Introduction

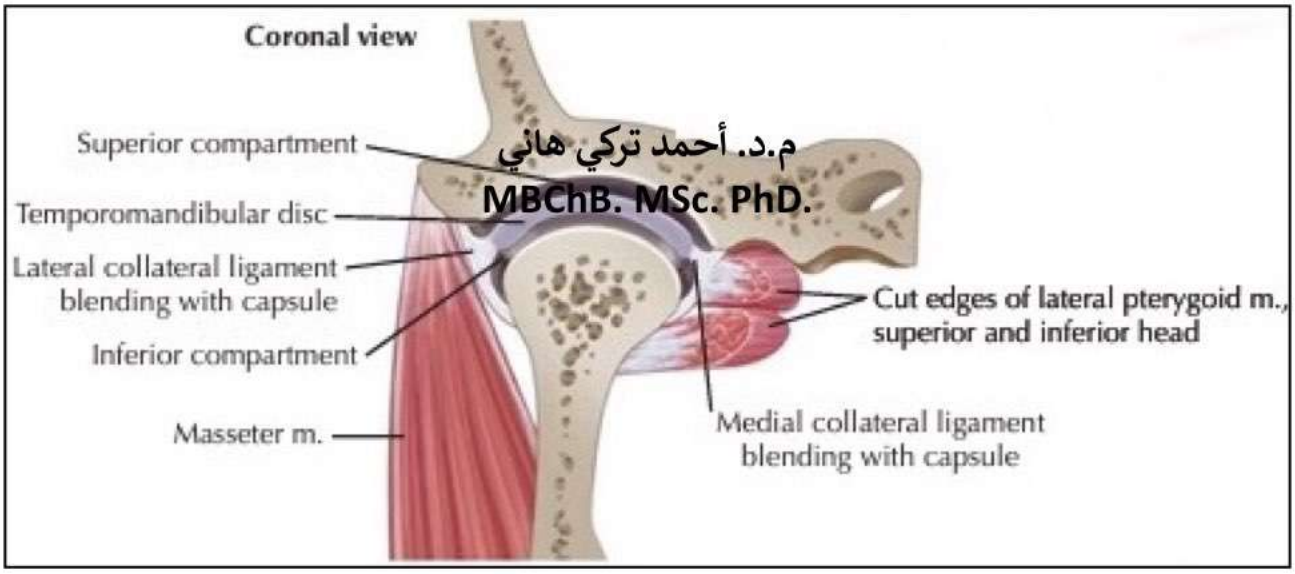
The Temporomandibular Joint (TMJ) is a bilateral synovial articulation between the mandibular fossa of the temporal bone and the condylar process (head) of the mandible.

It is a ginglymoarthrodial joint, meaning it performs two types of movement:

Ginglymoid (hinge): Rotation around a horizontal axis (occurs in the lower joint compartment).

Arthrodial (gliding/sliding): Translation (occurs in the upper joint compartment).

The articulating surfaces are covered by fibrocartilage, not hyaline cartilage, which makes it more resistant to breakdown and allows it to repair better than other synovial joints.



The Articular Disk (Meniscus)

A biconcave, oval plate of dense fibrous connective tissue situated between the mandibular fossa and the mandibular condyle.

It divides the joint space into two compartments:

Upper (Superior) Compartment: Between the temporal bone and the disk, responsible for gliding (translation) movements.

Lower (Inferior) Compartment: Between the disk and the mandibular condyle, responsible for hinge (rotational) movements.

Functions: Stabilizes the joint, acts as a shock absorber, and facilitates smooth movements by adapting to the changing shapes of the articulating surfaces.

Retrodiscal Tissue (Posterior Attachment)

