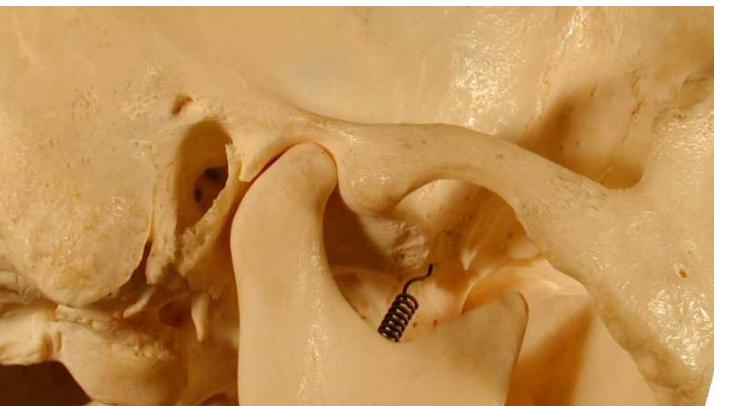




# GOOD MORNING

- Development and Anatomy of TMJ



Dr.Vanaja Reddy

Associate Professor

Oral medicine & Radiology

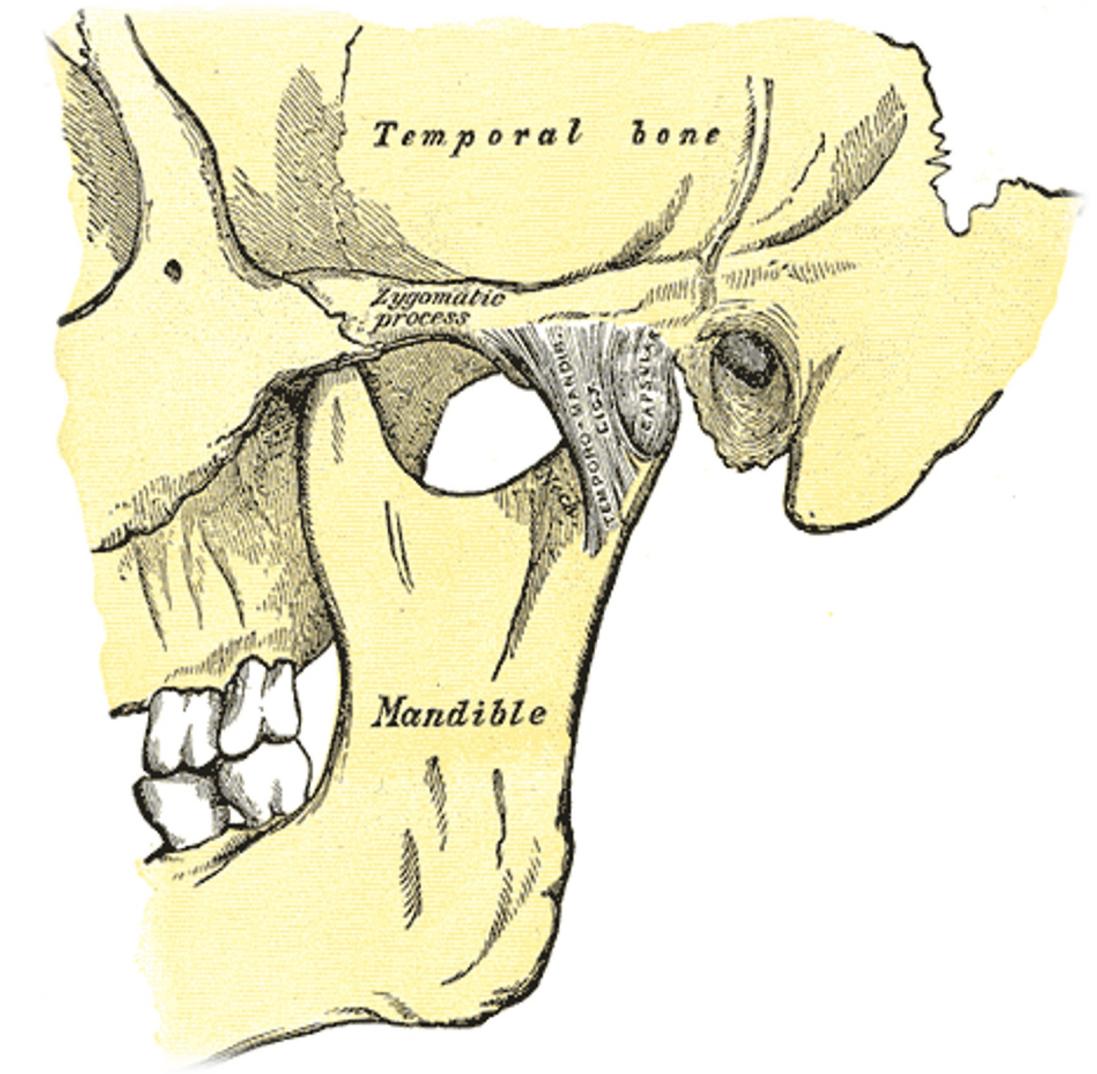
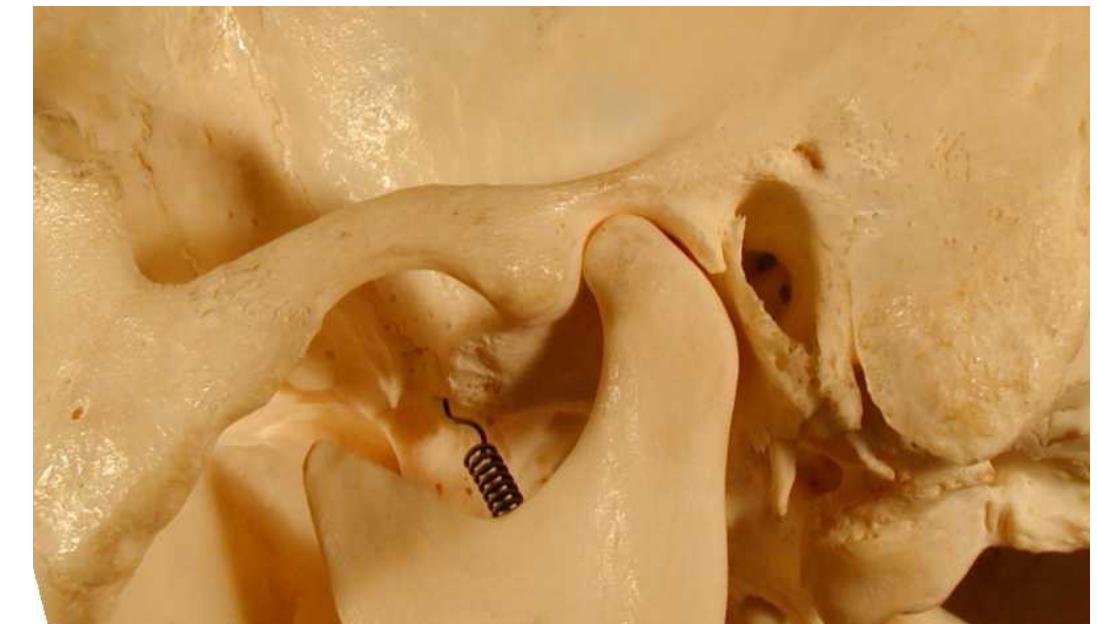
OCH  
3rdYR -25-26



LLO		<b>By the end of this lecture, students should be able to:</b>
1		<b>Describe the embryological development of the temporomandibular joint (TMJ).</b>
2		<b>Explain the anatomy of TMJ, the articulating disc, condyles and temporal fossa</b>
3		<b>Outline the capsule and associated ligaments of the TMJ.</b>
4		<b>Discuss radiology and imaging of TMJ</b>
5		State the blood supply and nerve supply of the TMJ.

## INTRODUCTION

- The ***Temporomandibular joint*** is one of the most complex joints in the body in which the mandible articulates with cranium (Temporal bone).



# Development of TMJ

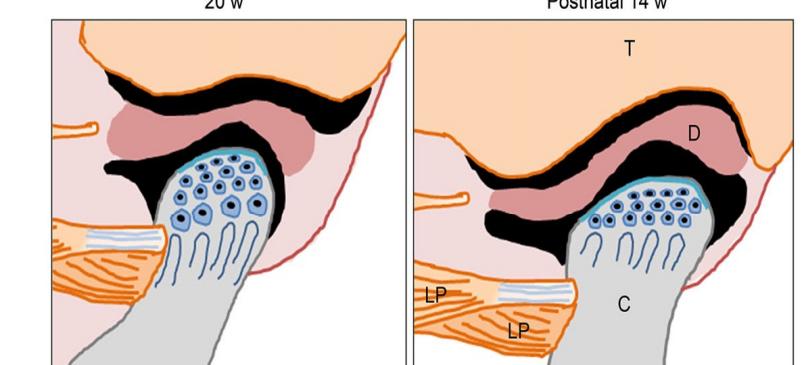
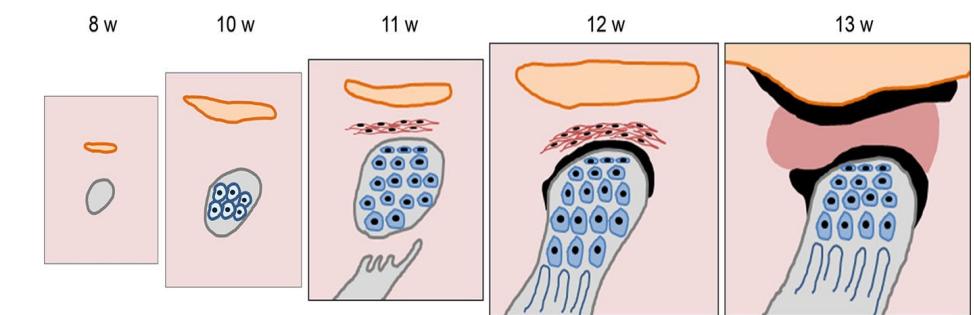
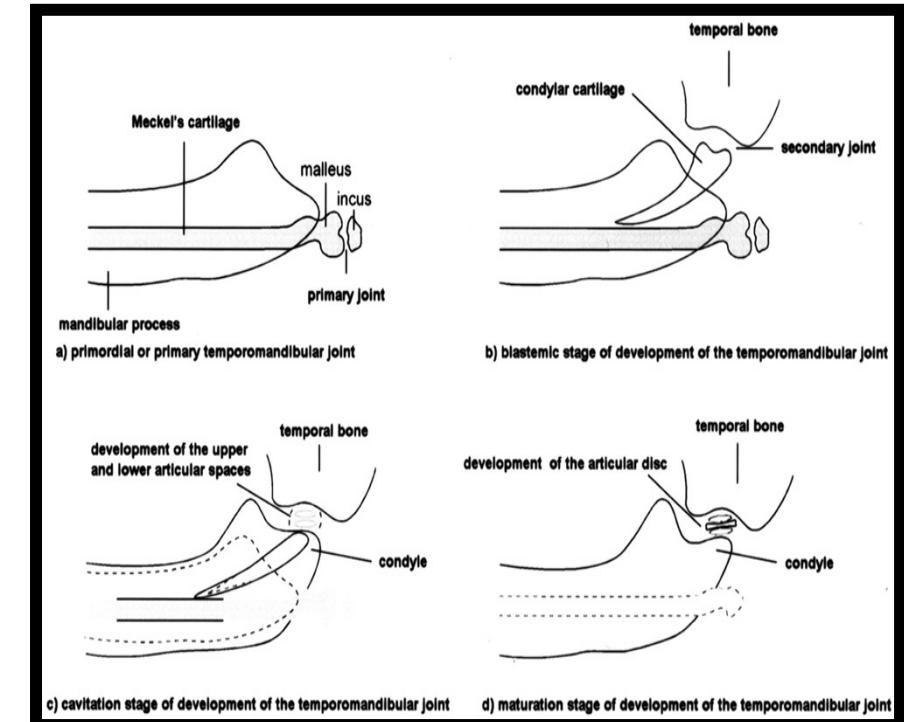
**Origin (6th–8th week IUL):** TMJ develops from the first pharyngeal arch (Meckel's cartilage).  
**condylar and temporal blastemas form .**

