

# Oral Medicine

## Temporomandibular Joint TMJ

### Lecture 7

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# Temporomandibular Joint (TMJ)

One of synovial joints occur between the mandible and temporal bone, it is composed of bony components and soft tissues components.

Bony components are parts of temporal bone (glenoid fossa & articular eminence) and mandible share in joint by head of condyle.

Soft tissues components composed of :

Articular disc, muscular tissue, bilaminar zone and capsule.

# Anatomy of TMJ

## **Bony components:**

### **The condyle :**

It is bony ellipse structure attached to the ramus by an elongated neck.

It's media-lateral dimension (20mm) is larger than antero-posterior dimension (8-10mm).

It's articulating surface is covered in a thin layer of fibrocartilage.

### **The glenoid fossa :**

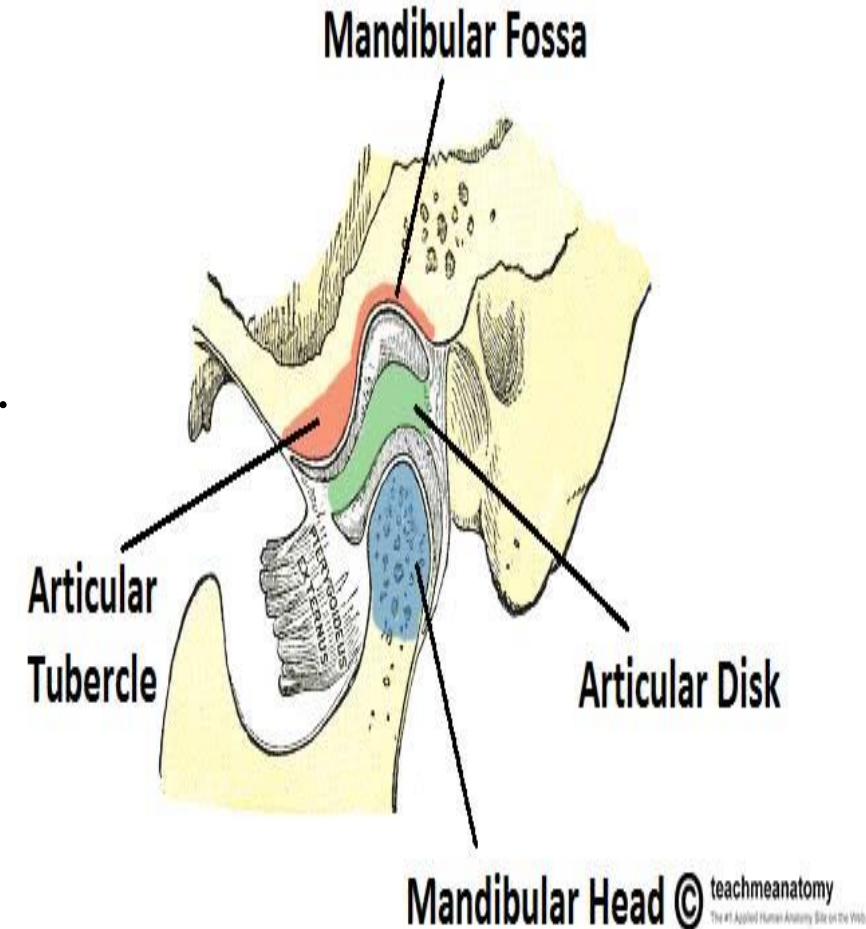
The fossa is hollow on the inferior surface of the squamous temporal bone.

The fossa is bound anteriorly by the articular eminence.

The fossa is covered with a thin layer of fibrocartilage.

### **The articular eminence:**

A ridge of bone which forms the anterior margin of the joint.



## Soft tissues components:

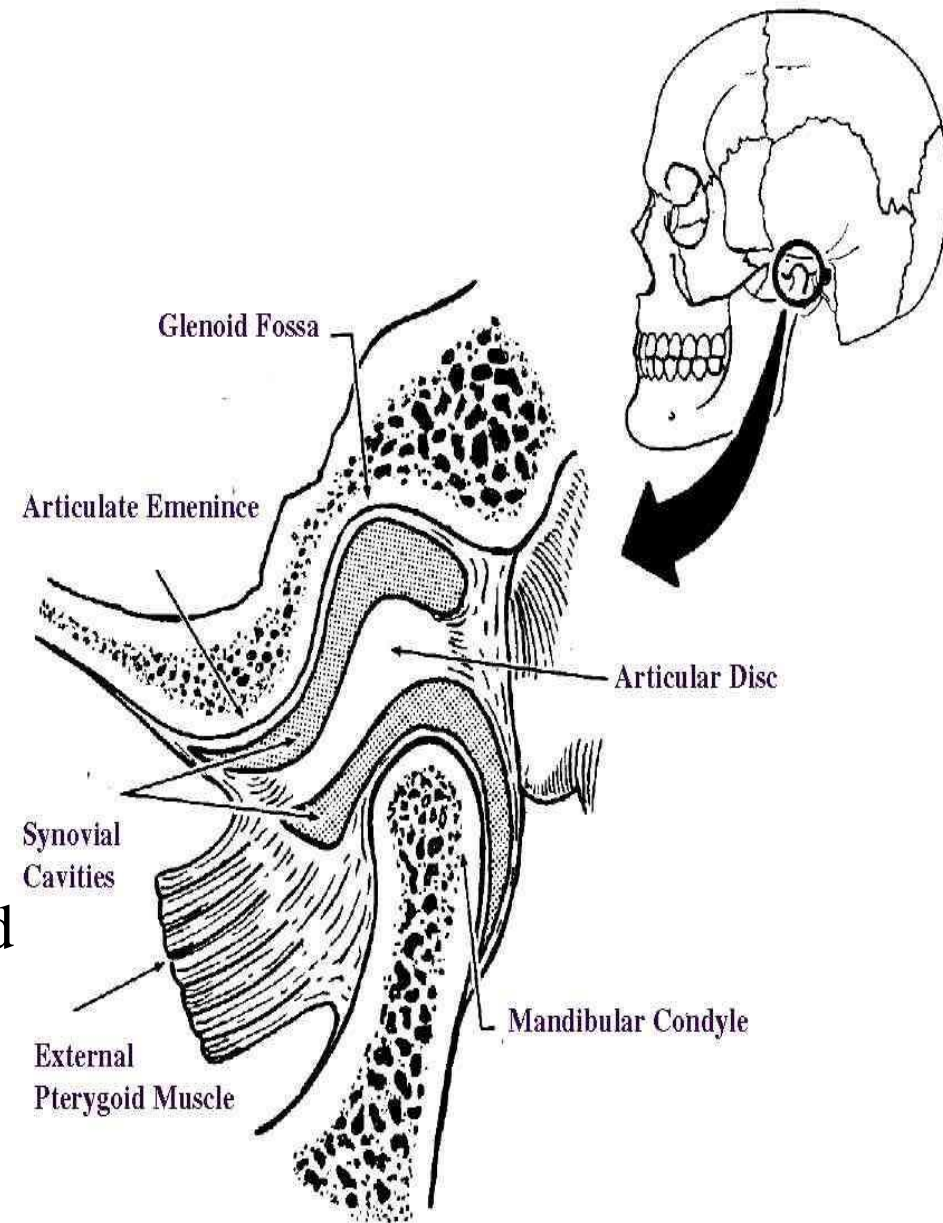
### The articular disc (meniscus):

