Lec 5&6 **Dr. Muayad Hashim**

Temporomandibular joint

Introduction:

The temporomandibular joints (TMJ) are the two joints connecting the Jawbone to the skull. It is a bilateral synovial articulation between the temporal bone of the skull above and the mandible below; it is from these bones that its name is derived. This joint is unique in that it is a bilateral joint that functions as one unit.

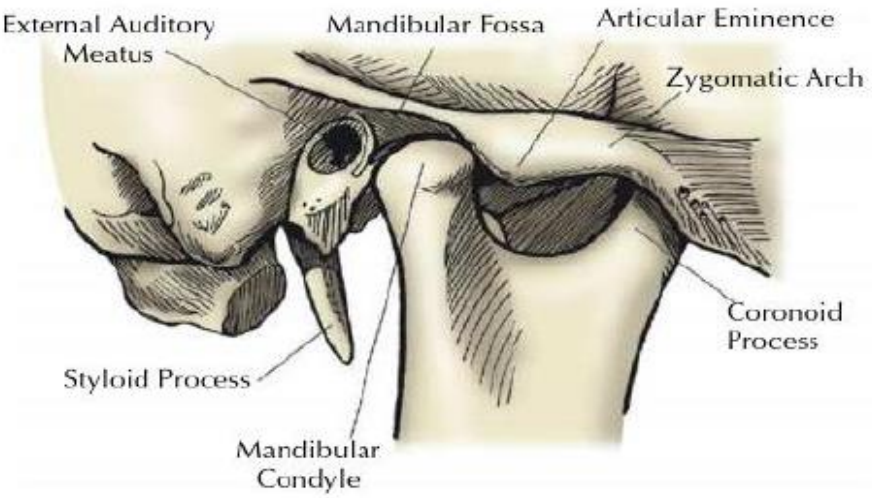
Since the TMJ is connected to the mandible, the right and left joints must function together and therefore are not independent of each other both TMJ are join by a single bone (mandibular bone) movement in one joint cannot occur without similar coordinating movement in the other joint.

in synovial joints of the body the articular part covered with hyalin but here cover with dense con. tissue so the head of the condyle , articular eminence and glenoid fossa covered with dense con. T.

The central area of the disc is avascular and lacks innervation, thus getting its nutrients from the surrounding synovial fluid. In contrast, the posterior ligament and the surrounding capsules along has both blood vessels and nerves. Few cells are present, but fibroblasts and white blood cells are among these. The central area is also thinner but of denser consistency than the peripheral region.

Osseous component:

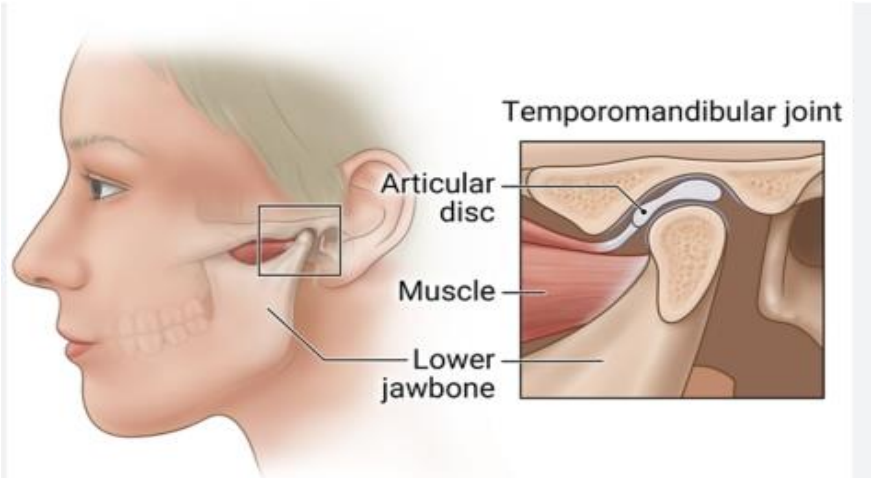
Glenoid fossa.
Tympanic plate.
Condylar head of mandible.
Articular eminence
Squamous portion of temporal bone.
External auditory meatus.



Soft tissue component:

Articular disc
Muscular tissue.
Bilaminar zone.
Capsule

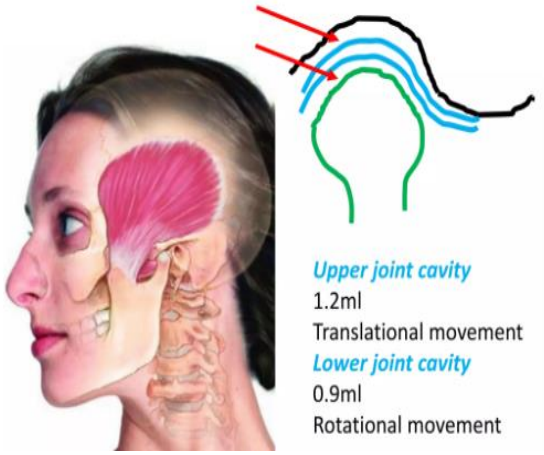
Articular disc: It is formed of dense fibrous collagenous tissue, and some called fibrocartilage because cartilage incorporated with fibrous`1 connective tissue. It is situated between the head of the condyle and the glenoid fossa