**8th–10th week:** Condylar blastema forms cartilage → **mandibular condyle;**

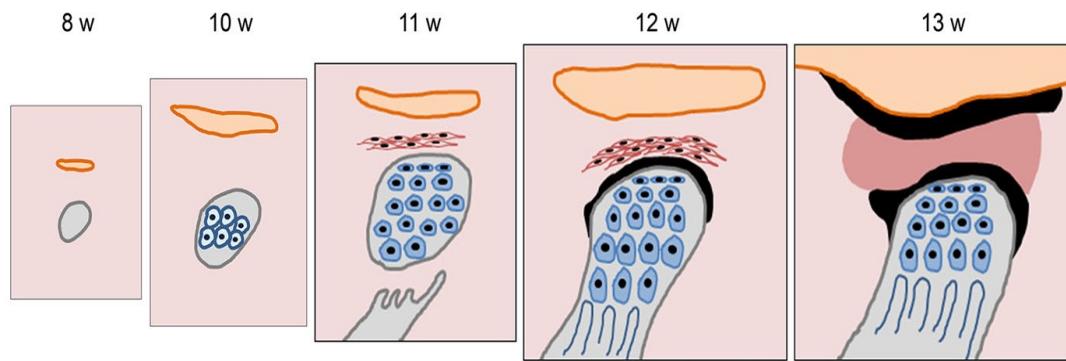
-temporal blastema ossifies → **squamous part of temporal bone.**

**Joint Cavity Formation (10th–12th week):** Mesenchyme splits into upper and lower synovial cavities, establishing the **joint space.**

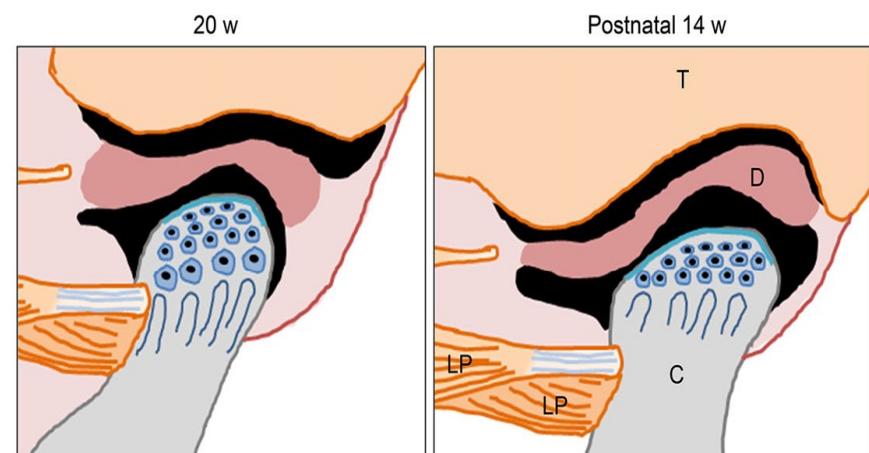
**Articular Disc Development (12th week):** Intervening mesenchyme condenses to form the **articular disc.**



**Capsule & Ligament Formation (12th–20th week):** Joint capsule, synovial membrane, and ligaments develop; condylar cartilage serves as a growth site.



**Postnatal Functional Adaptation:** TMJ continues remodeling after birth with tooth eruption and mastication, achieving adult morphology by adolescence.

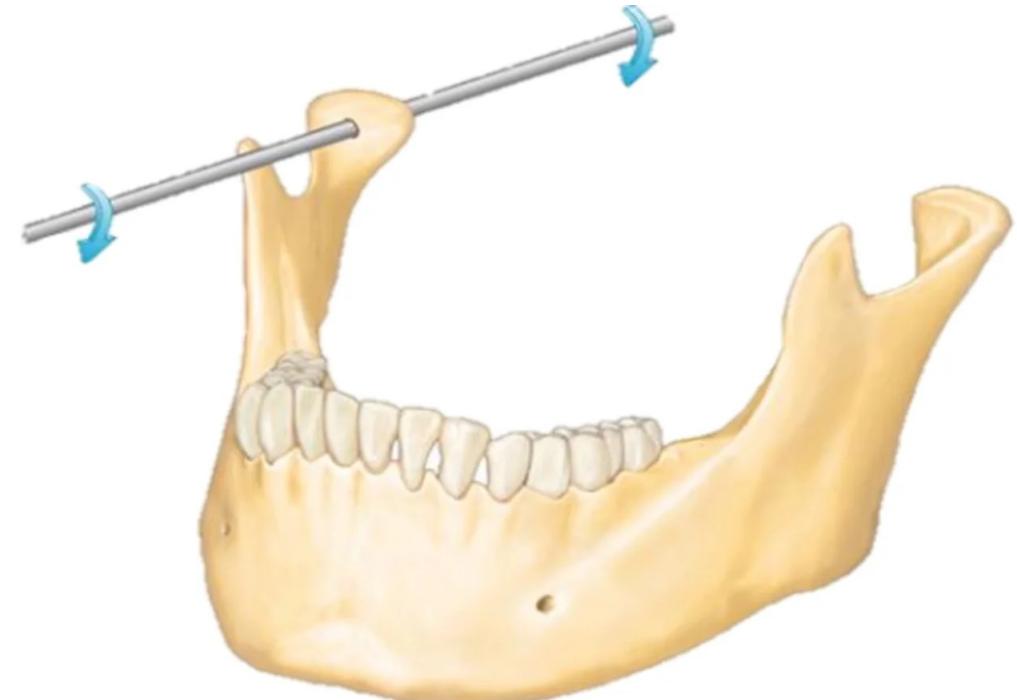


**TMJ is structurally present at birth, but complete functional maturation , full calcification of condyle and fossa remodeling, are usually achieved by 16–20 years of age**

➤ **GINGLYMODIARTHROIDAL** joint

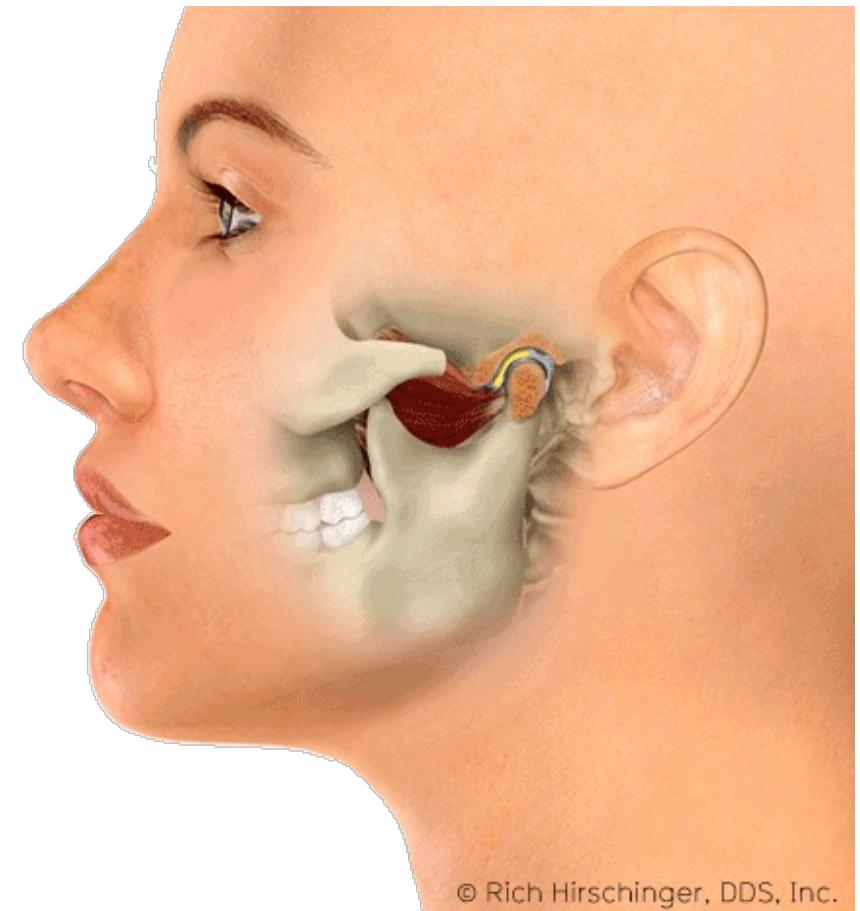
- **GINGLYMOID** joint - hinging movement in one plane ,

{hinge movement is a rotation of the mandibular condyle in its socket, primarily responsible for the initial opening and closing of the mouth)



