

Oral Medicine Lecture

Temporomandibular Joint Disorders

Temporomandibular Joint : Is a synovial joint located between the condyle (head of the mandible) and the glenoid fossa (inferior surface of the squamous part of Temporal bone)

TMJ is similar to the other joints of the body that it composes of osseous and soft tissue components.

However, the difference that it is:

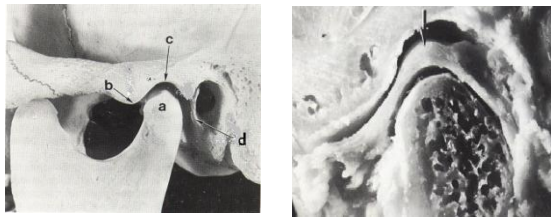
- 1-Double joints in function.
- 2-The function is controlled by other factors like teeth and neuromuscular system.
- 3-The movement of the joint is not bone to fossa but sliding (from glenoid to the eminence).
- 4-The ossification of the joint is fibrous, while the others are hyaline in nature.

Anatomy of the Temporomandibular joint

Osseous components:

The lower portion is formed by the head and neck of the condyle of the mandible (a).

The upper portion contains the squamous portion of the temporal bone, the glenoid fossa (c), and the articular eminence (b). The tympanic plate (d) lining the joint posteriorly .



Soft tissue components:

The articular disc (meniscus) is formed of dense fibrous C.T located between the head of the condyle and the glenoid fossa (act as a cushion between the two surfaces).The disc is biconcave shape with thick bands in the periphery and thin in the middle area. The Upper and lower synovial spaces contain synovial fluid. The fluid lubricate, nourishes the joint surfaces, and debridement of the waste products.

Muscles Related to the TMJ: The four pair muscles of mastication are (Masseter, Temporalis Medial, and Lateral pterygoid muscles). In addition, suprahyoids are involved in the joint movement.

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.

Medial pterygoid muscle:

Originate from the medial wall of the lateral pterygoid plate and inserted to the medial surface of the medial ramus of the mandible.

Lateral pterygoid muscle:

Originate in two heads; the upper head from the greater wing of sphenoid and the lower head originate from the lateral wall of the lateral pterygoid plate.

The insertion of the fibers are to the meniscus and the lower fibers inserted to the condyle.

The Reciprocal Action of the Muscles: The reciprocal action to the lateral pt. Muscle to hold the meniscus in position is by:

1- Superior bilaminar zone: Elastic fibers hold the meniscus to the temporal plate.

2- Inferior bilaminar zone Less elastic fibers holding the meniscus to the neck of the condyle posteriorly.

All these structures are surrounded by loose CT with blood vessel and nerves forming the retrodiscal pad (area).

The osseous and soft tissue structures are enclosed in a dense fibrous CT capsule that hold the joint in the infra temporal region and enclose them firmly in the condylar neck region called Joint Capsule.

C-condyle

P-postglenoid process

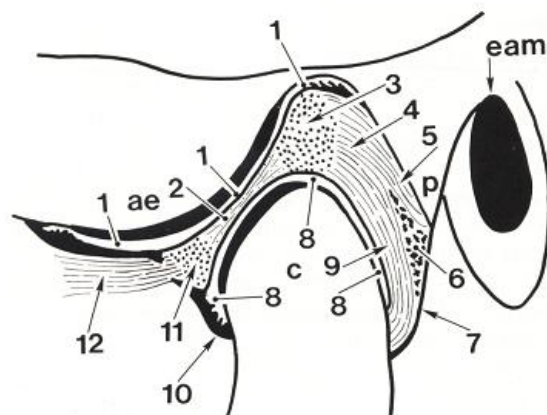
eam (external auditory meatus)

ae (articular eminance)

