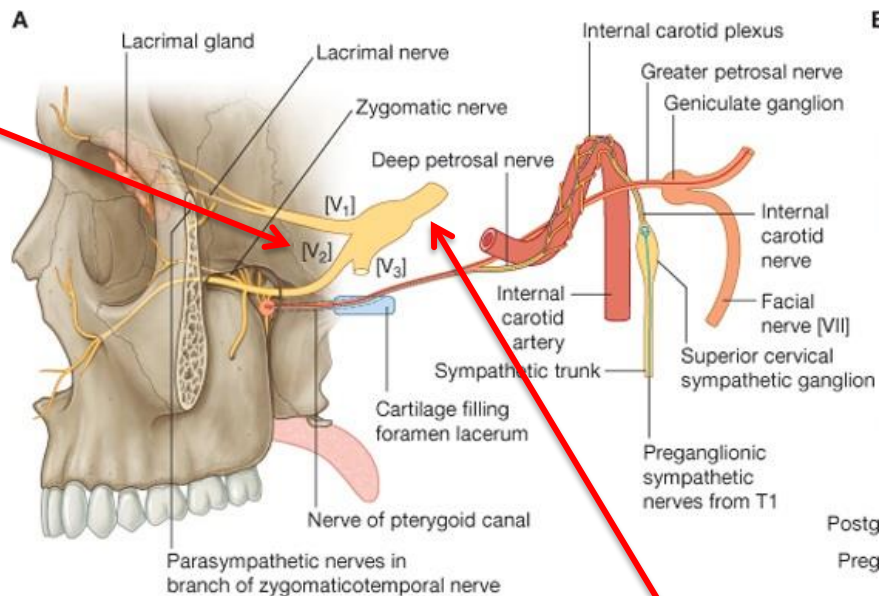
- RECALL: Maxillary artery is branch of External carotid a.
- Maxillary artery is divided by the **lateral pterygoid muscle** into 3 parts
- 3rd part → is found in the Pterygopalatine fossa area , thus Called : **pterygopalatine part** .

3. Nerve of pterygoid canal

4. Pterygopalatine ganglion

- All ganglion in the head and neck are **parasympathetic** (pterygopalatine , otic , submandibular , ciliary) {bcz they are secretomotor }
- except for cervical ganglions are **sympathetic** (3) → superior / middle / inferior
- dry mouth → sympathetic

(*symp. is a waster while parasymp. is not*)



- **RECALL :** CN (V)Trigeminal nerve gives three branches →

- Ophthalmic nerve (V1)
- **Maxillary nerve (V2)**
- Mandibular nerve (V3)

- **RECALL :**

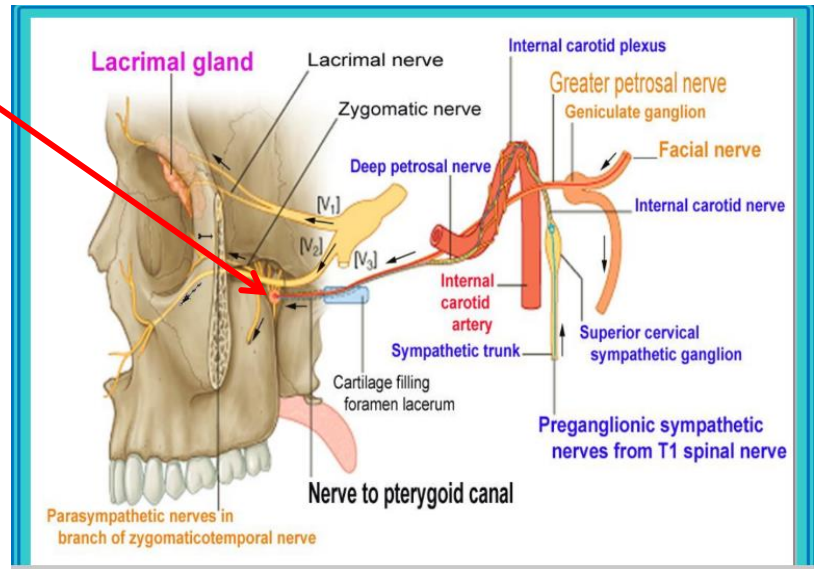
Muscles of face develop from 3 prominences

- 1) frontonasal prominence → supplied by V1 ophthalmic nerve (sensory)
- 2) Maxillary prominence → supplied by V2 maxillary nerve (sensory)
- 3) Mandibular prominence → supplied by V3 (motor and sensory)