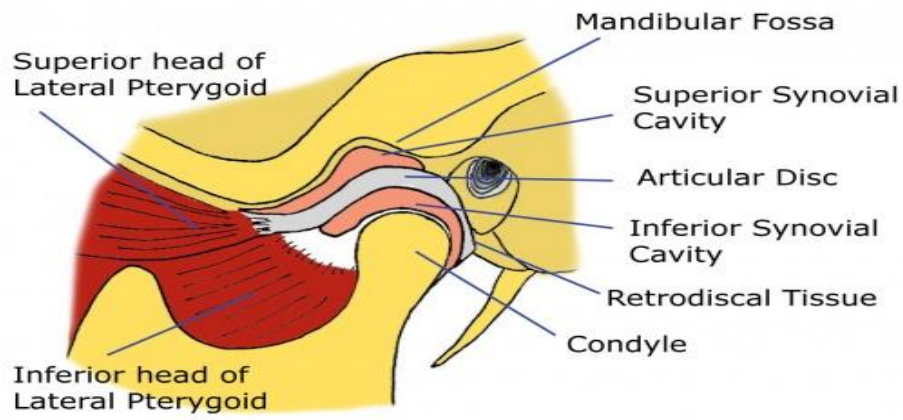
- provide stabilization during condylar movement and shock absorption during mastication .
- It is biconcave in shape ,anteriorly give attachment to the upper head of lateral pterygoid muscle and posteriorly to very loose cont. tissue which contain elastic fiber which is highly vascular and highly innervated.
- sup.bilaminar zone hold it to temporal bone.
- inf. Hold it to the condyle

The disc separates the joint into superior and inferior compartment and filled with synovial fluid so called synovial joint for :

- lubrication of the joint surface.
- Nutritional supply.
- Debridement of waste products of tissues.



Retrodiscal tissue - Unlike the disc itself, the retrodiscal tissue is vascular and highly innervated. As a result, the retrodiscal tissue is often a major contributor to the pain of Temporomandibular Disorder (TMD), particularly when there is inflammation or compression within the join



The Temporomandibular Joint

Capsule - The capsule is a fibrous membrane that surrounds the joint and attaches to the articular eminence, the articular disc and the neck of the mandibular condyle

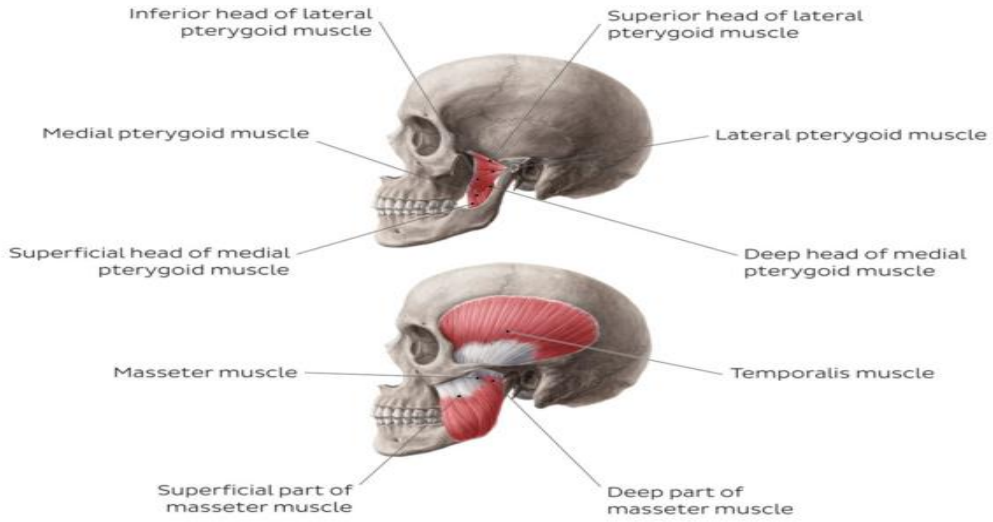
Muscles Related to the TMJ:

Muscles include:

- Masseter
- Temporalis
- Lateral pterygoid
- Medial pterygoid

Masseter muscle: Originate from the inferior border of the zygomatic arch and inserted to the angle of the mandible.

Temporalis Muscle:
Originate from the ridge of the temporal bone and inserted to the coronoid process of the mandible.



Temporalis muscle

- Fan shaped
- Fills temporal fossa

Origin:

Temporal fossa & fascia covering temporalis muscle

Insertion:

Margin & deep surface of coronoid process

Ant.border of ramus of mandible

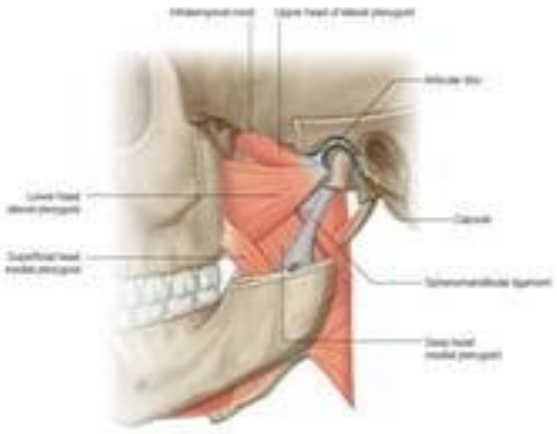
Lateral pterygoid muscle cont…

- Short muscle
- Conical shape
- Muscle is surrounded by pterygoid plexus of veins
- Has 2 heads

1. Upper head (small)
2. Lower head (large)

Origin:

- **Upper head :** Infratemporal surface & crest of greater wing of sphenoid
- **Lower head:** Lateral surface of lateral pterygoid plate



Lateral pterygoid muscle cont…

Insertion:

Pterygoid fovea (ant.surface of neck of mandible)

