

"Temporomandibular Joint (TMJ)"

- The temporomandibular joint is the synovial articulation between:

-> The articular tubercle and the anterior portion of the mandibular fossa of the temporal bone (above)

-> The head (condyloid process) of the mandible (below)

- The capsule surrounds the joint and is attached:

-> Above: to the articular tubercle and the margins of the mandibular fossa

-> Below: to the neck of the mandible

» Ligaments

i) Lateral Temporomandibular Ligament

- Strengthens the lateral aspect of the capsule

- Fibers run: downward and backward from the tubercle on the root of the zygoma to the lateral surface of the neck of the mandible
- Function: limits posterior movement of the mandible and protects the external auditory meatus

ii) Sphenomandibular Ligament

- Lies on the medial side of the joint
 - Thin band attached:
 - > Above: to the spine of the sphenoid bone
 - > Below: to the lingula of the mandibular foramen
- Represents the remains of the first pharyngeal arch in this region

iii) Stylomandibular Ligament

- Lies behind and medial to the joint and some distance from it

- Band of thickened deep cervical fascia
- Extends from the apex of the styloid process to the angle of the mandible

» Articular Disc

- A fibrocartilage articular disc
- Intervenes between the bony surfaces
- Divides the TMJ into upper and lower compartments
- The disc is an oval plate that attaches circumferentially to the capsule
- Attached in front to the tendon of the lateral pterygoid muscle
- Also attached by fibrous bands to the head of the mandible

> The fibrous bands:

- Ensure that the disc moves forward and backward with the head of the mandible

- Assist in protraction and retraction of the mandible

> Upper surface of disc:

- Concavoconvex (from anterior to posterior)
- Fits the shape of the articular tubercle and mandibular fossa

> Lower surface of disc:

- Concave
- Fits the head of the mandible

» The synovial membrane:

- Lines the capsule in both the upper and lower cavities of the joint

» Nerve Supply

- Auriculotemporal branch of the mandibular nerve
- Masseteric branch of the mandibular nerve

» Mastication Muscles

MUSCLE	ORIGIN	INSERTION	NERVE SUPPLY	ACTION
Masseter	Zygomatic arch	Lateral surface of ramus of mandible	Mandibular division of the trigeminal nerve	Elevates the mandible to occlude teeth
Temporalis	Floor of temporal fossa	Coronoid process of the mandible	Mandibular division of the trigeminal nerve	Anterior and superior fibers elevate mandible; posterior fibers retract mandible
Lateral pterygoid (two heads)	Greater wing of the sphenoid and lateral pterygoid plate	Neck of mandible and articular disc	Mandibular division of the trigeminal nerve	Pulls neck of mandible forward (protraction)
Medial pterygoid (two heads)	Tuberosity of maxilla and lateral pterygoid plate	Medial surface of angle of mandible	Mandibular division of the trigeminal nerve	Elevates mandible

» Movements

- The mandible can be:
 - Depressed
 - Elevated
 - Protruded
 - Retracted
 - Rotated (as in chewing)
- Resting position:
 - Teeth of the upper and lower jaws are slightly apart
- Closure of jaws:
 - Teeth come into contact (occlusion)

1) Mandible Depression

- As the mouth is opened:

-> The head of the mandible rotates on the undersurface of the articular disc around a horizontal axis

- To prevent the angle of the jaw from impinging on the parotid gland and sternocleidomastoid muscle:

-> The mandible is pulled forward (protracted)

- Protraction is accomplished by contraction of the lateral pterygoid muscle, which:

-> Pulls forward the neck of the mandible and the articular disc

-> Moves the disc onto the articular tubercle

- Forward movement of the disc is limited by:

-> Tension of the fibroelastic tissue, which tethers the disc to the temporal bone posteriorly

- Depression of the mandible is brought about by contraction of:
 - Digastrics
 - Geniohyoids
 - Mylohyoids
- Lateral pterygoids also play an important role by pulling the mandible forward

2) Mandible Elevation

- Movements in depression are reversed:
 - > First, the head of the mandible and the disc move backward
 - > Then, the head rotates on the lower surface of the disc
- Elevation of the mandible is brought about by contraction of:
 - Temporalis
 - Masseter
 - Medial pterygoids

- The head of the mandible is pulled backward by:

-> The posterior fibers of the temporalis

- The articular disc is pulled backward by:

-> The fibroelastic tissue, which tethers the disc to the temporal bone posteriorly

3) Mandible Protrusion

- The articular disc is pulled forward onto the anterior tubercle, carrying the head of the mandible with it

- All movement takes place in the upper cavity of the joint

- In protrusion:

-> The lower teeth are drawn forward over the upper teeth

- Protrusion is brought about by:

-> Contraction of the lateral pterygoid muscles of both sides

-> Assisted by both medial pterygoids

4) Mandible Retraction

- The articular disc and the head of the mandible are pulled backward into the mandibular fossa

- Retraction is brought about by:

-> Contraction of the posterior fibers of the temporalis

5) Lateral Chewing Movements

- Produced by alternately protruding and retracting the mandible on each side
- A certain amount of rotation occurs during these movements
- The muscles on both sides work alternately and not in unison

» Important Temporomandibular Joint Relations

> Anteriorly:

- Mandibular notch
- Masseteric nerve and artery

> Posteriorly:

- Tympanic plate of the external auditory meatus
- Glenoid process of the parotid gland

> Laterally:

- Parotid gland
 - Fascia
 - Skin

> Medially:

- Maxillary artery and vein
- Auriculotemporal nerve

"Clinical Notes"

» Clinical Significance of the Temporomandibular Joint

- The TMJ lies immediately anterior to the external auditory meatus
- The lateral temporomandibular ligament:
 - > Prevents posterior displacement of the head of the mandible
 - > Protects the tympanic plate from fracture during a severe blow to the chin
- The articular disc may become partially detached from the capsule, resulting in:
 - > Noisy movement
 - > Audible clicking sound during joint movements

» Temporomandibular Joint Dislocation

- Dislocation may occur during mandibular depression (e.g., yawning)
 - During this movement:
 - > Head of the mandible and articular disc move forward to the summit of the articular tubercle
 - > In this unstable position, a minor blow or sudden muscle contraction (especially lateral pterygoids) can pull the disc forward beyond the summit
 - In bilateral dislocation:
 - > Mouth is fixed open
 - > Both heads of the mandible lie in front of the articular tubercles
 - Reduction of dislocation:
 - > Place gloved thumbs on lower molars, apply downward pressure

-> Simultaneously, push jaw backward

- Downward pressure overcomes temporalis and masseter tension
- Backward pressure overcomes lateral pterygoid spasm