It is a biconcave sheet of a dense fibrous collagenous tissue it is situated between the head of condyle and glenoid fossa.

It divides the joint into superior and inferior joint space, these spaces filled with synovial fluid so the joint called synovial joint, the function of fluid are: lubrication of joint surface, nutritional supply and debridement of waste products of tissues.

It's anterior margin is blend with fibers of the lateral pterygoid muscle, posteriorly it attached to the loose C.T (bilaminar zone).

The articular disc provide stabilization during condylar movement and shock absorption during mastication.



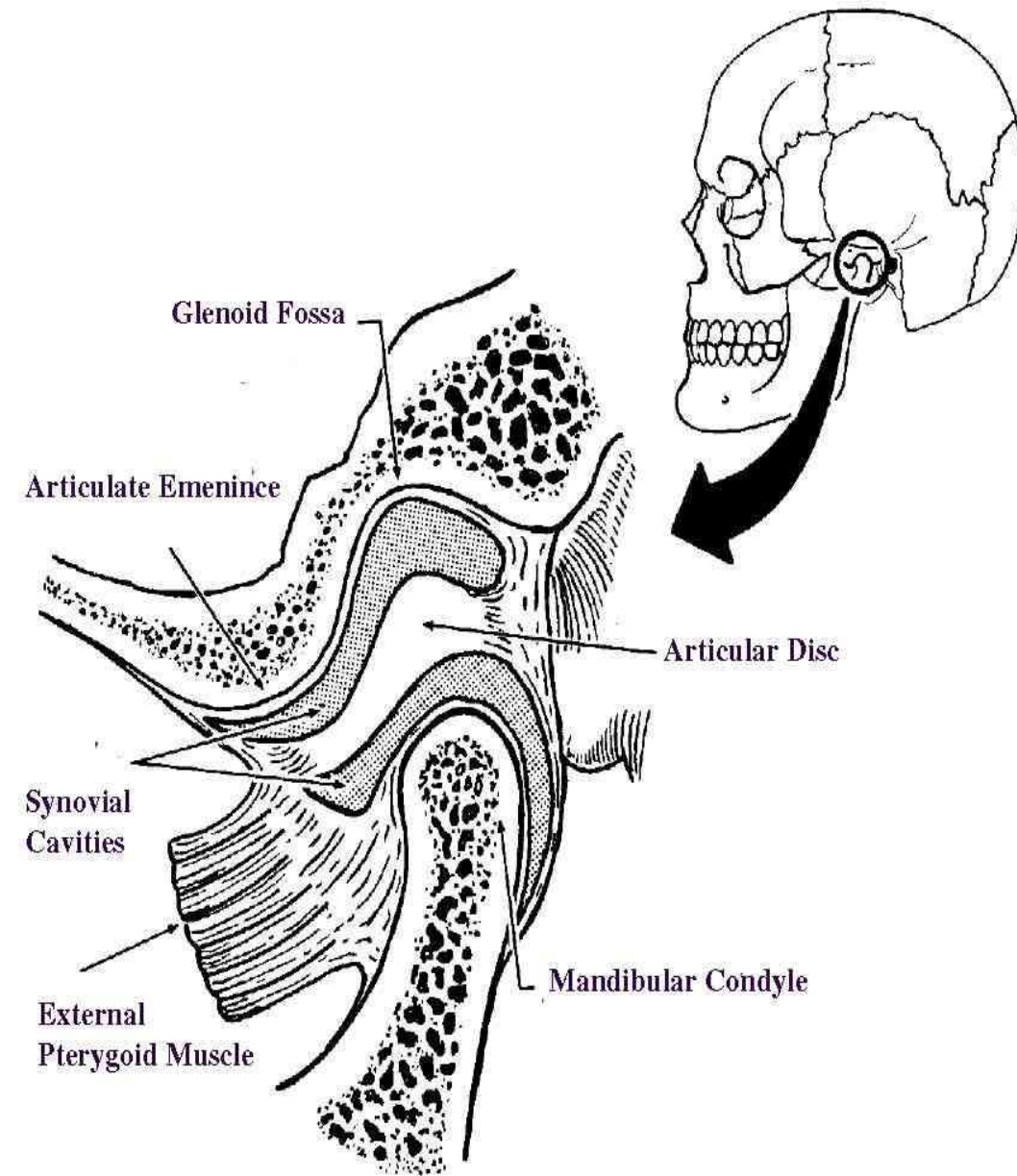
## The bilaminar zone (retrodiscal tissue):

A mass of soft tissue occupies the space behind the disc and condyle.