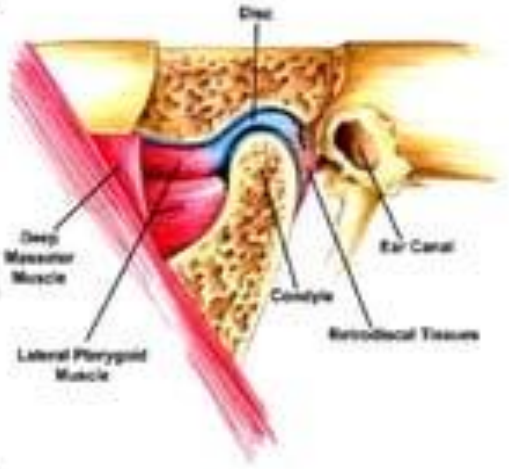
Ant.margin of articular disc & capsule of TMJ

Nerve supply :

A Branch from anterior division of mandibular nerve

Action:

- Depress the mandible (open the mouth)
- Protrude the mandible
- Side to side movements -grinding action (with opp. Medial pterygoid turn the chin to same side)



Medial pterygoid muscle

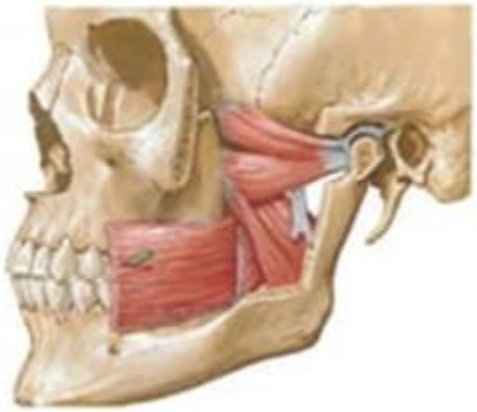
- Quadrilateral in shape
- Has 2 heads

1. Superficial head
2. Deep head

Origin:

Superficial head:
Tuberosity of maxilla

Deep head:
Medial surface of lateral pterygoid plate



Medial pterygoid muscle cont...

Insertion:

- Medial surface of angle & adjoining ramus of mandible

Nerve supply:

- Nerve to medial pterygoid – branch from main trunk of mandibular nerve

Action:

- Elevates the mandible (close the mouth)
- Protrusion of mandible
- Side to side movements – grinding action (with opp.lateral pterygoid turn the chin to opp.side)

TEMOROMANDIBULAR LIGAMENTS:

There are two main ligaments;

1-capsular ligaments

It is a thin, elastic, fibrous connective tissues attached to the margins of articulating disc

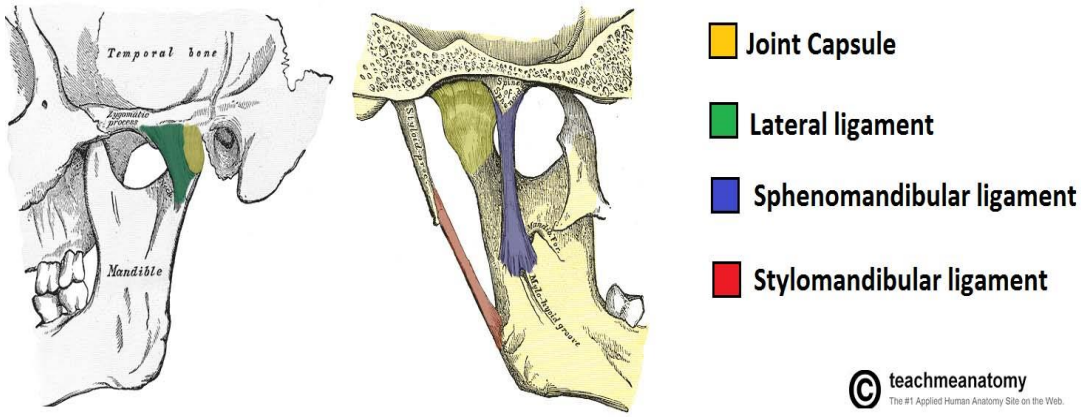
2-Lateral temporomandibular ligaments

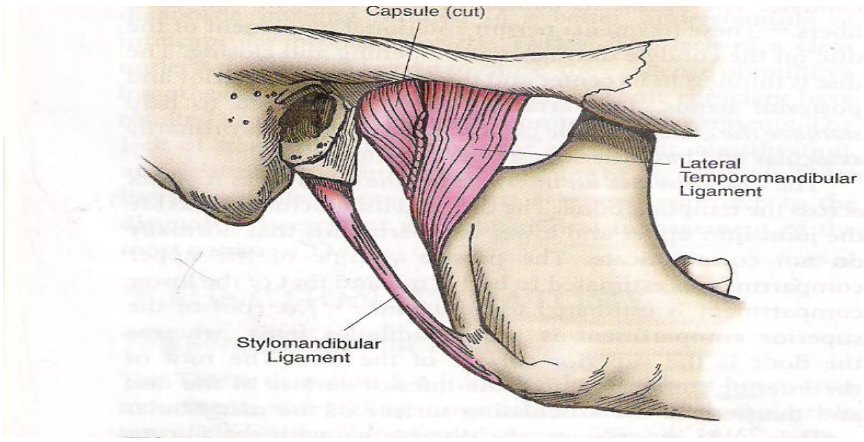
a-Sphenomandibular ligaments;