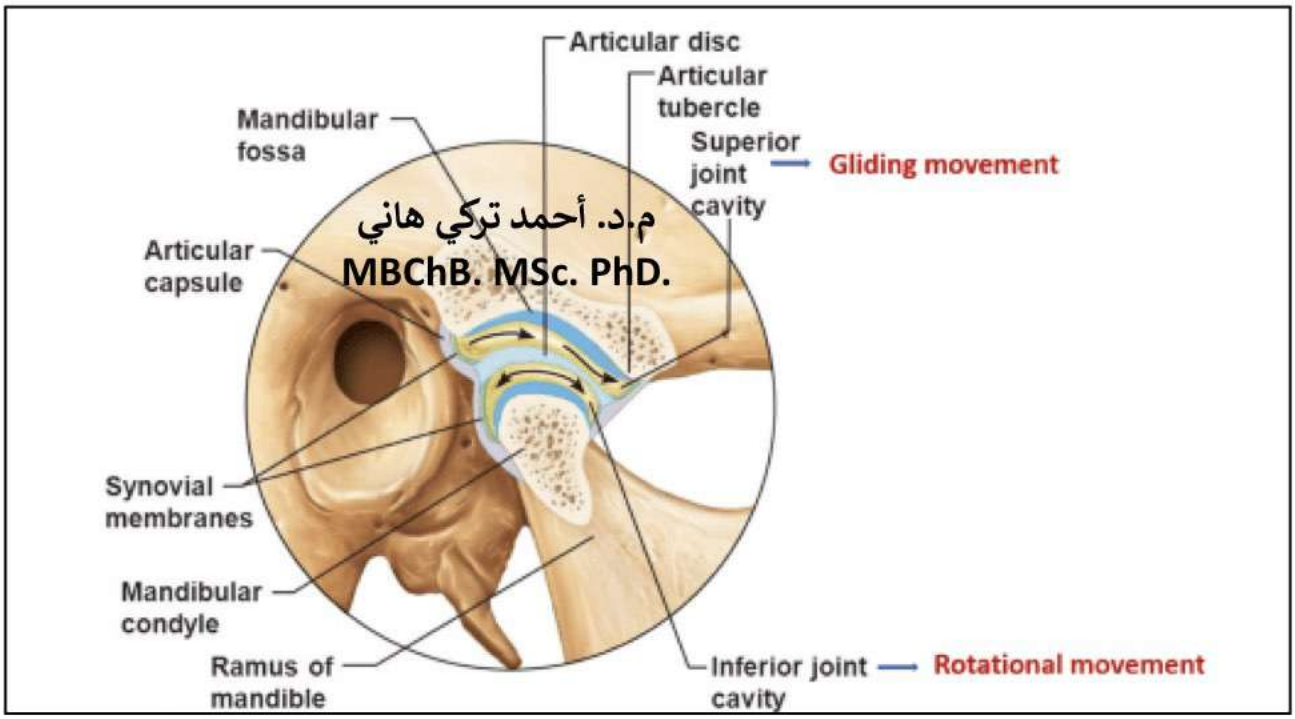
A highly vascularized and innervated loose connective tissue located posterior to the articular disk.

It attaches the disk to the posterior wall of the mandibular fossa.

It contains the major blood and nerve supply to the joint.

Superior Lamina: Connects the disk to the tympanic plate. It is primarily elastic tissue and helps pull the disk posteriorly when the mouth closes.

Inferior Lamina: Connects the disk to the posterior aspect of the condyle. It is mostly collagenous and limits the forward rotation of the disk.



Capsule

A fibrous sac that encloses the joint.

Attachments:

Superiorly: Around the borders of the mandibular fossa and articular eminence of the temporal bone.

Inferiorly: To the neck of the mandibular condyle.

Function: Provides stability and limits excessive movement. It is often thin and loose, especially anteriorly.

Synovial Membrane

A thin, vascular tissue lining the inner surface of the fibrous capsule (except over the articulating surfaces).

It is present in both the upper and lower joint compartments.

Function: Produces synovial fluid, a lubricant necessary for the health and nutrition of the articular surfaces and the central avascular portion of the disk.

Ligaments

The TMJ is supported by one major and two accessory ligaments:

Temporomandibular (Lateral) Ligament:

The major ligament of the TMJ, thickening of the lateral capsule.

Runs posteroinferiorly from the zygomatic arch to the lateral side of the condylar neck.

Function: Limits posterior, lateral, and inferior displacement of the condyle; essential for limiting jaw opening.

Sphenomandibular Ligament (Accessory):