It's a loosely organized system of collagen fibers, elastic fibers, fat, blood and lymph vessels and nerves and it's lined by synovial membrane.

Retrodiscal tissue arranged in two lamina of dense C.T between them loose areolar highly vascular and well innervated.

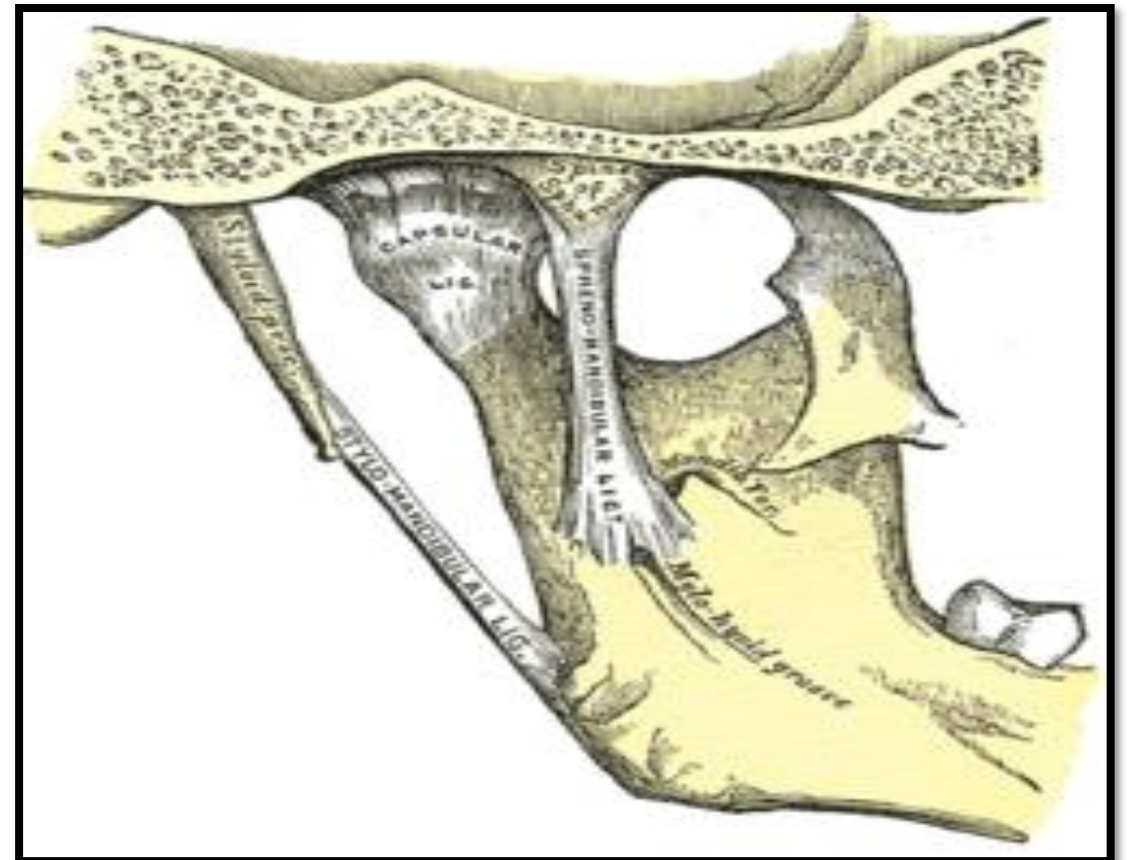
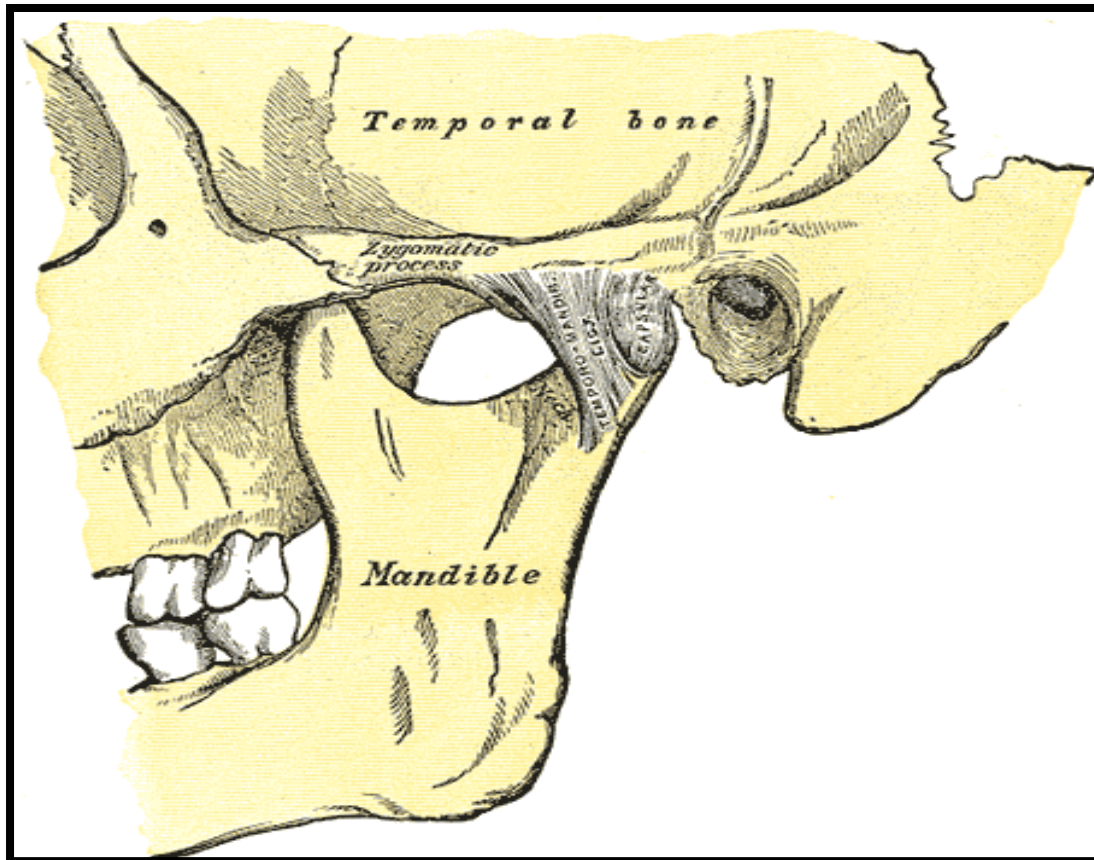
Function of bilaminar zone is reciprocate the action of the muscles by pulling the disc backward.