**ARTHROIDAL** joint - gliding movements-.

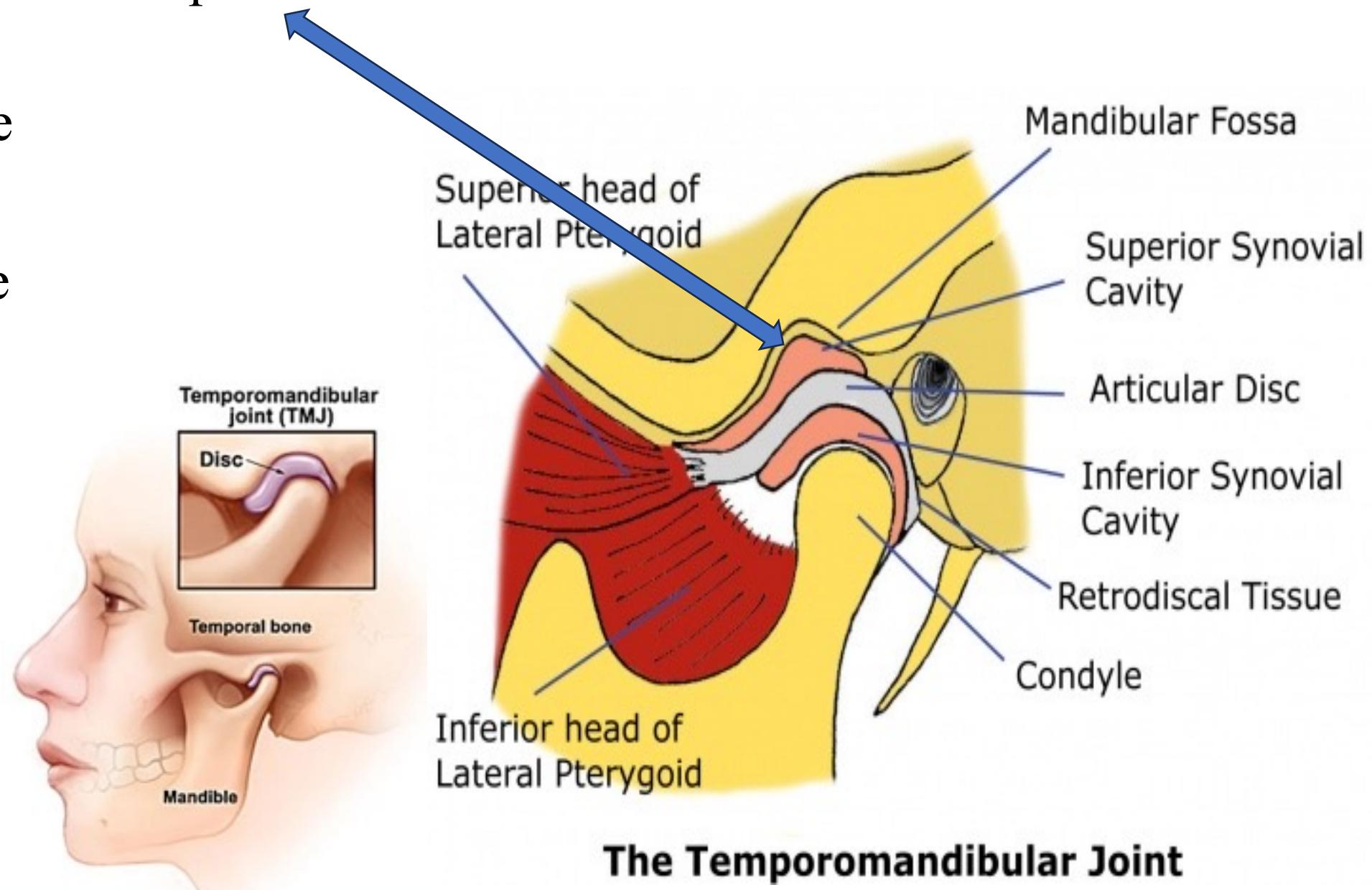
Gliding movement, is a forward and backward sliding motion of the condyle and articular disc .



Temporomandibular joint is a **SYNOVIAL JOINT**

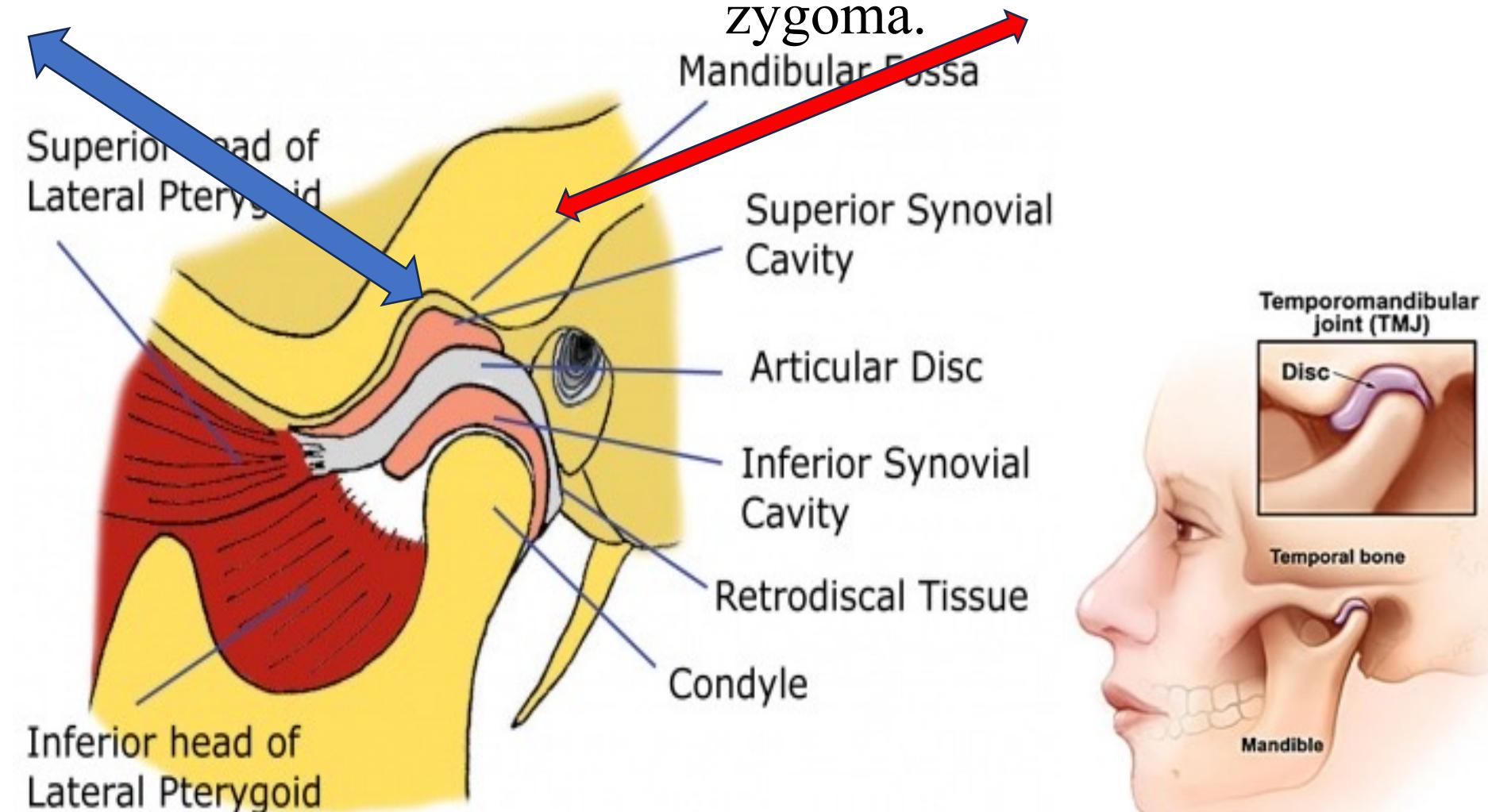
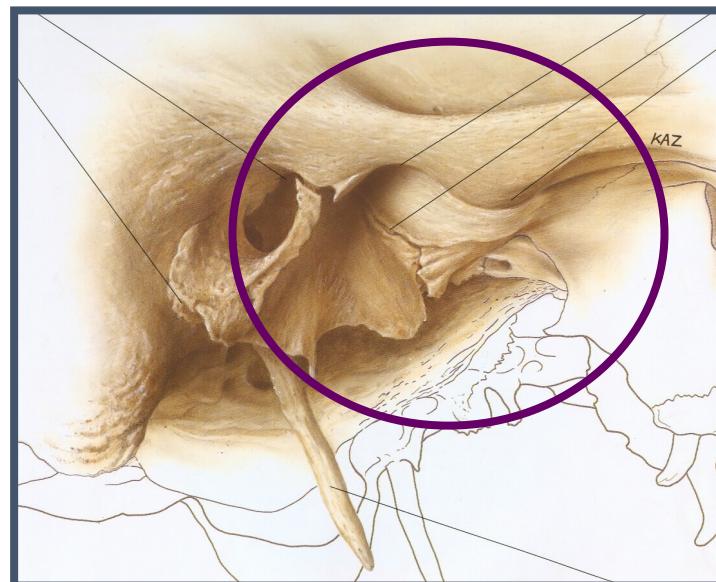
# CONTENTS OF TEMPOROMANDIBULAR JOINT

- Mandibular fossa of the temporal bone
- Mandibular condyle
- Articular disc
- Synovial membrane
- Synovial fluid
- Ligaments
- Muscle attachment



# Articular/Glenoid/mandibular fossa

➤ **MANDIBULAR FOSSA-** It is an oblong S-Shaped cavity on the undersurface of the squamous portion of the temporal fossa.