1-upper joint compartment

2-intermediate zone

3-posterior band



4-bilaminar zone

5-upper portion bilaminar zone

6-tissue with Blood & Nerves

7-posterior joint capsule

8-lower joint compartment

9-lower portion bilaminar zone

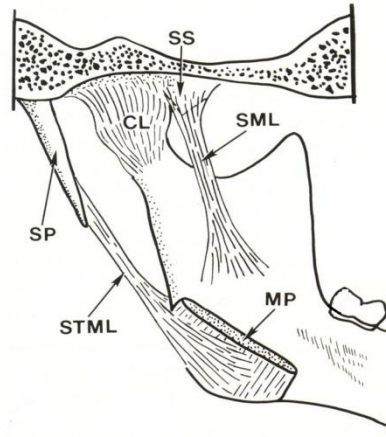
10-anterior capsule

11-the anterior band

12-superior fiber of L pt M

The temporomandibular ligaments (stylomandibular, sphenomandibular and capsular ligament)

limits the movement of the mandible beyond the normal limits.



MP medial pterygoid muscle

SS sphenoidal spine

SML sphenomandibular ligament

CL capsular ligament

SP styloid process

STML stylomandibular ligament

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:

- Bruxism
- Clenching
- Sleeping position

- Head resting on hands
- Prolong protrusion due to aesthetic
- 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-Inflamations and infections

Extra capsular causes like

- Pericoronitis
- Parotitis
- Dental abscess

May cause spasm, trismus, 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 erythematosus
- Behcet's syndrome

may involve the joint and cause TMJ disorders

Diagnosis of Temporomandibular Joint Disorders

1-History taking

- Past history of the disease include; the onset of the illness, duration, frequency, initiating or relieving factors.
- Social and family history
- Past dental and medical history and hospitalization.

2-Clinical Examination

Extra oral examination

- Assymetry
- Color of the face

- Presence of scar...etc
- Palpation of the muscles of mastication
- Digital examination of the TMJ
- Auscultation of the Joint

Intra oral examination

- Soft tissue condition
- Teeth and jaws relation
- Mouth opening and jaw movements

3-Radiographic examination

- Orthopantomograph
- Transcranial or transpharyngeal
- Tomograph
- Arthrograph
- CT scan or CBCT (Cone beam computed tomography)

4-Magnetic Resonance Imaging

5-Arthroscopy

A device used for by inserting a tube into the joint spaces for

The diagnosis of the joint diseases to visualize the surfaces of the disc, bones, and lesions of the joint.

The treatment is by injecting a fluid for debridement of the waste products out of the synovial spaces.

6-Electromyography

A device used to detect the action of the muscles by inserting two electrodes in the muscle affected by spasm and drawing a line on a paper or on the screen to monitor changes activity and the response to the therapy. The Symptoms associated with TMD characterized by the presence of one or more of the following signs and symptoms:

- Periauricular pain and tenderness

- Limitation in the mandibular motion
- Noise in the joint during condylar movement
- Pain and spasm of the muscles of mastication

Myogenic Pain

- It is the most common disorder causing facial pain.
- Females are more common than males.
- The pain refers to the TMJ region.
- Diffused to the facial muscles
- The pain is dull, chronic, and worse in the morning.
- The mandible may deviate to the affected side.
- The patient can open full range(40-50 mm).
- La pt m is mostly involved followed by masseter, and temporalis which are associated with pain and tenderness.

Internal Derangement

Abnormal positional and functional relations between disc, condyle , and temporal bone surface.

The general clinical signs and symptoms

- Clicking or popping with or without pain
- Episode of pain and tenderness in the joint
- Sometimes crepitation
- History of locking
- Interference in closing movement
- The patient may open full range with manipulation.
- The mandible may deviate laterally.
- **Meniscus perforation**
- Occurs due to chronic anterior disc displacement.

- The articulation of the condylar head is with the loose CT (retrodiskal pad area) and cause bone to bone friction (absence of cushion).
- Clinically:
- The patient has history of pain, clicking and locking.
- Perforation may cause limited mouth opening.
- Crepitus on auscultation
- Arthrography;
- shows dye opacity on both joint spaces.
- **Osteoarthritis (Degenerative Bone Disease)**: Generalized process involve weight bearing joints and metacarpophalangeal joints with nodular existence called Heberden's nodes. TMJ is not often involved in generalized joints disease.