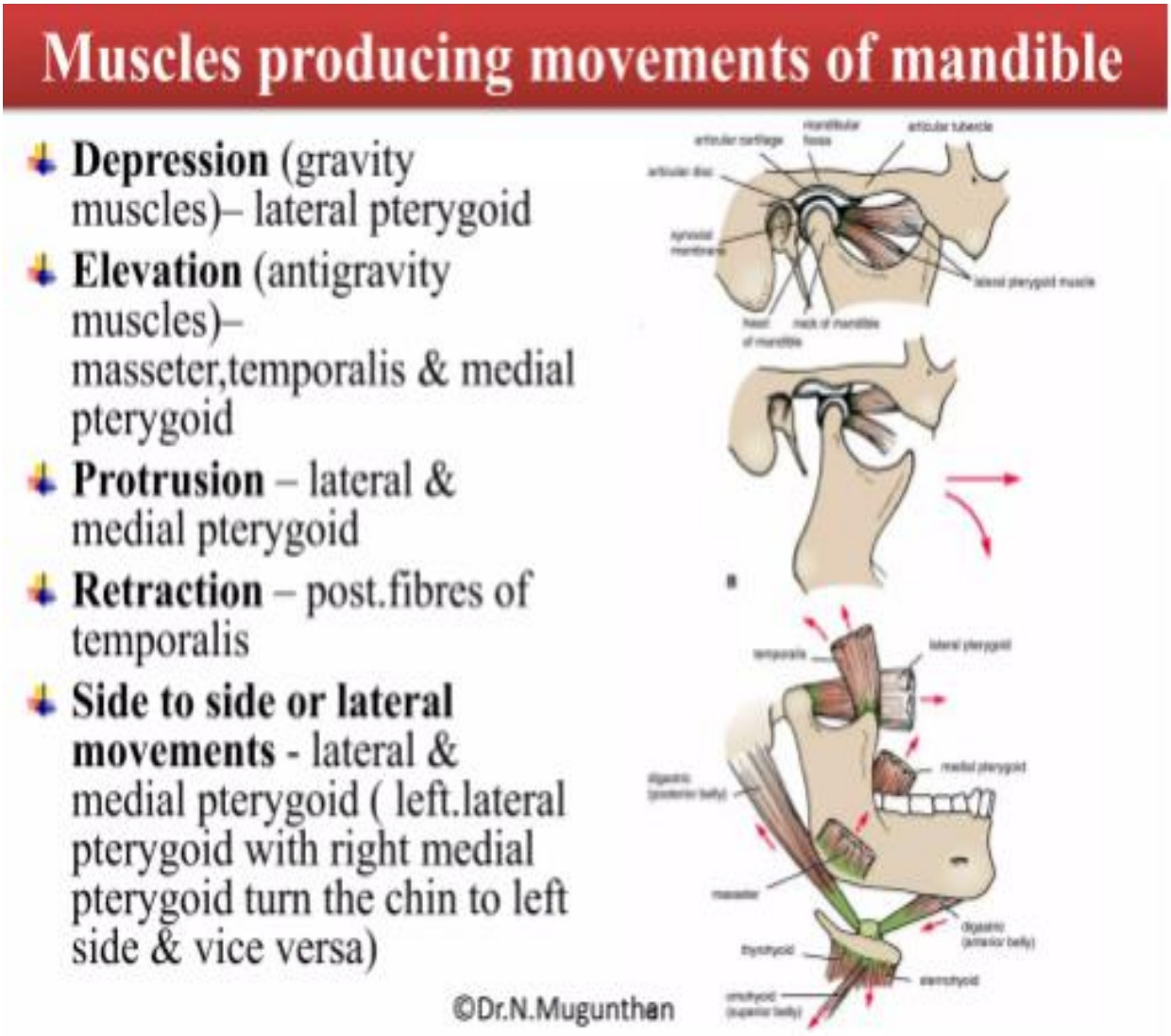
Arise from sphenoid bone and insert in the medial aspect of the mandible. At lingula ,it is not limit or affect mandibular movements.

b- Stylomandibular ligaments;

Extended from styloid process to the deep fascia of the medial pterygoid muscle , it cotribute limiting protrusive of mandible and insert in the angle of mandible .





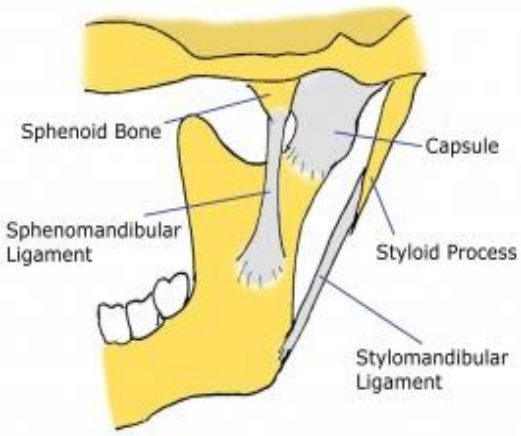


Resting Position and Close-Packed Position

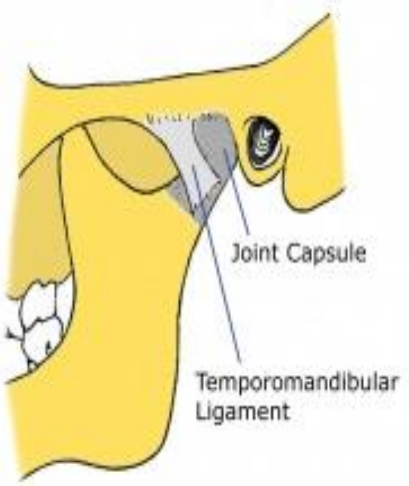
The resting position of the TMJ is with the mouth slightly open, the lips together and the teeth not in contact. This is in contrast to the closed-pack position in which the teeth are tightly clenched.

bilaminar zone : reciprocate the action of the muscles by pulling the disc backward and this achieved by the superior and inferior bilaminar zones these consist of elastic fibers inserted in the disc (meniscus) and glenoid fossa (inferior bilaminar zones is less elastic than the superior). Between the bilaminar zones loose con. Tissues which is highly vascular and highly innervated

Capsule: all these structures are incapsulated by dense fibrous conn. tissue.the capsule laterally and medially firm while ant. & post. Loose to allow forward &backward movement.