## Capsule:

Inelastic dense fibrous C.T surrounds and envelope the joint that attaches to the margins of the articular surfaces (articular tubercle and the margins of the glenoid fossa), and extend below to the neck of the mandible.

The capsule laterally and medially firm while anteriorly and posteriorly it loose to allow forward & backward movement.



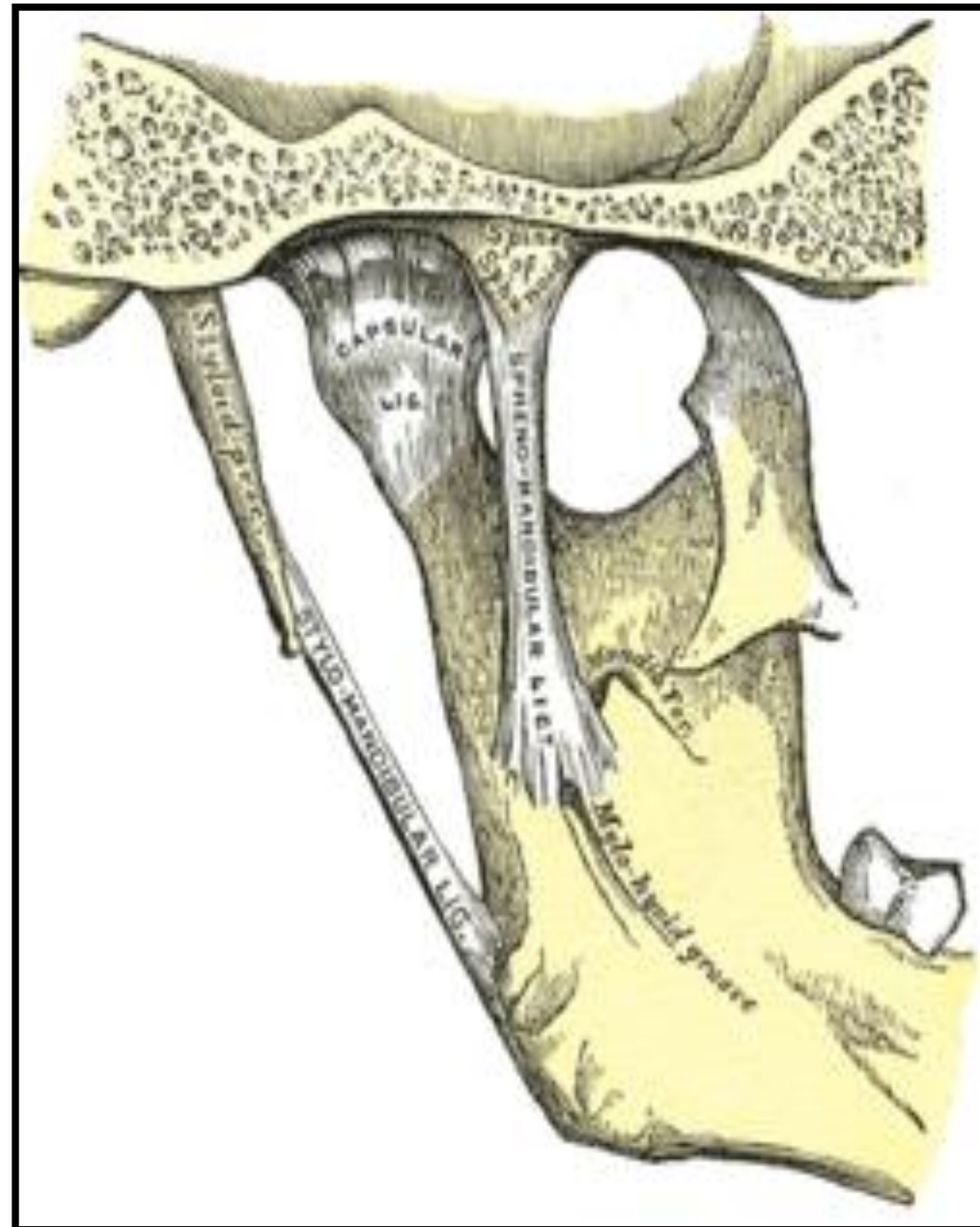
## The ligaments:

### **1/ The sphenomandibular ligament:**

It is thin band attached the spine of sphenoid bone below to the lingua of the mandibular foramen.

### **2/ The stylomandibular ligament:**

It is a band of thickened deep cervical fascia which extends from the apex of the styloid process to the angle of the mandible.