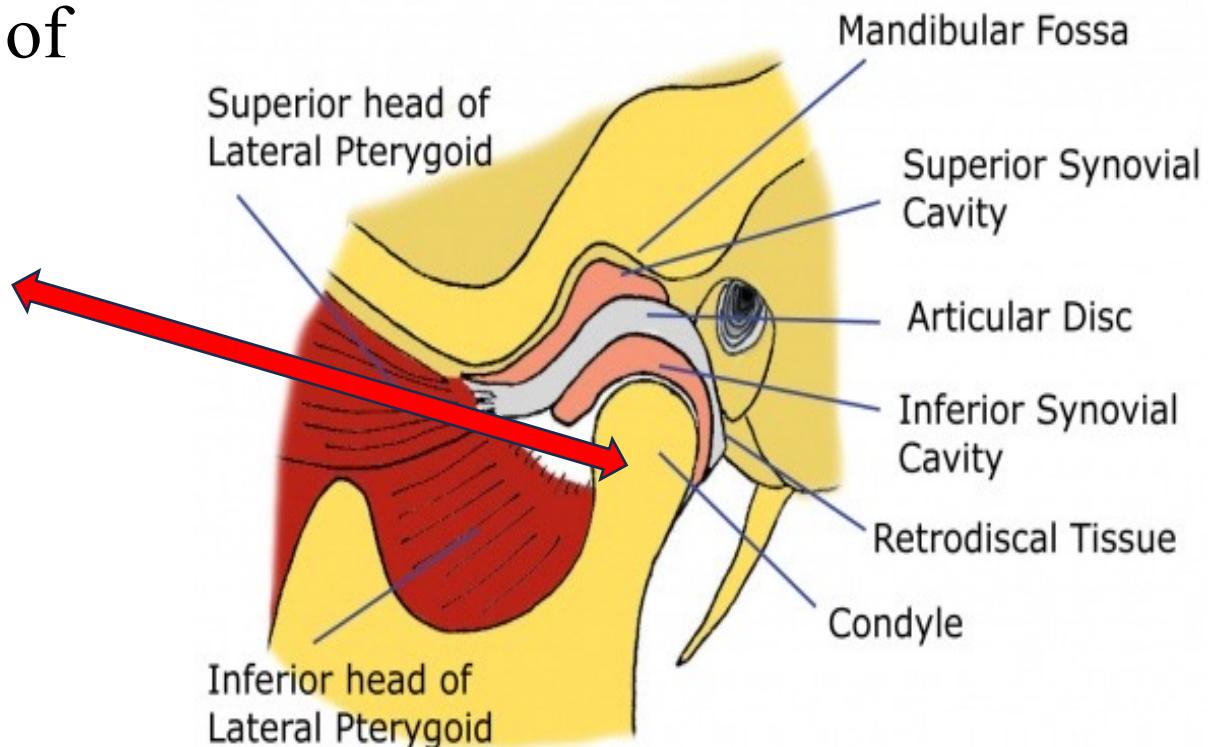


The Temporomandibular Joint

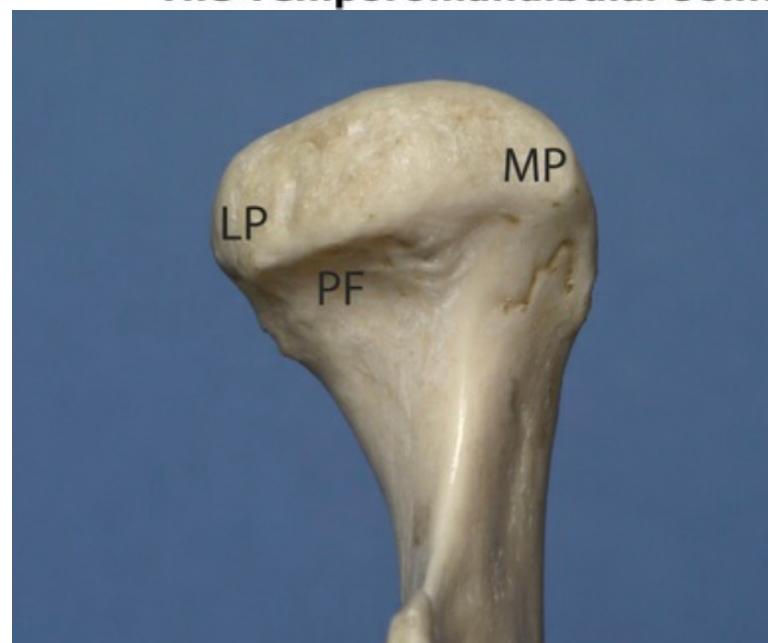
➤ **Articular eminence-** This is the entire transverse bony bar that forms the anterior root of zygoma.

# Mandibular condyle

- **Mandibular Condyle** is the articulating surface of the mandible.
- From the front view it has
  - Medial pole
  - lateral pole
- The articular part of the condyle is covered by the **fibrocartilagenous tissue**.



The Temporomandibular Joint



# Synovial membrane

The capsule is lined with synovium and the joint cavity is filled with synovial fluid.

**Lubrication** – reduces friction between the articular surfaces during mandibular movements.

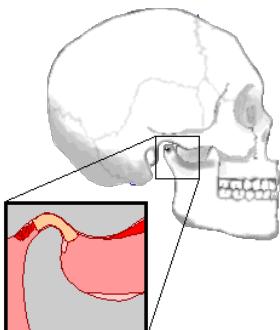
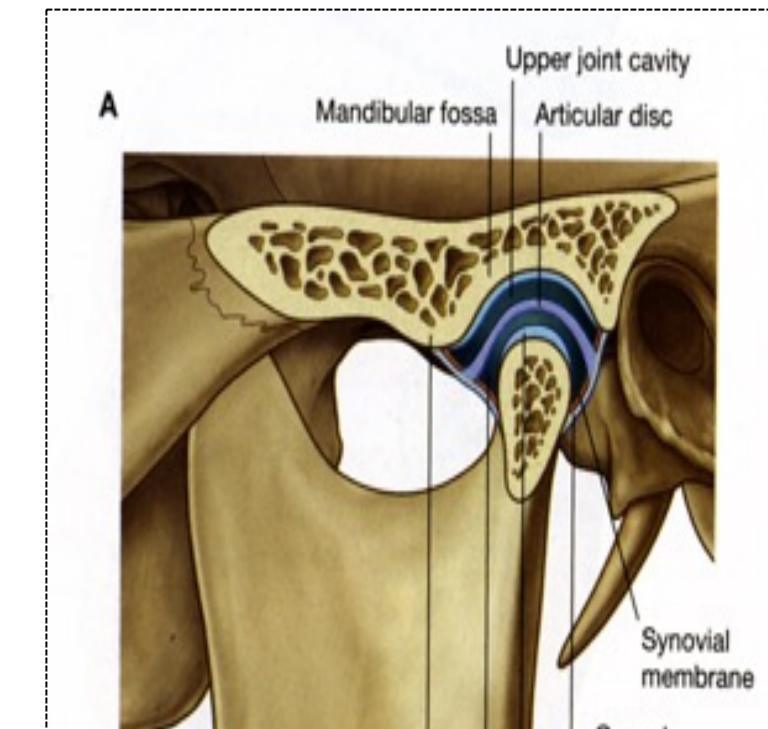
- Joint lubrication is achieved by

1. Weeping lubrication:

2. Boundary lubrication:

- **WEEPING LUBRICATION**

- This acts as a lubricant between articular surfaces to prevent sticking during compressive forces.



- **BOUNDARY LUBRICATION**

--It prevents friction in the moving joint and is the primary mechanism for lubrication.

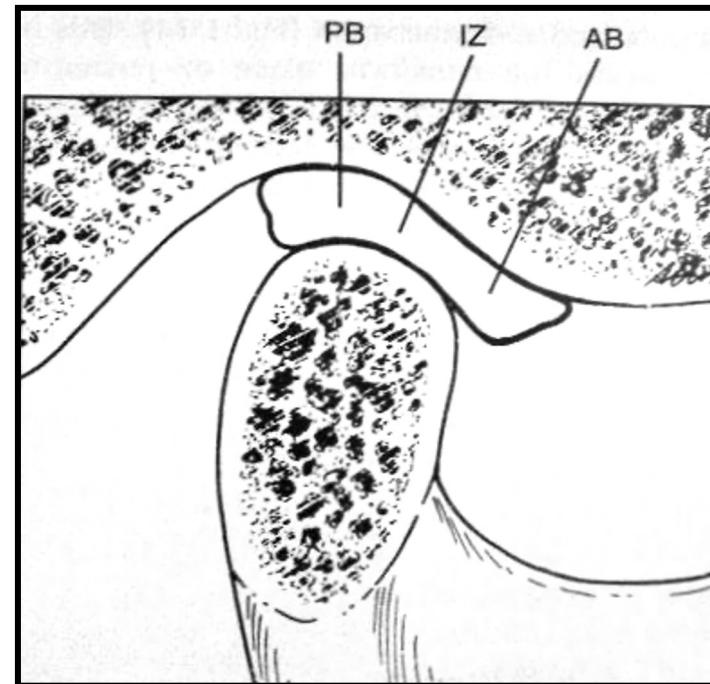
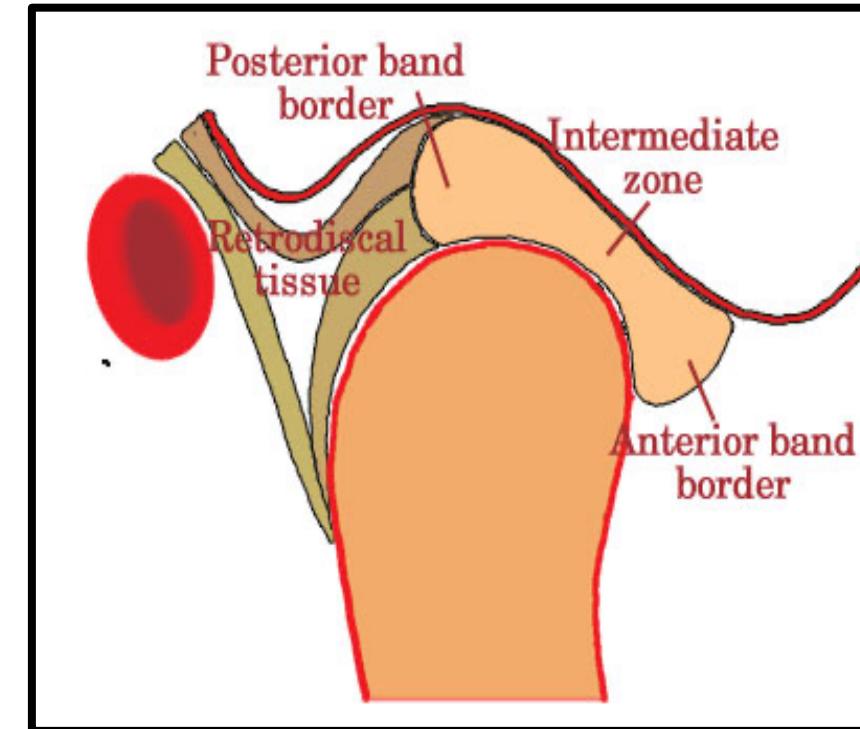
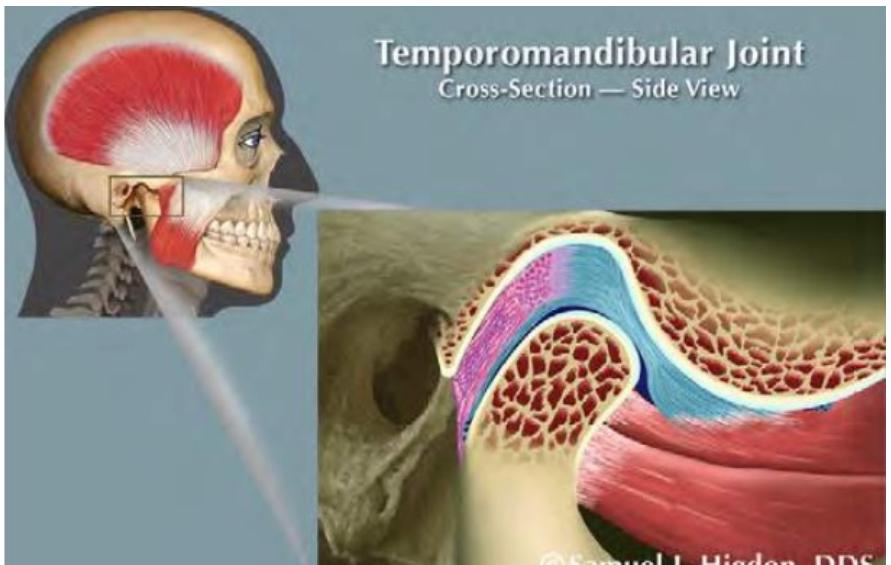
# Articular disc