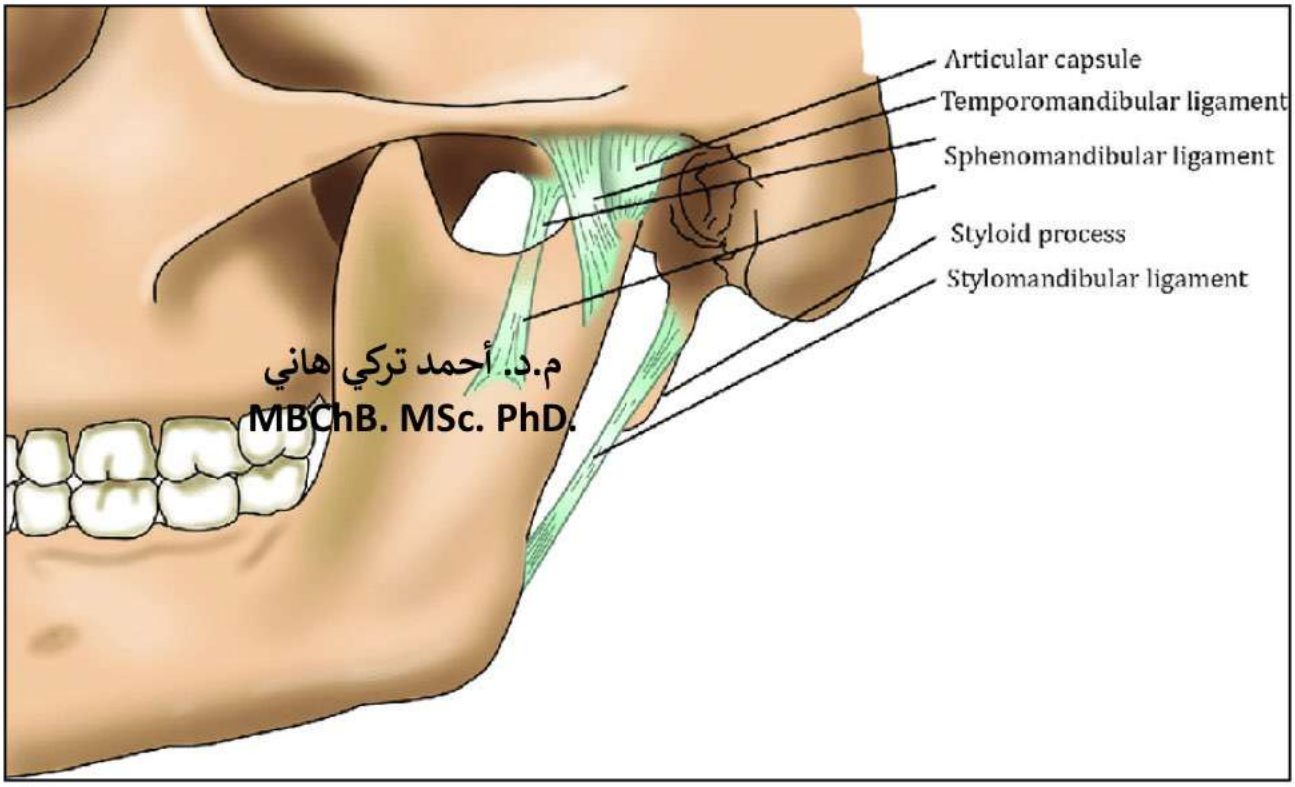
Runs from the spine of the sphenoid bone to the lingula of the mandibular foramen.

Function: Acts as a suspensory ligament for the mandible; provides a non-limiting, passive support.

Stylomandibular Ligament (Accessory):

Runs from the styloid process to the posterior border of the ramus near the angle.

Function: Limits excessive protrusion of the mandible and may limit excessive opening.



Nerve Supply

The TMJ is richly innervated, contributing to its proprioception and pain sensitivity.

Primarily derived from branches of the **Mandibular Nerve (V_3)**:

Auriculotemporal Nerve (major supply, especially posterior and lateral).

Masseteric Nerve (superior and anterior).

Deep Temporal Nerve (sometimes).

Vascular Supply

Main blood supply comes from branches of the **External Carotid Artery**:

Superficial Temporal Artery (major supply).

Maxillary Artery.

The central portion of the articular disk is avascular, but the peripheral margins and retrodiscal tissue are highly vascularized.

Movements

Jaw movement is complex and involves rotation and translation.

Movement	Description	Muscles of Action
Depression (Opening)	Rotation of condyle (hinge) followed by translation (gliding)	Lateral Pterygoid (main opener), Digastric, Geniohyoid, Mylohyoid
Elevation (Closing)	Reverse of opening: Translation followed by rotation	Masseter, Temporalis, Medial Pterygoid
Protrusion (Forward)	Both condyles glide forward	Bilateral Lateral Pterygoids, Masseter, Medial Pterygoids
Retrusion (Backward)	Condyles move back into the fossa	Posterior fibers of Temporalis, Deep Masseter, Suprahyoids
Lateral Excursion (Side-to-Side)	Working Side: Rotation/ slight retrusion. Balancing Side: Protrusion	Ipsilateral Temporalis and Contralateral Lateral Pterygoid

Important Relations of the Temporomandibular Joint

Anterior: Lateral Pterygoid muscle.
Posterior: External Auditory Meatus, Parotid Gland, Auriculotemporal Nerve.
Lateral: Skin, Fascia, Parotid Gland, Temporomandibular Ligament.
Medial: Maxillary Artery, Auriculotemporal Nerve, Middle Meningeal Artery.
Superior: Middle Cranial Fossa.

Clinical Notes

TMJ Disorders (TMD/TMJD): A term covering pain and dysfunction in the joint and/or surrounding muscles. Can involve pain, clicking/popping, and limited movement.

Disk Displacement: Most commonly, the disk displaces anteriorly.

Reduction: The disk "pops" back onto the condyle during opening (associated with a 'click' sound).

Non-Reducing: The disk stays displaced, limiting full opening ("Closed Lock").

Dislocation (Luxation): When the mandibular condyle moves anterior to the articular eminence upon wide opening and cannot return without manual manipulation.

Trismus: Spasm/lockjaw, often due to muscle overuse or infection (e.g., tetanus), leading to difficulty opening the mouth.