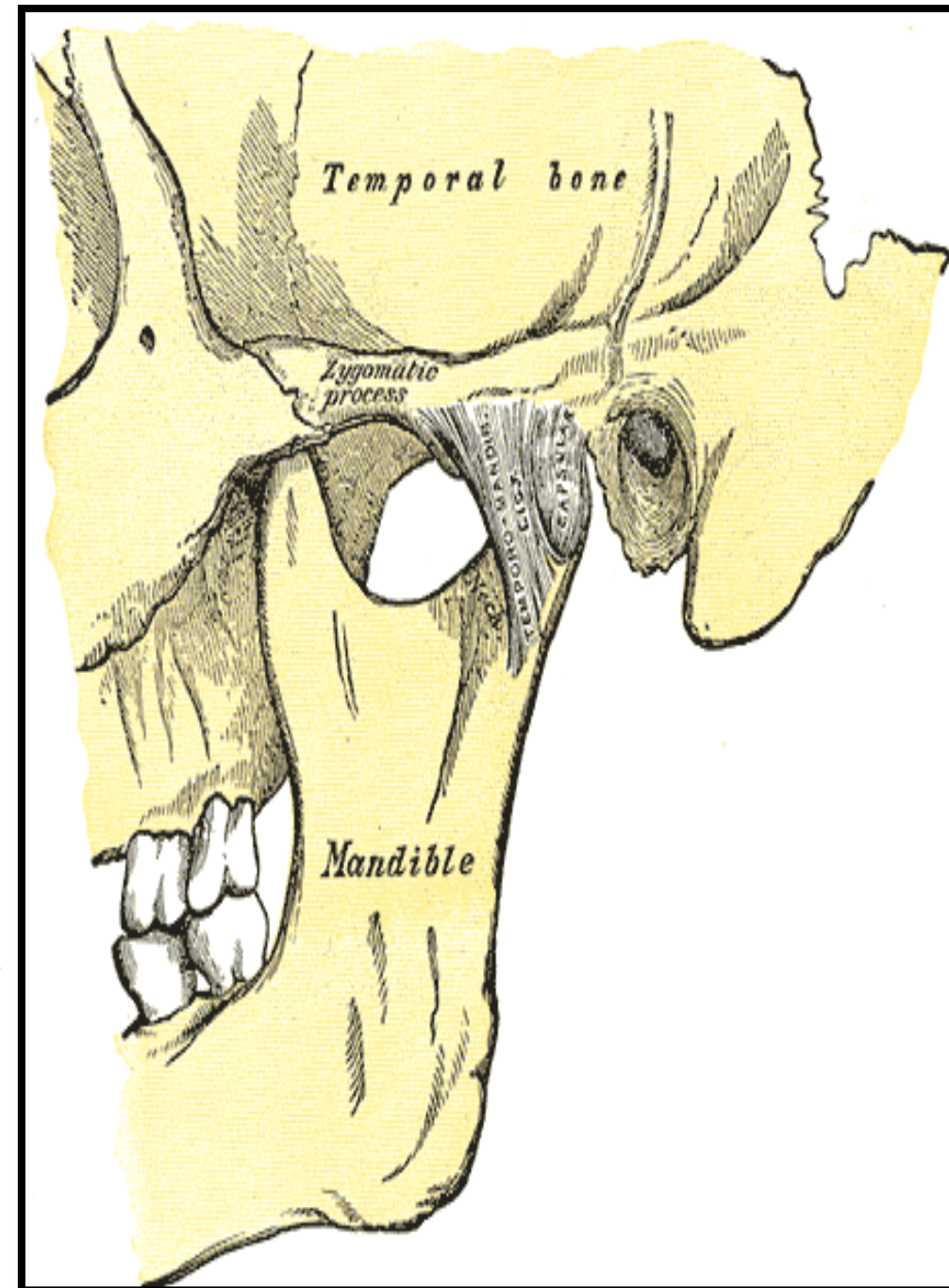


### **3/ The lateral ligament:**

Strengthen the lateral aspect of capsule and its fibers run downward from the tubercle on the root of the zygoma to the lateral surface of the neck of the mandible.

### **Muscular tissue:**

The function of muscles is pulling the head of condyle and the disc forward.