- Articular disc is composed of fibrous connective tissue, devoid of any blood vessels or nerve fibers.

(The extreme periphery of the disc, however is slightly innervated)

- Sagittal plane –

Intermediate , Anterior , Posterior band



In the normal joint the articular surface of the condyle is located on the intermediate zone of the disc.

- The disc & its attachments divides joint space into a upper & lower compartment that normally don't communicate.

- Upper compartment:**

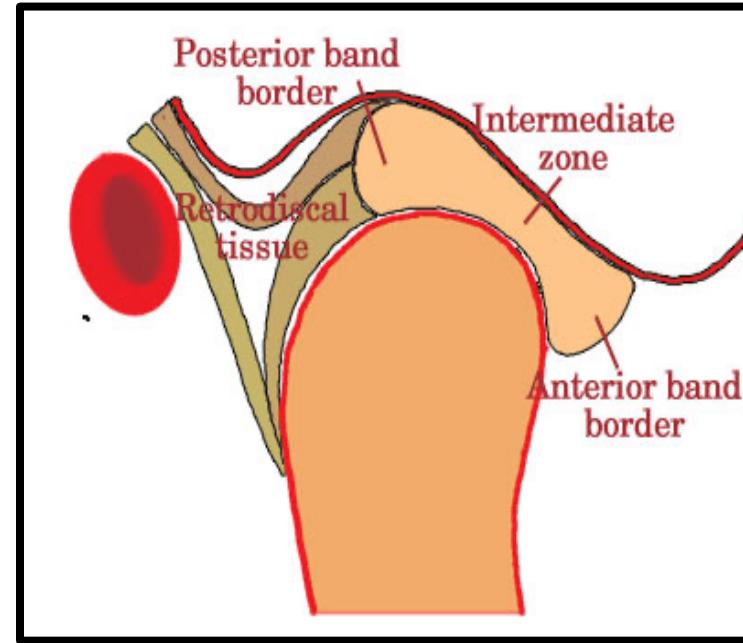
Roof: Mandibular fossa

Floor: superior surface of the disc

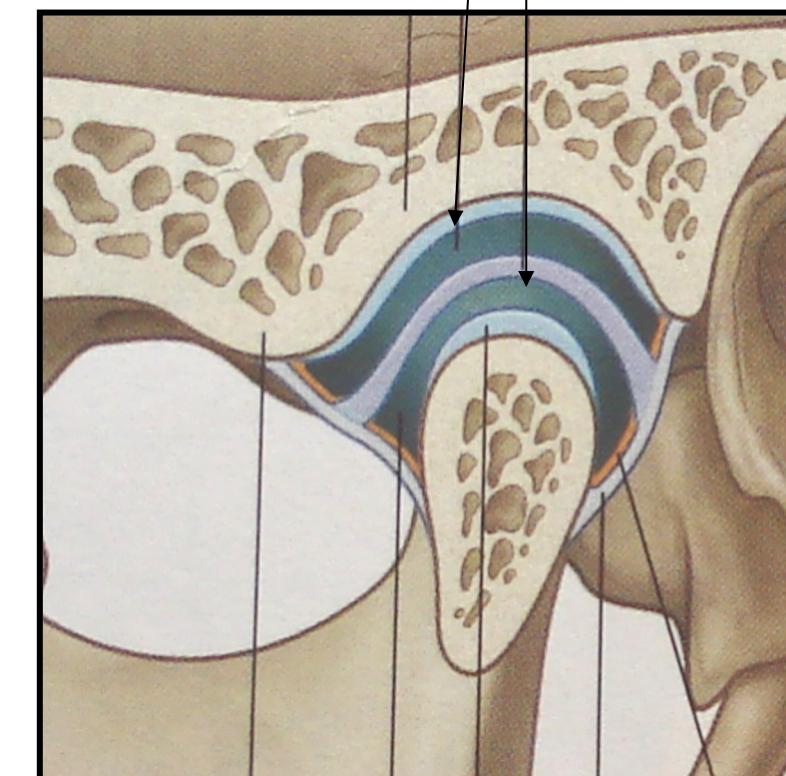
- Lower compartment:**

Roof: inferior surface of the disc

Floor: articulating surface of the condyle



Articular disc  
Upper compartment



lower compartment

## **Functions of the articular disc**

The **articular disc** stabilizes the temporomandibular joint (TMJ).

- **Muscle force:** Controls condyle position and shapes the joint space.
- **Functions:** Reduces wear, aids in lubrication (weeping lubrication), and may destabilize the condyle.

# TEMPOROMANDIBULAR JOINT LIGAMENTS

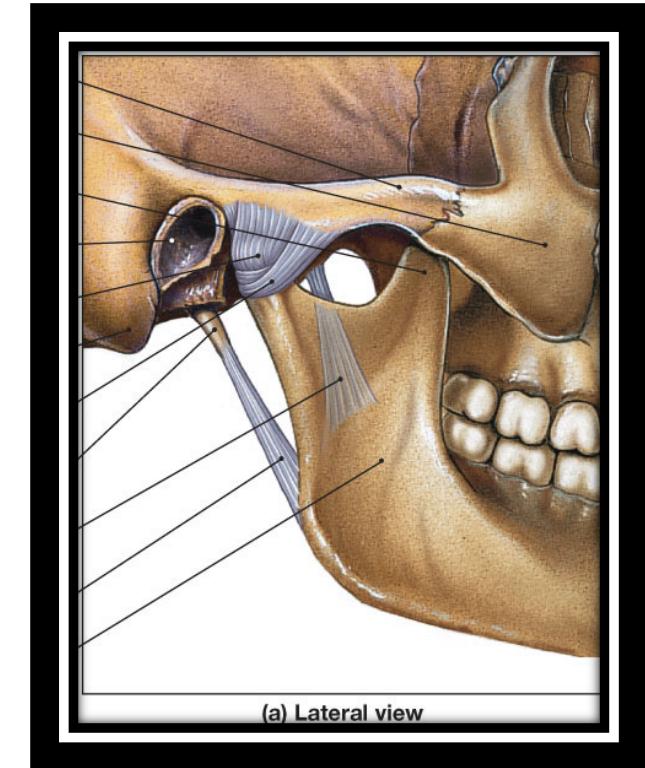
"Ligaments do not actively control joint movement; instead, they passively limit and restrict extreme movements."

3 functional ligaments support the TMJ :

- **The collateral ligament**
- **The capsular ligament**
- **The temporomandibular ligament**

There are 2 accessory ligaments :

- **The sphenomandibular ligament**
- **The stylomandibular ligament**



### Collateral (discal) ligament

-- function -restrict movement of the disc away from the condyle.

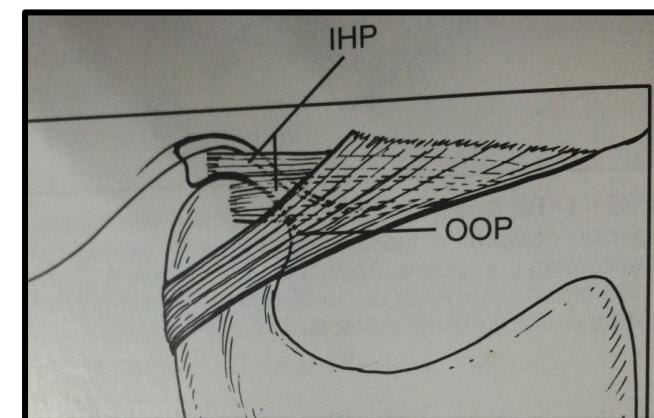
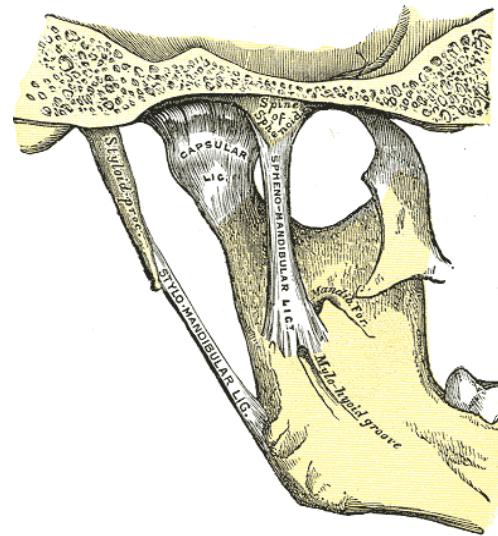