The Temporomandibular Ligaments and Joint capsule (medial view)



The Temporomandibular Ligament and Joint capsule (lateral view)

Nerve supply

- Auriculotemporal nerve
- Masseteric nerve

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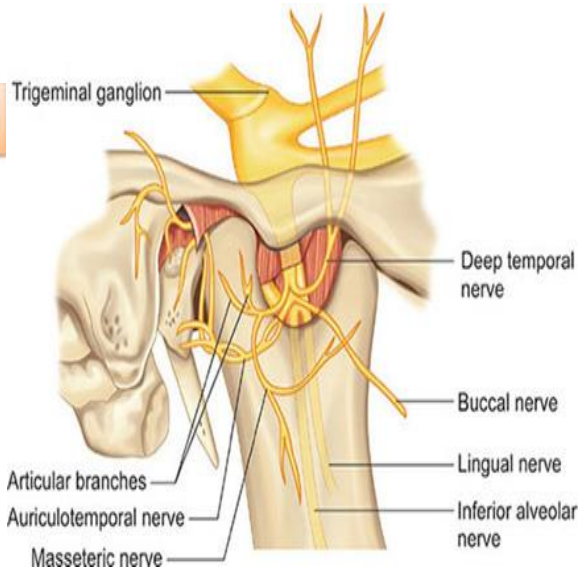
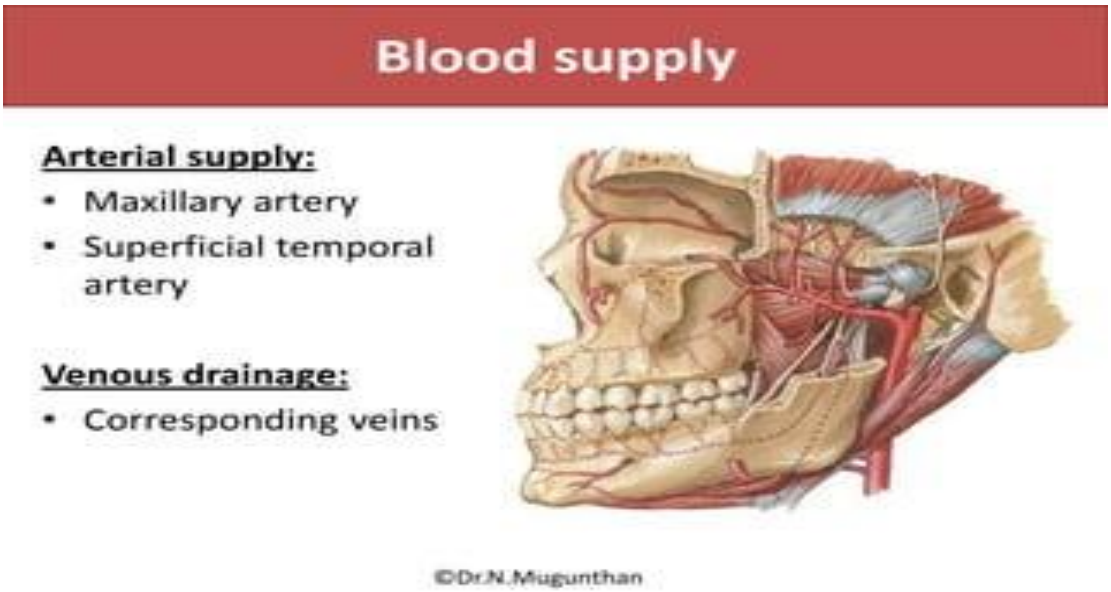




In general, most common symptoms of TMJDs can be summarized:
1-Facial pain.
2-Pain in tmj and surrounding tissue, including ear.
3-Limitation opening and closing of the mouth.
4-Sweling in the side of the face.
5-Clicking and criptus.
6-Pain in shoulders .neck and back.
7-Headach.

Diagnosis

1. **patient history: C.C , HPI ,PDH, Medical history, history of trauma, history of stress ,anxiety and depression, family history, social history.**

Pain :

1. **Occur spontaneously or when do certain activities.**
2. **Intermittent or constant.**
3. **Gradually or paroxysmal.**
4. **Duration.**
   Is pain sharp, lanciating, dull, throbbing

TMJ symptoms:

1. Clicking or pop.
2. Limitation or deviation.
3. Pain and dysfunction in other joint of the body.
4. Locked jaw or dislocation.