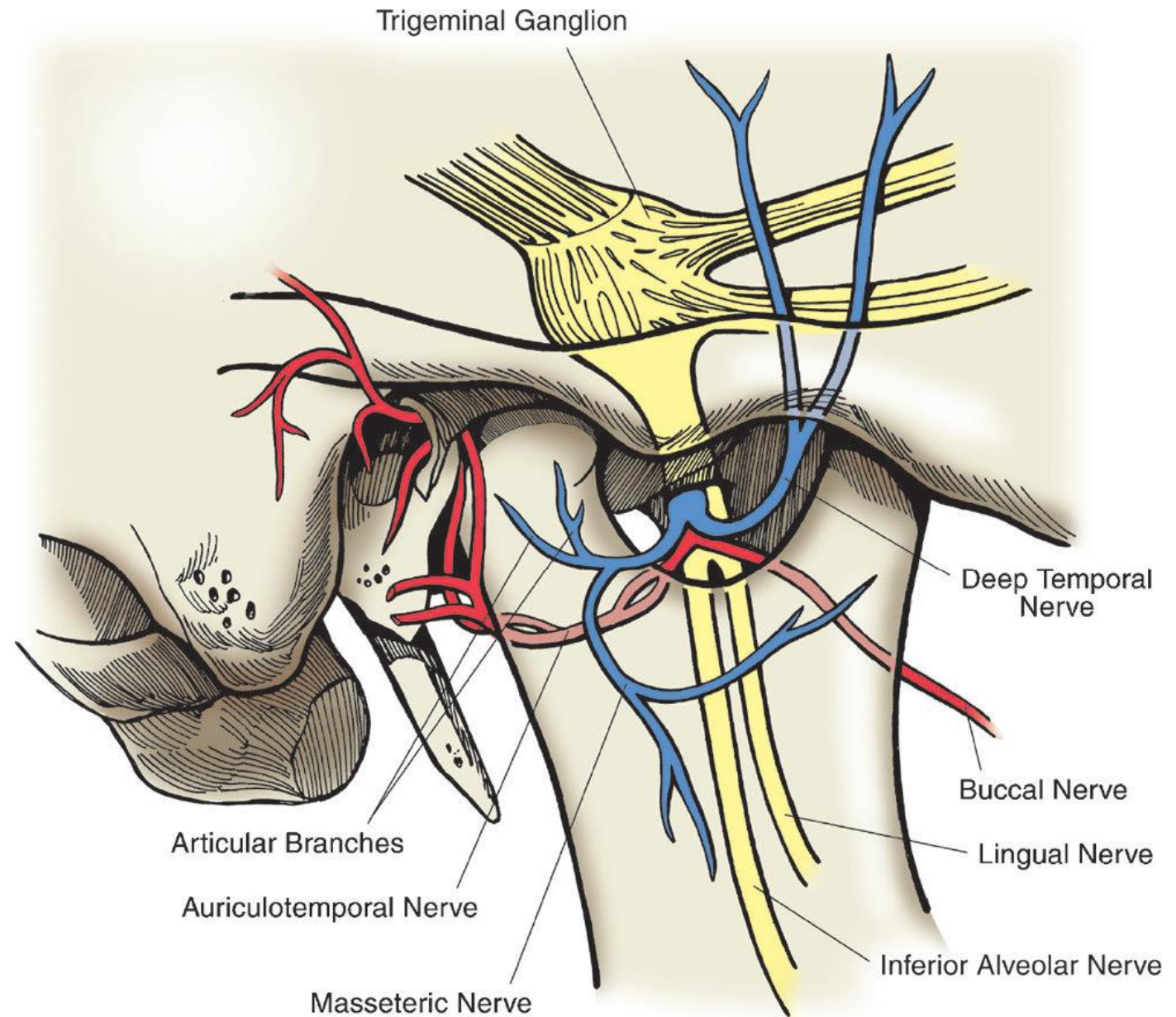


## Nerve supply:

- Auriculotemporal nerve.
- Masseteric nerve.
- Posterior deep temporal nerve.

## Blood supply:

- Superficial temporal artery.
- Maxillary artery of external carotid artery.



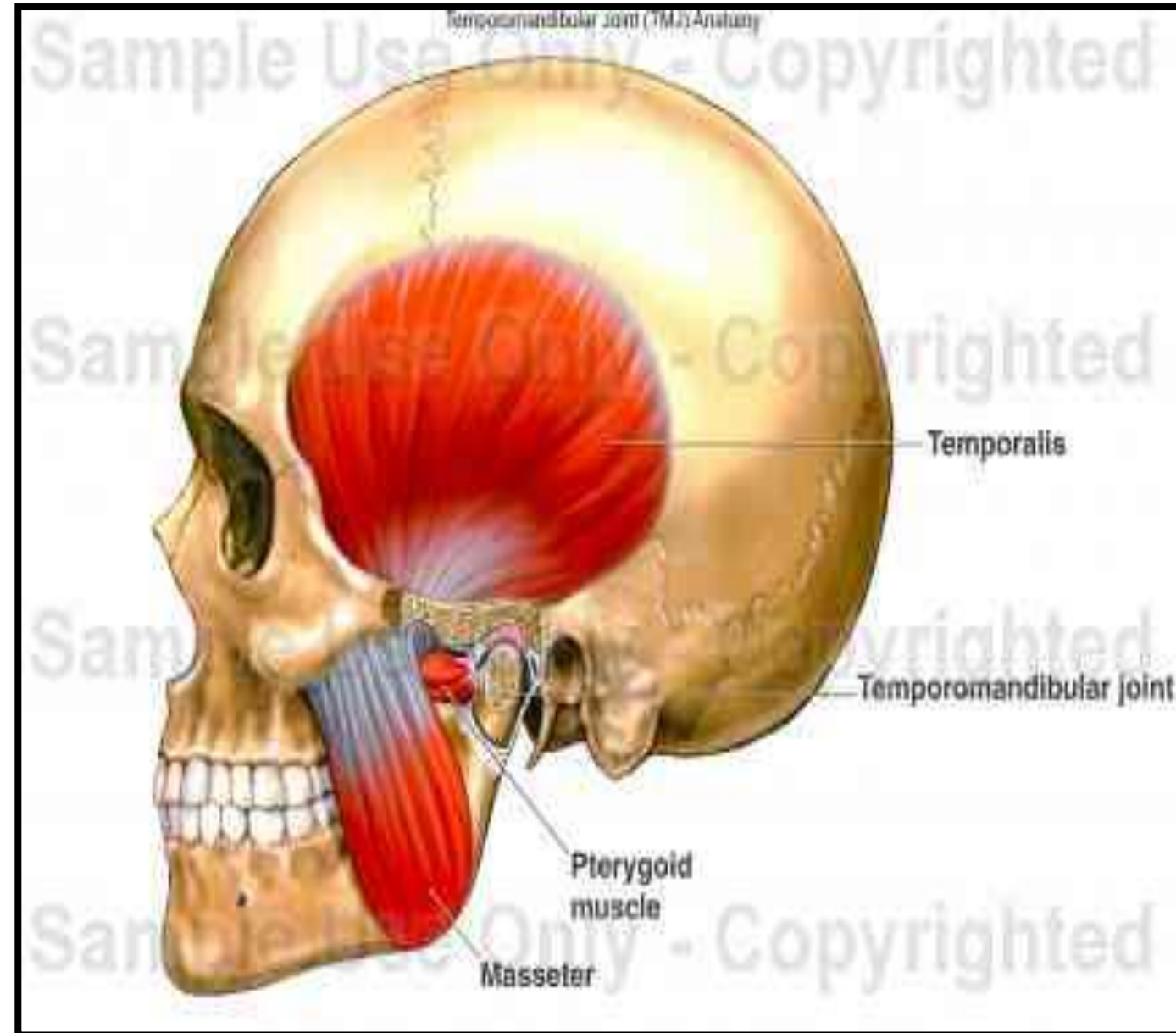
# Muscles related to the TMJ

## Temporalis muscle:

- Origin: temporal fossa.
- Insertion: coronoid process.