- skin > fascia > muscles of facial expressions
- fascia is supplied by CN V → sensory
CN VII (facial nerve) → motor

Pterygopalatine ganglion

- *Parasympathetic* ganglion
- Location :
inside pterygopalatine fossa
- Correlations :
 - ✓ Superiorly : **maxillary n. (V2)**
 - ✓ Laterally : palatine bone
 - ✓ Anteriorly : maxillary bone
 - ✓ Posteriorly : **pterygoid canal** + temporal bone
 - ✓ Medially : **sphenopalatine foramen**



➤ NOTE :

PARASYMPATHETIC GANGLION = SECRETOMOTOR

➤ Common Carotid artery

Location : Neck

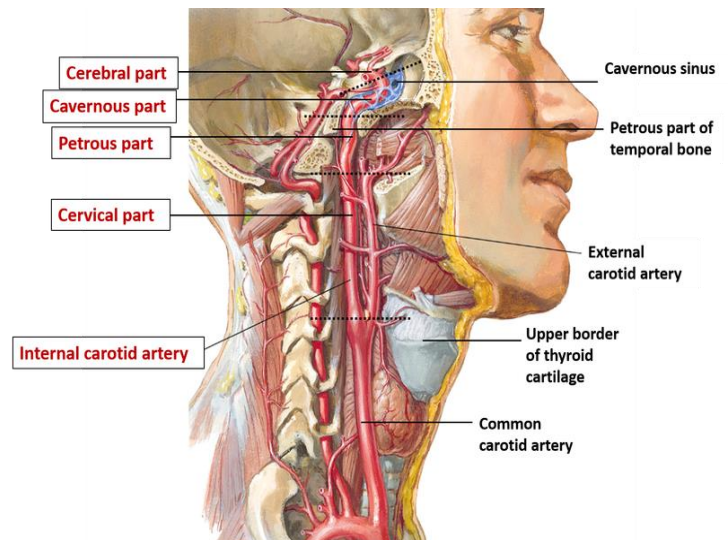
Bifurcation : at the level of the superior border of thyroid cartilage .

Branches : Internal carotid artery + External carotid artery .

➤ Internal carotid artery

(has parts)

- 1) **Cervical part of ICA** in neck ➡ 2) **Petrous part of ICA** in the petrous bone
- 3) After that into the foramen lacerum ➡ 4) **cavernous part of ICA** in the cavernous sinuses ➡ 5) **cerebral part of ICA** in the brain



- Surrounding the ICA are the Sympathetic plexus of the internal carotid artery
- these sympathetic plexus of ICA has **preganglionic sympathetic nerves** from T1 (thoracic) spinal nerve – (intercostal nerve ← thoracic spinal nerves)

anger and sadness may lead to stroke and this is due to the sympathetic nerves (fibers) sympathetic

- Synapse at the **superior cervical sympathetic ganglion**
- Then the **postganglionic fibers** make up the **sympathetic plexus** around the internal carotid artery
- Sympathetic plexus surrounding the ICA → **sympathetic Branch** called **deep petrosal nerve**
- which will continue Passing through **foramen lacerum**
- then passing through **pterygoid canal**
- then reaching to the **pterygopalatine ganglion**

➤ Why superior cervical symp. Ganglion ? because all symp. ganglion are located in the **thoracolumbar region** and only ascending to the head and neck region , thus the **superior cervical ganglia** is the only one found in the **cervical region** .

The **postganglionic sympathetic fibers** of the pterygopalatine ganglion

- the **facial nerve (VII)** gives
- parasympathetic branch** called → (**greater petrosal nerve**)
- greater petrosal nerve passes along **with the deep petrosal nerve** to the
- foramen lacerum**
- then through the **pterygoid canal**
- finally reaching to the **pterygopalatine ganglion**

Greater = big
Petrosal = passes through petrous bone

The **preganglionic parasympathetic fibers** of the pterygopalatine ganglion

- forming a **synapse** then sending **post ganglionic parasympathetic fibers** (combined to the **post ganglionic sympathetic fibers**) to the :
 - nasal gland
 - palatine gland
 - lacrimal gland

By way of ***maxillary n.**
***zygomatic n.** ***lacrimal n.**

some notes :

- *the pterygoid canal : 2 nerves passing through it together greater petrosal and deep petrosal nerve*
- *greater petrosal nerve → parasympathetic*
- *deep petrosal nerve → sympathetic*
- *synapse of the preganglionic sympathetic nerves → at the superior cervical ganglion*
- *synapse of preganglionic parasympathetic nerves → at the pterygopalatine ganglion*