2- Clinical examination:

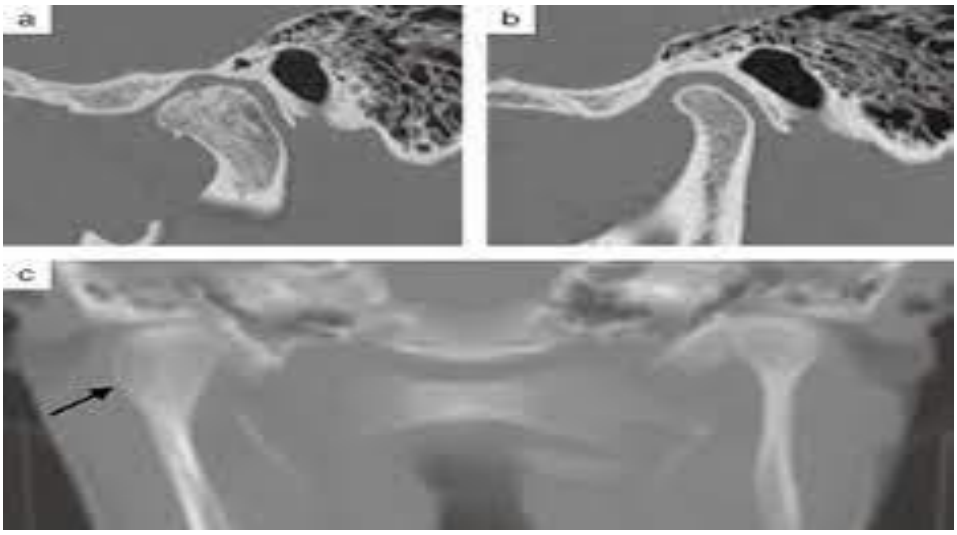
- **Inspection:** the symmetry of the face, deviation of man. on opening, max. interincisal opening.
- **Palpation:** pretragus area, intra auricular, muscle of mastication.
- **Auscultation:** type of the sound (grinding, crepitation, popping, clicking).

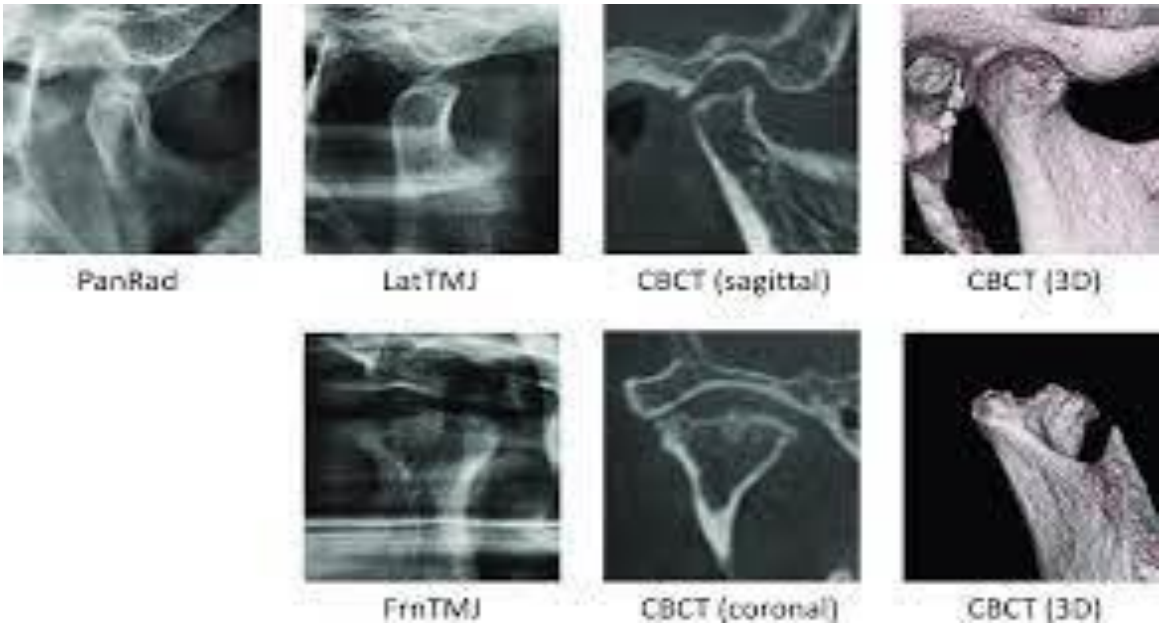
3- Radiographic examination:

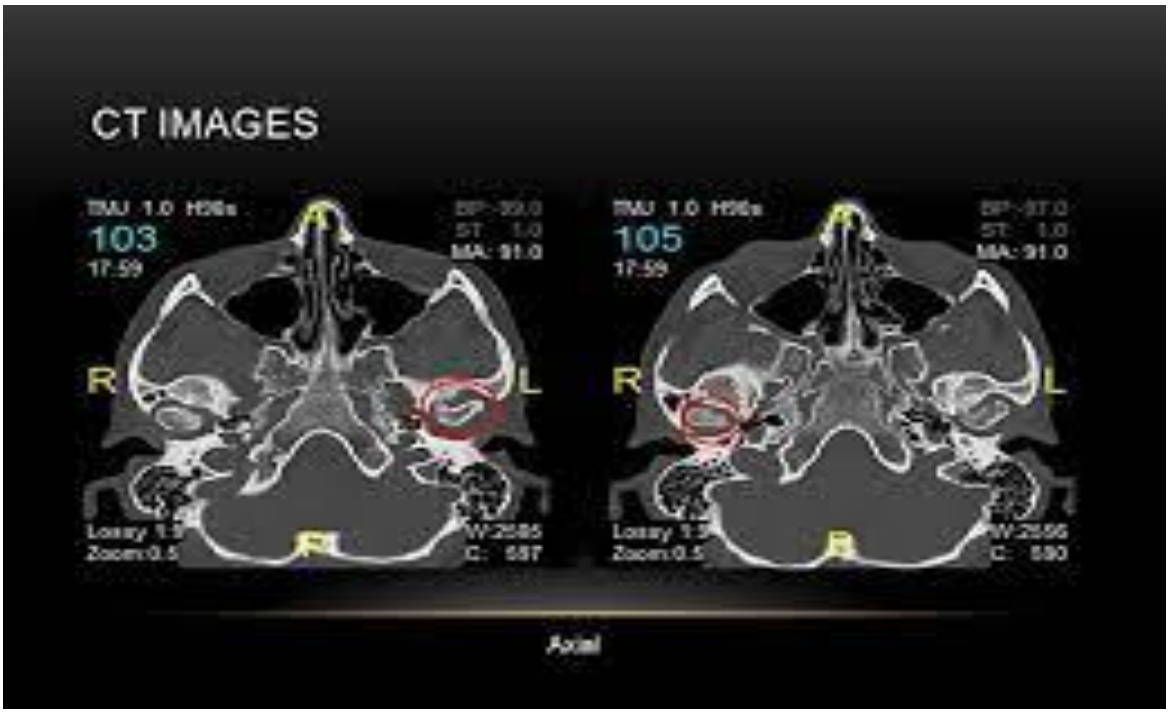
- Plain radiography: Transorbital, Transcranial and Transpharyngeal views to show:

1. **joint during opening and closing.**
2. **shape of condylar head and contour of the glenoid fossa.**
3. **relation of condyal to glenoid fossa.**

- Conventional tomography: It shows position of disc and if there is perforation of the disc.
- Computed tomography (CT)&CBCT: Gives information about position of the disc in addition of to osseous structures.







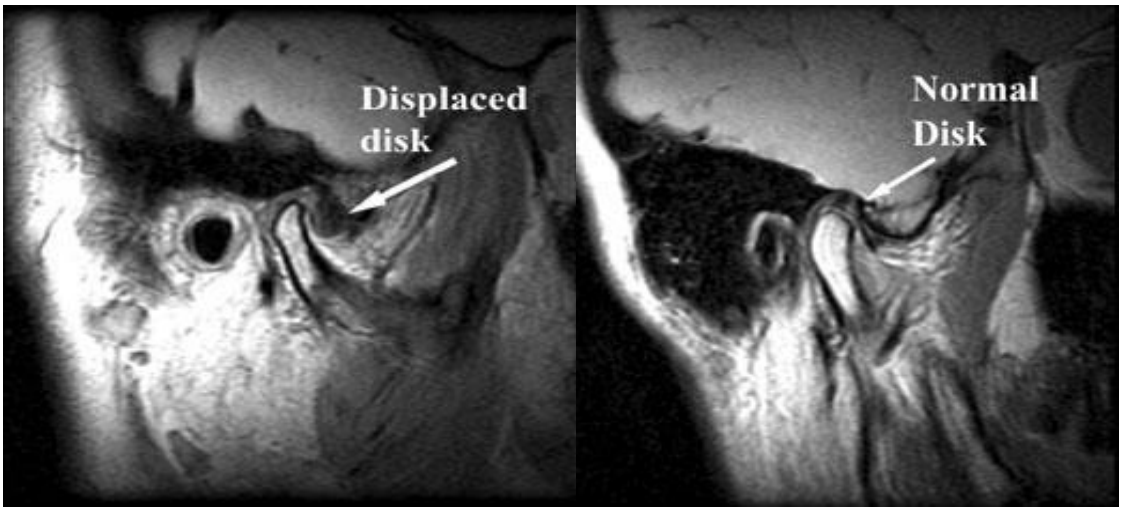
Arthrography: Radioopaque die is injected in the lower joint space and take either lateral or anterioposterior radiography or tomography

Used to study:

1. **Displacement or perforation of disc.**
2. **Irregularities in the posterior attachment of the disc.**
3. **Adheison.**
4. **Synovial proliferations.**

Magnetic Resonance Imaging (MRI):

1. **MRI does not use lonizing radiation and is noninvasive.**
2. **It is superior to arthrography in demonstrating medial and lateral displacement of disc but does not detect perforation.**
3. **Demonstrate osseous changes in TMJ.**



- Arthroscopy: Advice used for by inserting a tube in to the joint spaces for the diagnosis of the joint diseases. The treatment by injecting a fluid for debridement of waste products out of the synovial spaces .

Electromyography (EMG): provide an objective means of monitoring changes in muscle activity.

The articular disk is displaced anteriorly due to abnormal jaw mechanics; it may remain displaced (without reduction) or return (with reduction). Disk displacement with reduction typically manifests with clicking/popping and pain with jaw use

Anterior TMJ dislocation commonly follows extreme opening of the mouth (eg, during eating, yawning, laughing, singing, kissing, vomiting, or dental treatment) and less often occurs after trauma. Dislocation also can result from dystonic reactions to drugs, seizures, or tetanus infection

Subluxation is an abnormal excessive excursion of the disk-condyle complex from its normal path, which translates anterior to its normal range in front and beyond the articular eminence during the opening of the mouth.

Luxation is a condition in which the articular surfaces of a joint are completely dislocated (. Patients with TMJ luxation typically present with an inability to completely close the mouth due to mandibular drift resulting in maligned dental arches

Etiologic Factors in Temporomandibular Joint Disorders

The specificity in the etiology is often not possible and multi-factors may be involved in the TMJD

1-Psychological factors

The patient is unable to deal with stress and responds with facial pain, due to tension and spasm of the muscles of mastication.

Females are more subjected to the problems than males

Long exposure to stress may affect the joint movements and lead to irreversible alteration of the joint structures.

2-Occlusal factors

Uncoordinated mandibular movement can be caused by;

- Occlusal interference
- Loss of posterior support
- Cross bite
- Deep overbite
- Increase over jet
- Extruded teeth
- Poorly constructed prosthesis

Which lead to spasm of the muscles of mastication.
Chronic conditions may cause permanent damage to the structures if not treated.