### Capsular ligament

**function** - is to encompass the joint , thus retaining the synovial movement.

### Temporomandibular ligament

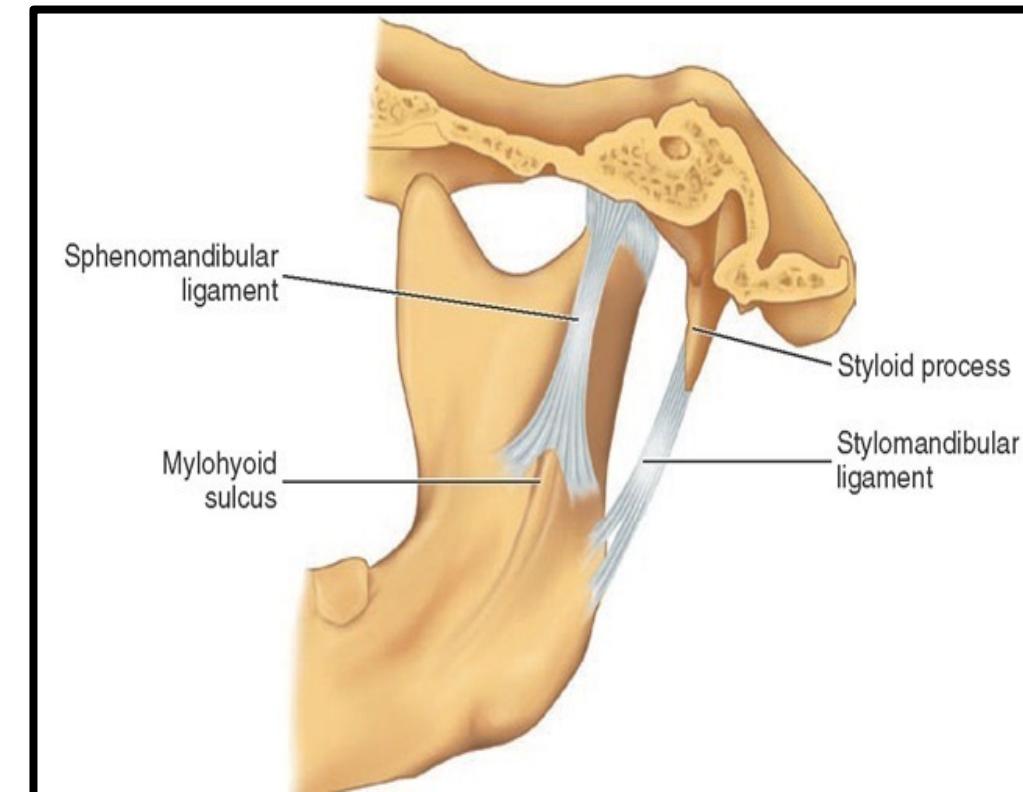
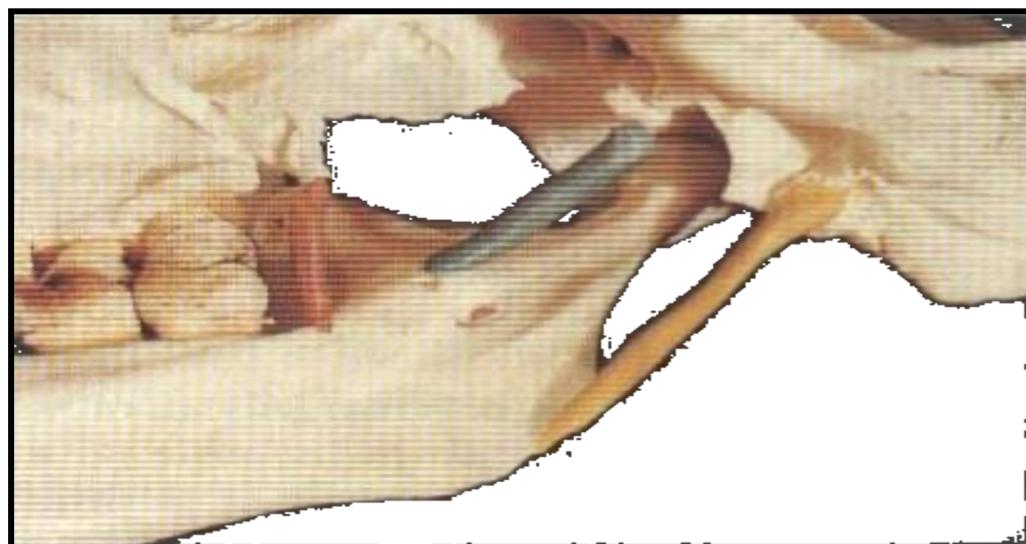
- Resist excessive dropping of the condyle .
- Limits posterior movement of the condyle and disc



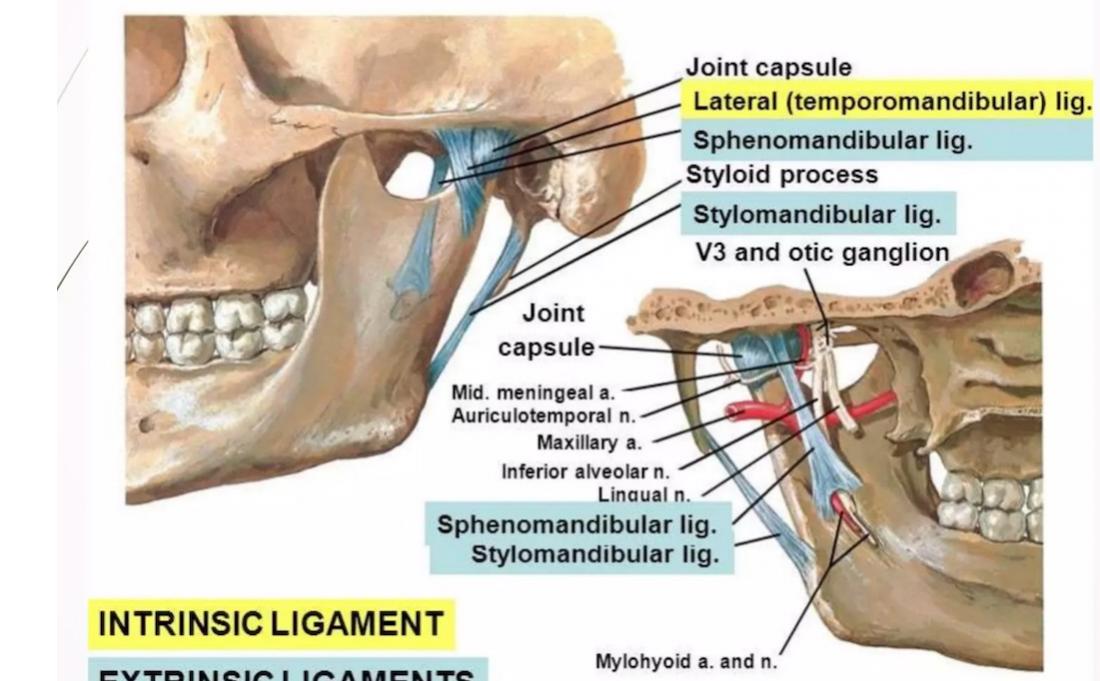
## The sphenomandibular ligament-.

does not have any significant limiting effects on mandibular movements .

Stylomandibular ligament - limits excessive protrusive movements of the mandible .



### ► a) Lateral ligament or TM ligaments:



# Muscles associated

## Primary Muscles Of Mastication:

- **Masseter**
- **Temporalis**
- **Medial pterygoid**
- **Lateral pterygoid**

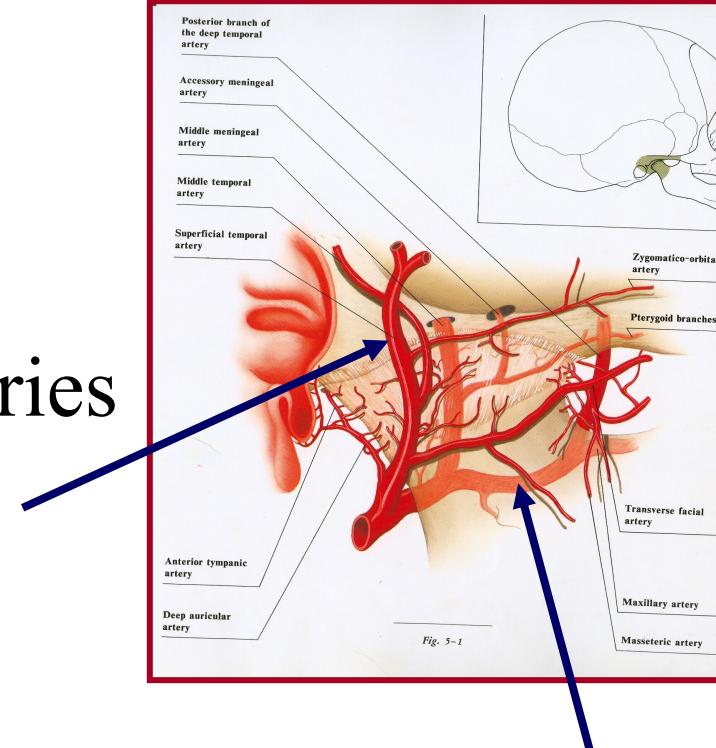
## Secondary Muscles Of Mastication:

The suprhyoid group of muscles being used as secondary or supplementary muscles they are