The TMJ may be affected, usually in people > 50 yr. Occasionally, patients complain of stiffness, grating, or mild pain. Crepitus results from a hole worn through the disk, causing bone to grate on bone. Joint involvement is generally bilateral. X-rays or CT may show flattening and lipping of the condyle, suggestive of dysfunctional change.

Secondary degenerative arthritis:

This type of arthritis usually develops in people aged 20 to 40 yr after trauma or in people with persistent myofascial pain syndrome. It is characterized by limited opening of the mouth, unilateral pain during jaw movement, joint tenderness, and crepitus may associated with myofascial pain. Diagnosis is based on x-rays, which generally show condylar flattening, lipping or erosion. Unilateral joint involvement helps distinguish secondary degenerative arthritis from osteoarthritis.

Treatment is symptomatic. A mouth guard worn during the night or day may help alleviate pain and reduce grating sounds in patients with missing teeth.



- **Rheumatoid Arthritis**

- Is a collagen disease associated with post streptococcal immunologic tissue changes localized in the joints.
- Ankylosis may occur in late stages of the disease

Clinically

- The joints are warm, swollen (joint stiffness) and painful.
- Muscle spasm may associate with the disease
- Usually the involved joints are bilateral
- TMJ is the last joint involved,
- Stiffness, Crepitation sounds of the joints are common
- In childhood, may result in class II malocclusion and facial deformity.
- X-ray is negative in early stages but later show destruction.

Condylar fractures

- Trauma cause unilateral or bilateral fractures.
- Complete (Green stick) fractures;
 - a-Unilaterally cause shift to the affected side.
 - b-Bilaterally cause gagged occlusion(repositioning, and anterior open bite

MANAGEMENT OF TMJ DISORDERS

The primary aim is to;

1. Relieve Pain and Discomfort
2. Restoring Functions

To do so, it is important to find out the main cause and interrelate factors which complicate the symptoms

1-Behavioral Modification

It is not simple but effective therapy.

The habits should be discontinued.

The patient should be informed about the problem and the way to prevent the complications.

2-Medication

Analgesics non steroidal anti inflammatory drugs and Steroid Therapy

Muscle relaxant (orphenadrine)

Tranquilizers (diazepam)

Antidepressant therapy (Amitriptyline 10mg)

Recently Botulinum toxin (botox) has been approved to relieve pain.

3-Physical therapy

- Exercising the muscles of mastication by Stretching or opening and closing against forces.
- Massage the area.
- Cold and/or hot application will enhance the circulation to remove the waste products and offer a relaxation of the muscle and relieve pain

4-Occlusal treatment

- Restoring the occlusion by restorative procedures, orthodontic appliance, or prosthesis will restore the relation of the condyle to the disc and improve the symptoms.
- Occlusal adjustment of dentate patient should be performed under strict knowledge about occlusion to avoid irreversible damage.

5-Occlusal splints

- occlusal splint, night guard or a bite plane is defined as a; Rigid or flexible appliances that overlay the occlusal surfaces of the teeth designed and fabricated for patients with

some types of functional temporomandibular joint disorders to provide a stable occlusal platform from which to reconstruct a functional occlusion.

Advantages of the occlusal splint

- The principles of good occlusion can be built on a bite or occlusal splint.
- Changes could be done with a reversible method of treatment.



- The appliance are used universally
- There are many designs and types dictated by the case.

6-Surgery

Relieving pain and restoring function of the joint could be performed by;
minor oral surgery

- e.g. removal of infected tooth, 3rd molar...etc

Major surgical procedures e.g.

- correction of Class II, and III malocclusions
- Repositioning of the disc
- Condylectomy for patients with ankylosis