3-Habits involving the TMJ

Habits causing damage to the joints or it's supporting structures and they are mostly associated with psychological stress.
Some of these habits are:

- Bruxisim
- Clenching
- Sleeping position
- Head resting on hands

- Prolong protrusion due to asthetic
- Prolong chewing of tobacco,gum, ice…etc.
- Pipe smoking

• Musical instrument use

4-Trauma

Direct trauma to the joint

Accident

Blow to the joint or mandible

straining the joint due to dental work

Indirect trauma to the joint

High spots (Incorrect prosthesis, dental fillings, orthodontic appliances..etc).

5-Inflammations and infections

Extra capsular causes like

- Pericoronitis
- Parotitis
- Dental abscess

May cause spasm, truismus, and limitation in joint movements.

Intracapsular causes like

- Osteoarthritis, or degenerative bone disease
- Rheumatoid arthritis
- Meniscus lesion and internal derangement May cause pain, and limitation in joint movements.

6-Genetic factors

Growth disturbances

• Hypoplasia

. Hyperplasia

Can affect one or both joints they may appear at birth or during further development.

7-Tumors

• Benign neoplasms may occur like osteoma.

• Malignant neoplasms like osteogenic sarcoma, chondrosarcoma, and metastatic neoplasms to involve the joint

8-Systemic Factors

Many systemic diseases e.g.

• Gout
• Hyperparathyroidism
• Paget's disease
• Vit D deficiency
• Scleroderma
• Lupus erythematosis
• Behcet's syndrome

May involve the joint and cause TMJ disorders

Hypoplasia

Osteoarthritis

TMJ remodeling, articular cartilage abrasion and deterioration Osteoarthritis localized to the TMJ may also be a part of this generalized condition

Osteoarthritis (OA) of the temporomandibular joint (mostly) unilateral, degenerative disease of the jaw joint

It is characterized by

Breakdown of the articular cartilage, architectural changes in bone, and degeneration of the synovial tissues causing pain and/or dysfunction in functional movements of the jaw

With osteoarthritis, the jaw joint can be the first joint to get the disease, where in rheumatoid arthritis it is the last joint to be affected

The patients who develop (OA) present with a variety of symptoms including pain on opening, limited movement to the opposite side, coarse grinding noise on function, history of clicking that has now stopped, and deviation on opening to the affected side.

The clinical findings are pain on palpation of lateral pole, decreased range of motion findings , heavy occlusion on second molar on the affected side, facial asymmetry,

referral pattern to the ear, pain on eating, talking, or function of the jaw joint,

In summary, a picture of pain, dysfunction, and disability is involved in osteoarthritis of jaw joint.

while flattened condyle, osteophytes on condyle(could be noticed by X ray findings).

Rheumatoid arthritis

Rheumatoid arthritis (RA) is a chronic, systemic, autoimmune inflammatory disorder that is characterized by joint inflammation, erosive properties and symmetric multiple joint involvement.

TMJ is very rare to be affected in the early phase of the disease, thus posing diagnostic challenges for the dentist. Conventional radiographs fail to show the early lesions due to its limitations. More recently (CBCT) has been found to diagnose the early degenerative changes of TMJ and hence aid in the diagnosis of the lesions more accurately.

Some common clinical symptoms of TMD include TMJ sounds/noises,
TMJ pain, facial pain, headaches, limited range of mandibular movement,
change in occlusion, masticatory difficulty, earaches,
tinnitus, vertigo, and neck, shoulder, and back pain.
while some patients
with pathological internal derangement of the TMJ, however, are asymptomatic or have relatively innocuous clinical symptoms.

Infection arthritis

Infection of the temporomandibular joint (TMJ) may result from direct extension of adjacent infection or hematogenous spread of blood borne organisms .
The area is inflamed, and jaw movement is limited and painful. Local signs of infection associated with evidence of a systemic disease or with an adjacent infection

suggest the diagnosis. X-ray results are negative in the early stages but may show bone destruction later. If suppurative arthritis is suspected, the joint is aspirated to confirm the diagnosis and to identify the causative organism.(Diagnosis must be made rapidly to prevent permanent joint damage.)

Treatment

Includes antibiotics, proper hydration, pain control, and motion restriction.
Parenteral penicillin G is the drug of choice until a specific bacteriologic diagnosis can be made on the basis of culture and sensitivity testing.

Once the infection is controlled, passive jaw opening exercises help prevent scarring and limitation of motion
The most common symptoms include:

- Difficulty in mouth opening due to pain,
-Fibrous adhesions,
-Anterior disc displacement,
-Muscle contracture,
-Inflammation, or more severe degeneration of the TMJ in the advanced stage

Ankylosis

Ankylosis of the temporomandibular joint (TMJ) most often results from traumaor infection, but it may be congenital or a result of rheumatoid arthritis. Chronic painless limitation of motion occurs. When ankylosis leads to arrest of condylar growth, facial asymmetry is common

Intra-articular (true) ankylosis must be distinguished from extra-articular (false) ankylosis, which may be caused by enlargement of the coronoid process, depressed fracture of the zygomatic arch, or scarring resulting from surgery,irradiation, or infection.

In most cases of true ankylosis, x-rays of the joint show loss of normal bony architecture

Treatment:

1. Personality and emotional support.
2. Hot and cold application.
3. Soft diet & bilateral chewing.
4. Aspirin and myogesic drug 2x3 daily.
5. Diazepam 2, 5-5mg at bed time.
6. Physical therapy.
7. Occlusal splint as diagnostic &treatment device.

Advantage of occlusal split (night guard):

1- Get greater freedom in mandibular Movement.
2- Increase in muscle balance.
3- Placebo effect of appliance