- **Digastric**
- **Mylohyoid**
- **Geniohyoid**

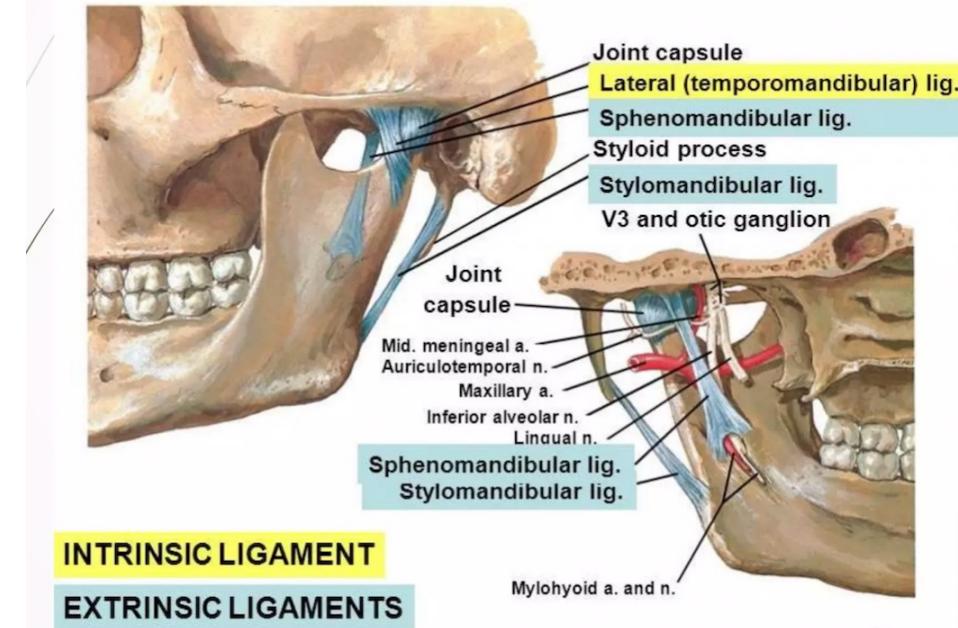
## BLOOD SUPPLY OF TMJ

Branches from superficial temporal and maxillary arteries



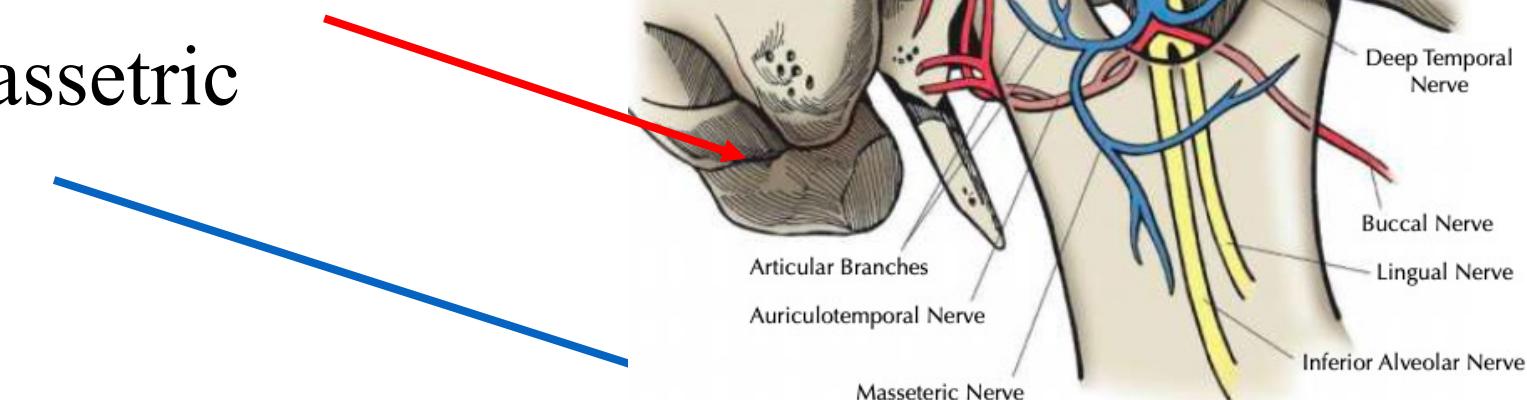
- Veins follow the arteries .

### ► a) Lateral ligament or TM ligaments:



- Nerve supply:

- Auriculotemporal nerve
- Deep temporal & Masseteric nerve



- **TMJ Imaging Modalities:**
- **Conventional radiography:**
- Images of the osseous structures of the joints :  
Panoramic imaging(OPG)

### **Advanced imaging modalities:**

- Cone beam computed tomography (CBCT) or
- Multidetector computed tomography (MDCT).

-**The soft tissues of the joints :**

Magnetic Resonance Imaging (MRI).

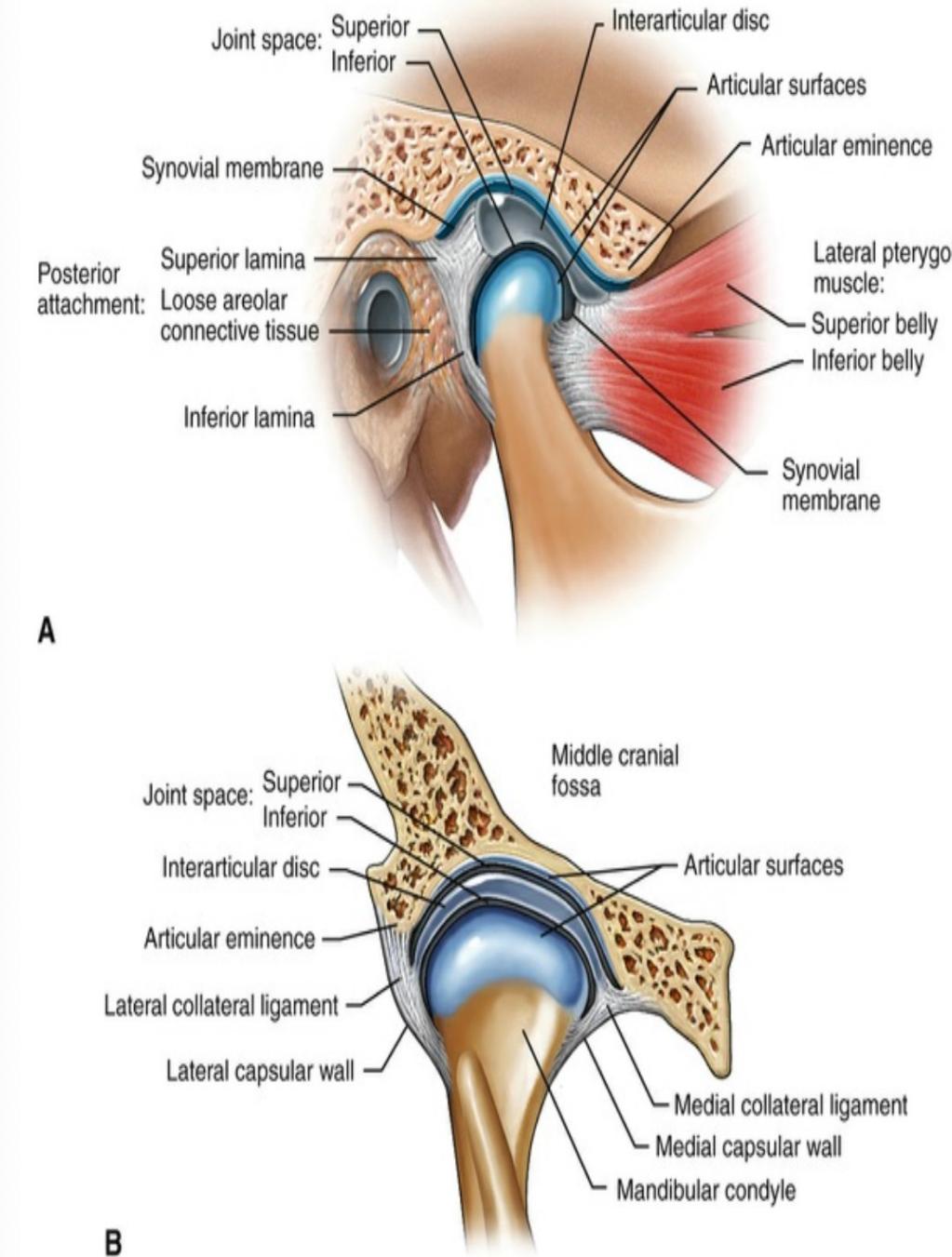
Ultrasonography

## PANORAMIC IMAGE

- The panoramic image is a useful tool for providing a broad overview of the anatomic structures of and around the TMJ.

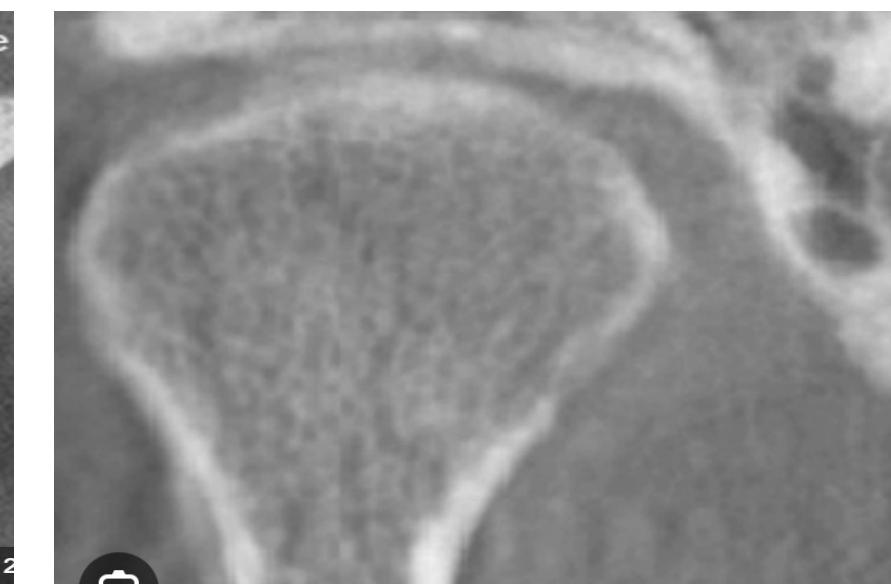
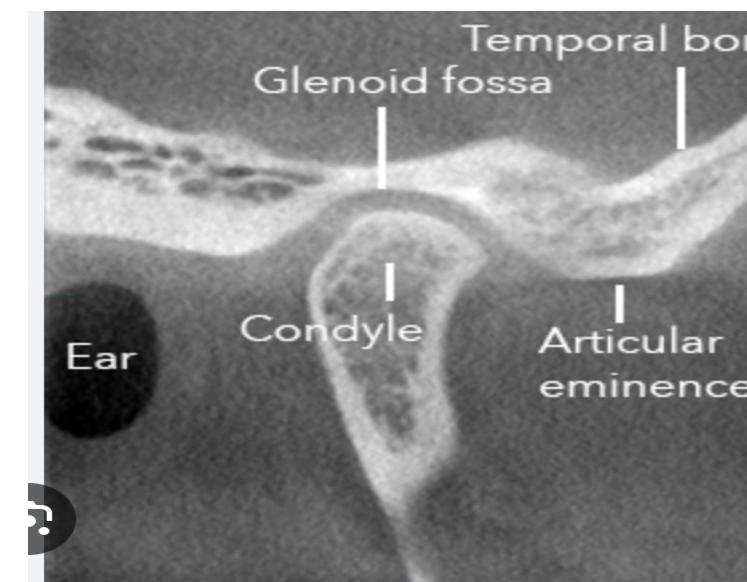


Lateral (A) and coronal (B) views of normal temporomandibular joint anatomy.