## Masseter muscle:

- Origin: inferior border of zygoma
- Insertion: angle of mandible.



## Medial pterygoid muscle:

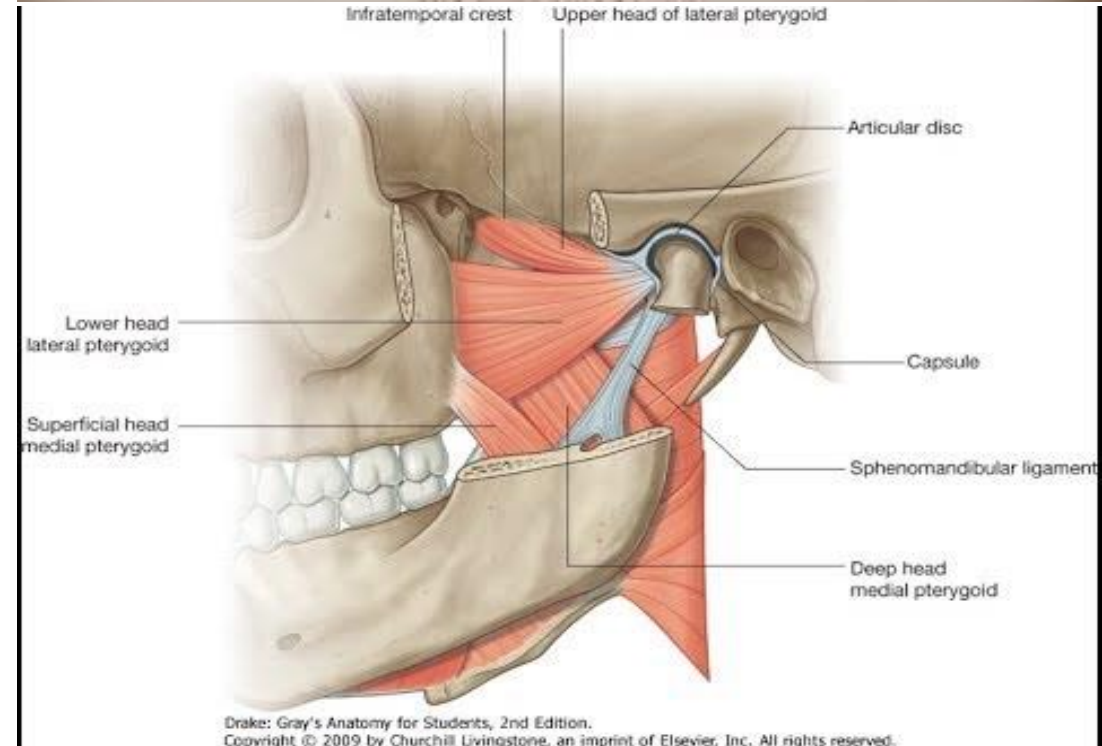
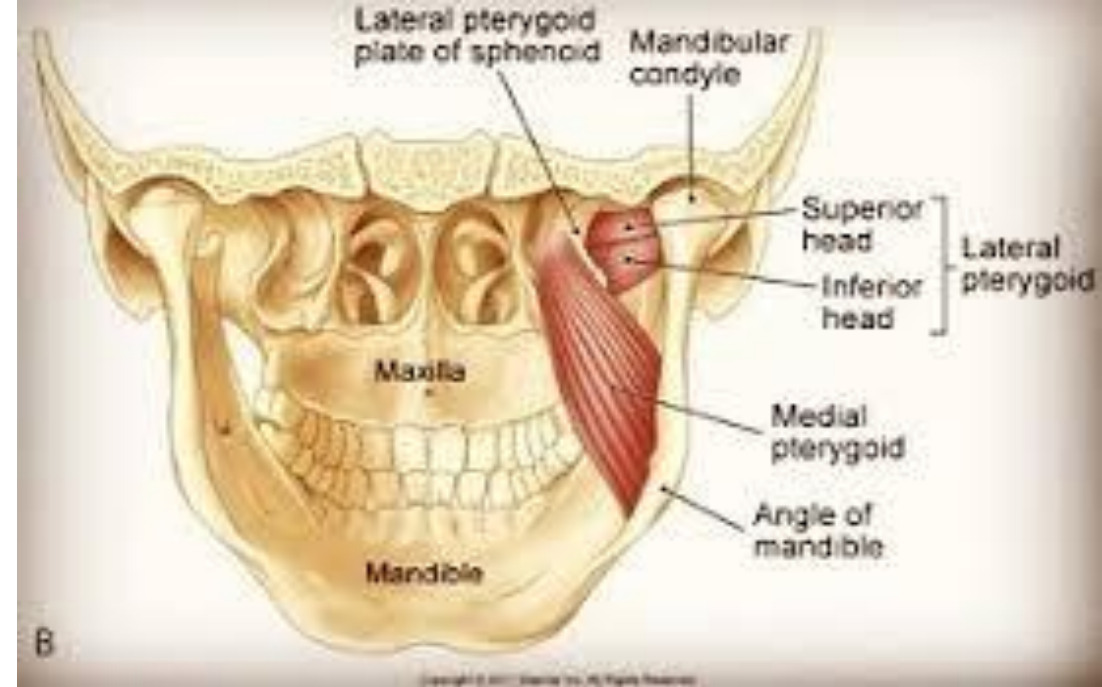
- Origin: 2 heads  
The deep from medial wall of lateral pterygoid plate  
The superficial from the maxillary tuberosity.