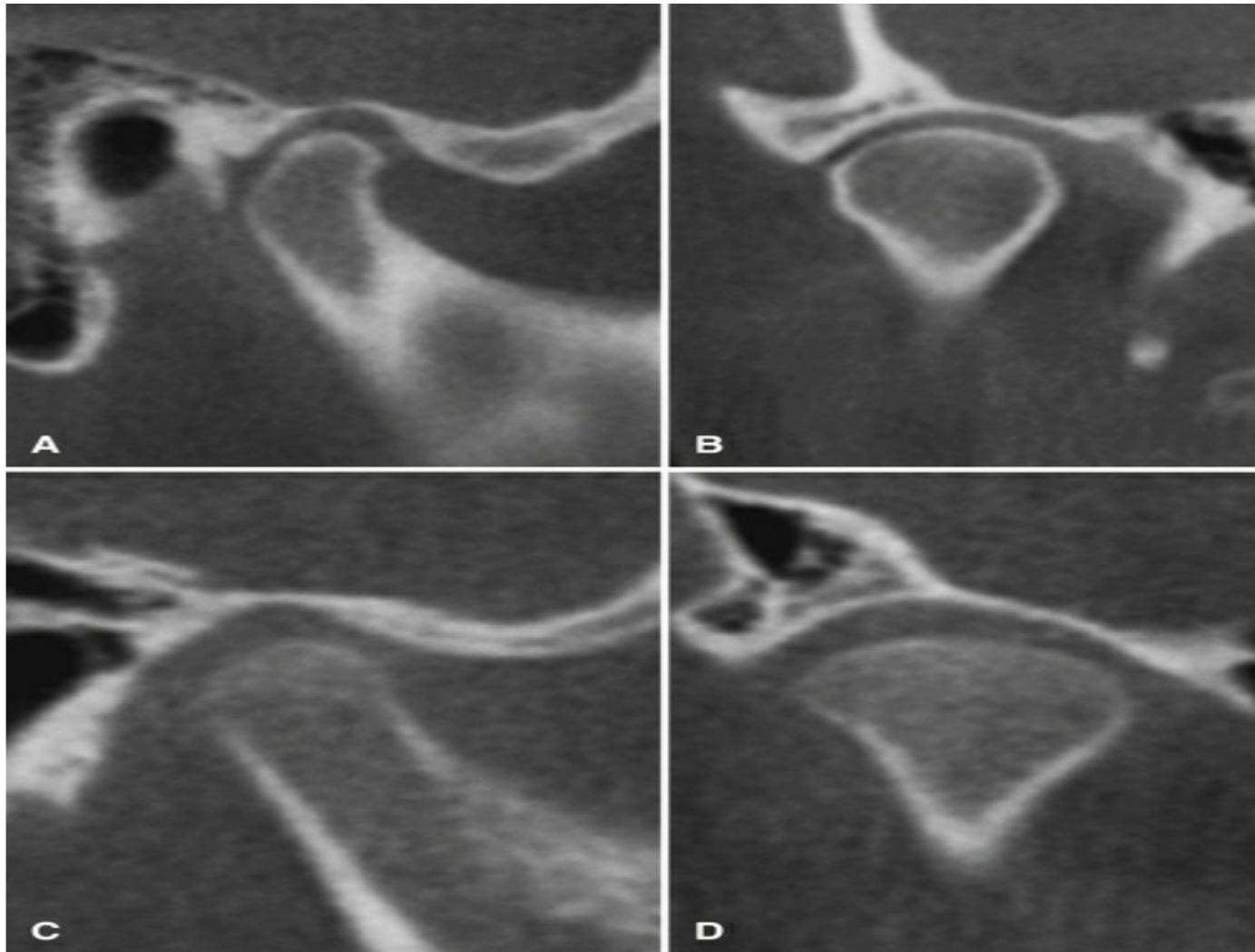


Radiographic:

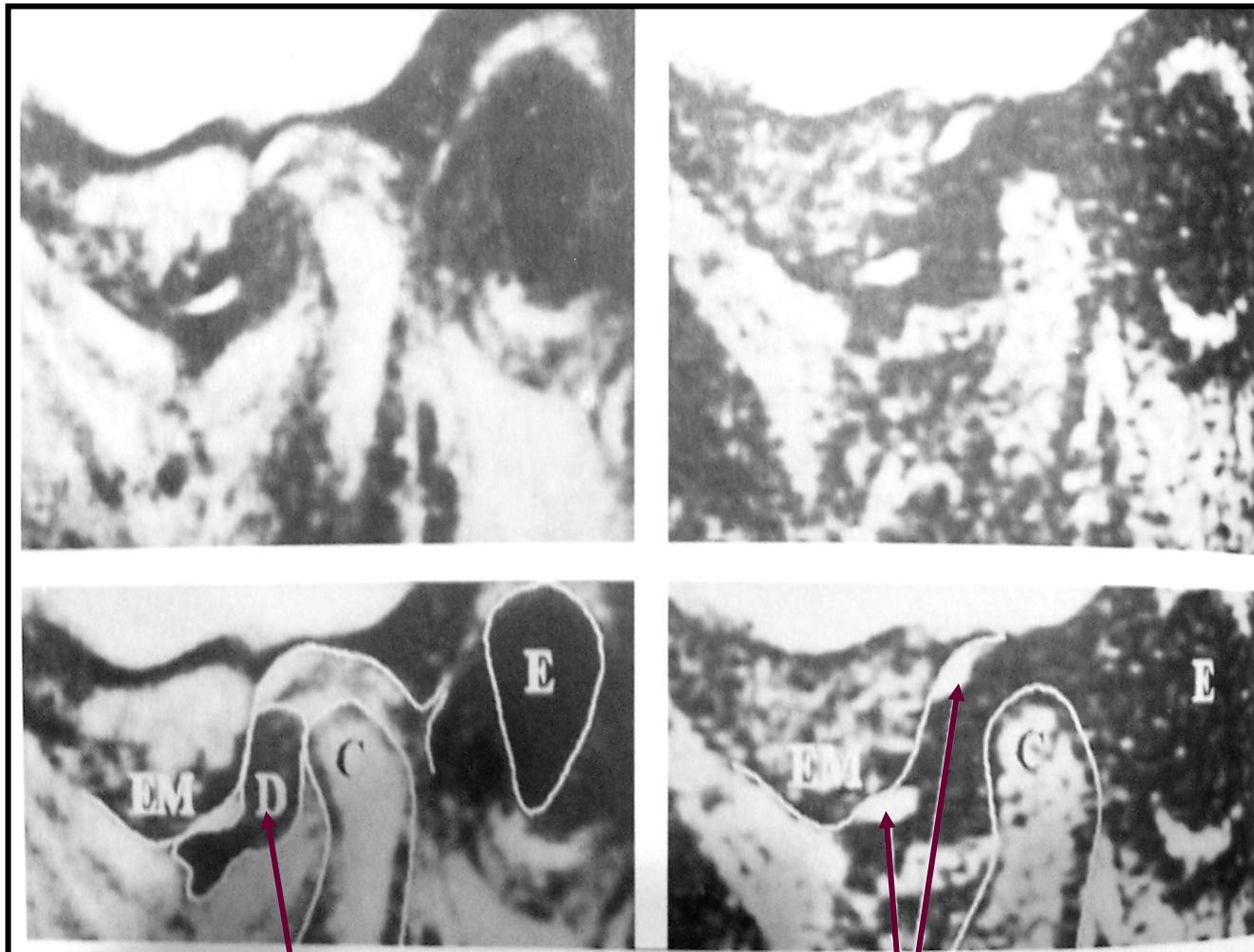
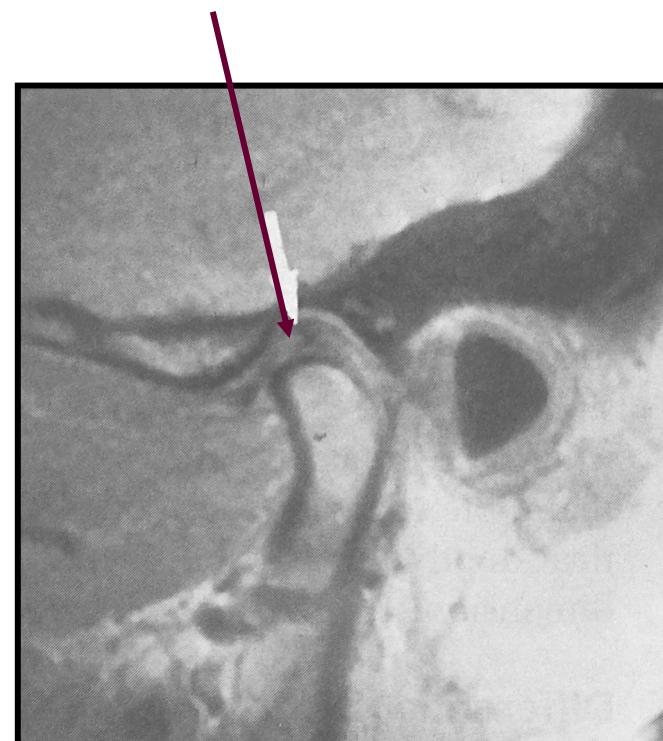
In conventional diagnostic images and CT-  
**-Joint space - radiolucent space**



**Cone beam computed tomography (CBCT) images of the right Temporomandibular joint (TMJ)**

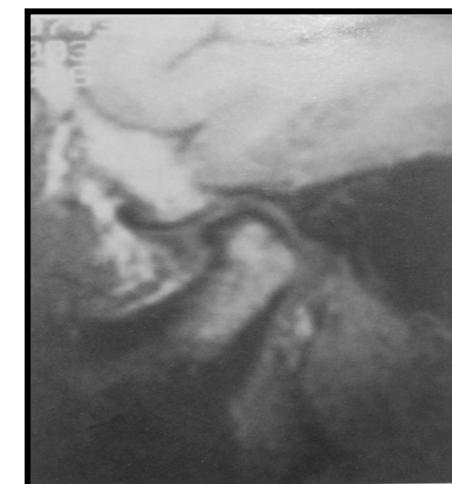


Articular disc



Disc  
displacement  
( T1 weighted  
images)

Joint effusion ( T2 weighted  
images)



**REFERENCES:**

- The anatomical basis of clinical practice: gray's anatomy (39<sup>th</sup> edition)
- Burkett's oral medicine (13<sup>th</sup> edition) pg :350-355.
- White and pharoah –Text book of Oral radiology -7<sup>th</sup> edition1350-1356

*Thank You*