- Insertion: medial wall of the ramus.

## Lateral pterygoid muscle:

- Origin: 2 heads  
Upper head from the sphenoid bone.  
Lower head from the lateral wall of lateral pterygoid plate .

- Insertion:  
Upper inserted to the disc  
Lower to the neck of the condyle.



## **Important relations of TMJ**

- Anteriorly / the mandibular notch, masseteric nerve & artery.
- Posteriorly / the tympanic plate of the external auditory meatus.
- Laterally / the parotid gland & fascia & skin.
- Medially / the maxillary artery & vein & the auriculotemporal nerve.

## **Physiology Of TMJ**

TMJ is an unique joint and differ from other joints in the body:

1. Both TMJ are join by a single bone (mandible bone) and movement in one joint can not occur without similar coordination movement in the other joint.
2. In other synovial joints of the body the articular part covered with hyaline cartilage but TMJ covered with dense C.T.

4. Minscus or articular disc divide TMJ space into upper & lower compartments, movement in these compartments are independent, in lower compartment the movement is rotary type as in opening of mouth, while in upper compartment gliding movement as in protrusion of teeth.
5. In the movement there is limit or fixed end point by bringing teeth in maximum intercuspation.
6. In most synovial type the head act against fossa, but in TMJ there is believe that head of condyle with disc acting as one unit against eminence and not against fossa.
7. Less distensible than other joints of the body (when there is systemic disease like rheumatoid arthritis involve joints of the body, it is not usually involve the TMJ).

## **Rest position:**

That situation when the mandible is not functionally active, in which the condyle occupy a relatively central position in glenoid fossa with the teeth separated.

The rest position is considered to be associated with minimum muscular activity.

## **Centric relation:**

The maxillo-mandibular relationship in which each condyle articulate with the thinnest avascular portion of the disc in antero-superior position against the posterior slop of articular eminence with maximum inter-cuspal position of upper & lower teeth.



# *Movements of the mandible*

## **1/ Depression :**

As the mouth opened, the head of the mandible is rotated on the undersurface of the articular disc around a horizontal axis.

It is achieved by lateral pterygoid, digastric, geniohyoid and mylohyoid muscles.

## **2/ Elevation :**

Here the movement is reversed, first the head of the condyle & disc move backward and the head rotates on the lower surface of the disc.

Elevation of the mandible is brought about by temporalis, masseter & medial pterygoids.

### **3/ Protrusion :**

The disc is pulled forward onto the anterior tubercle carrying the head of the mandible with it.

Protrusion is brought about by lateral pterygoid muscles of both sides assisted by both medial pterygoids.

### **4/ Retraction :**

The disc & the head of the mandible are pulled backward into the mandibular fossa, retraction is brought about by the contraction of the posterior fibers of the temporalis.

### **5/ Lateral excursive movements :**

In this type of movement, the medial pterygoid and lateral pterygoid of each side, act alternately.

If the mandible is moved to the right side the medial pterygoid of right side and the lateral pterygoid of left side act simultaneously



## *Temporomandibular disorder(s) (TMDs)*

The term *temporomandibular disorder(s)* (TMDs) is a collective term embracing a number of clinical problems that involve the masticatory muscles, the temporomandibular joints (TMJs) and associated structures or both.

Generally, these disorders are characterized by:

- (1) Facial pain in the region of the TMJs and/or muscles of mastication.
- (2) Limitation or deviation in mandibular movements.
- (3) TMJ sounds during jaw movement and function.

# Etiological Factors of TMDS

1. Psychological factors (Laskin theory psychophysiology).
2. Occlusal factors.
3. Habitual factors.
4. Trauma.
5. Inflammations and infections.
6. Genetic Factors.
7. Tumors.
8. Systemic factors.

## 1. Psychological factors

When the patient is stressed & unable to deal with it, response will be facial pain due to tension and spasm of the muscles of mastication, in some other patients response may be headache or combination.

The long exposure to stress may affect the joint movement and lead to irreversible alteration of the joint structures.

It has found that females are more subjected to this kind of problems than males.

## **2. Occlusal factors**

Disturbances in occlusion must be considered a significant etiologic factors in TMJ dysfunction.

Uncoordinated mandibular movement can be caused by occlusal interference which lead to pain and tenderness in the muscles of mastication.

Once the interference is removed, the condition will be relieved.

However; severe occlusal changes such as loss of posterior support (teeth), deep overbite and severe cl II malocclusion may cause severe prominent damage to the joint structure if not treated.

### **3. Habits**

Habits causing damage to the TMJ or its supporting structures are associated with psychological stress.

These habits are bruxism, clenching, head resting on hands, nail biting and pencil biting.

Chronic protruding movement due to esthetics or interference in occlusion or occupational causes like musical instrument or pipe smoking.

### **4-Trauma**

- Direct trauma to the joint:

Accident, blow to the joint or mandible and 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, truisms, and limitation in joint movements.

Intra-capsular causes like

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

## **6-Genetic Factors**

Growth disturbances

- Hypoplasia
- Hyperplasia

That 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 may involve the joint and cause TMJ disorders e.g. :

- Gout
- Hyperparathyroidism
- Paget's disease
- Vit D deficiency
- Scleroderma
- Lupus erythematosus