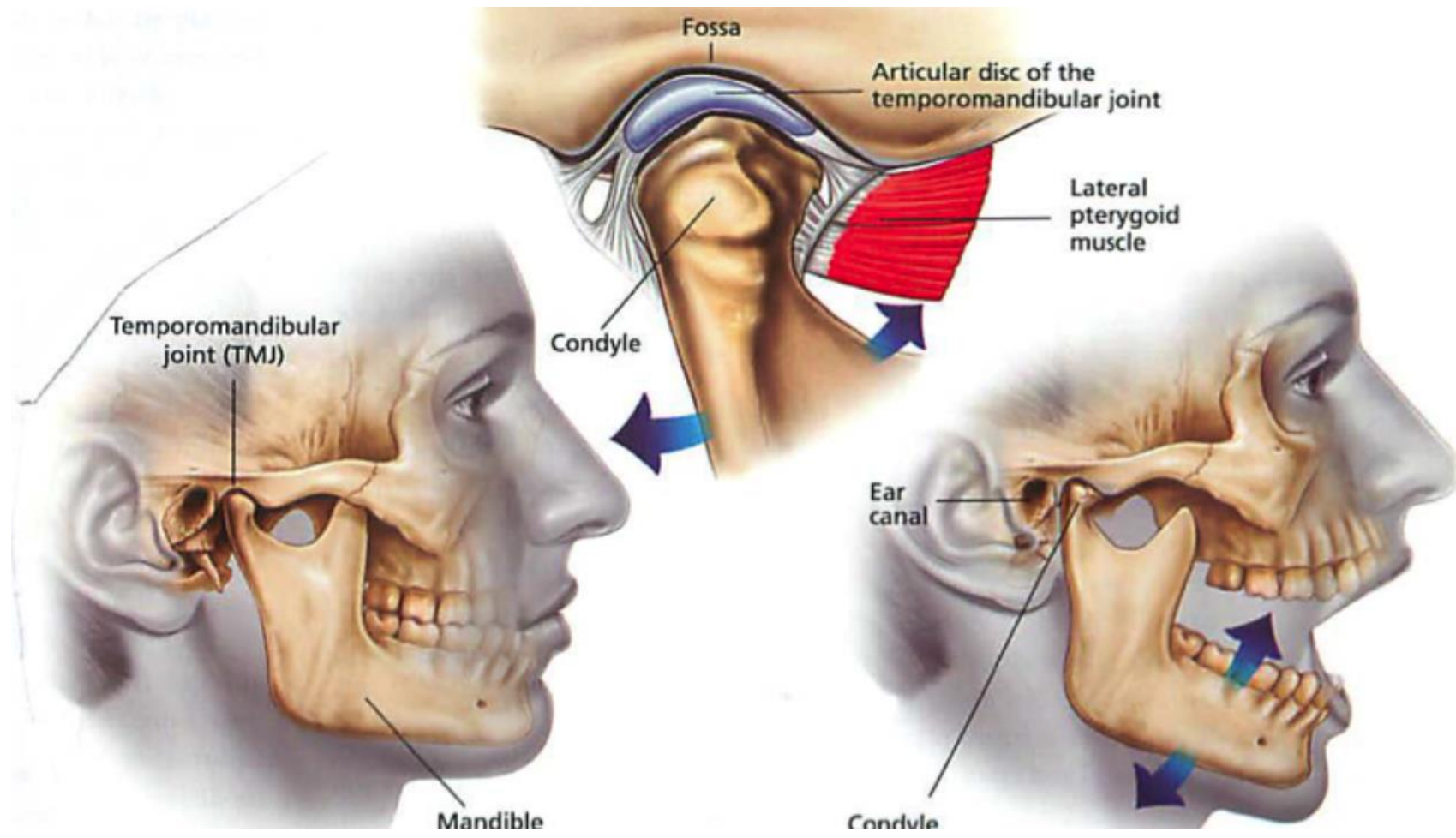


ANATOMY AND PHYSIOLOGY OF TEMPOROMANDIBULAR JOINT

Prof. Dr. Mohammed T. Alkhasagy

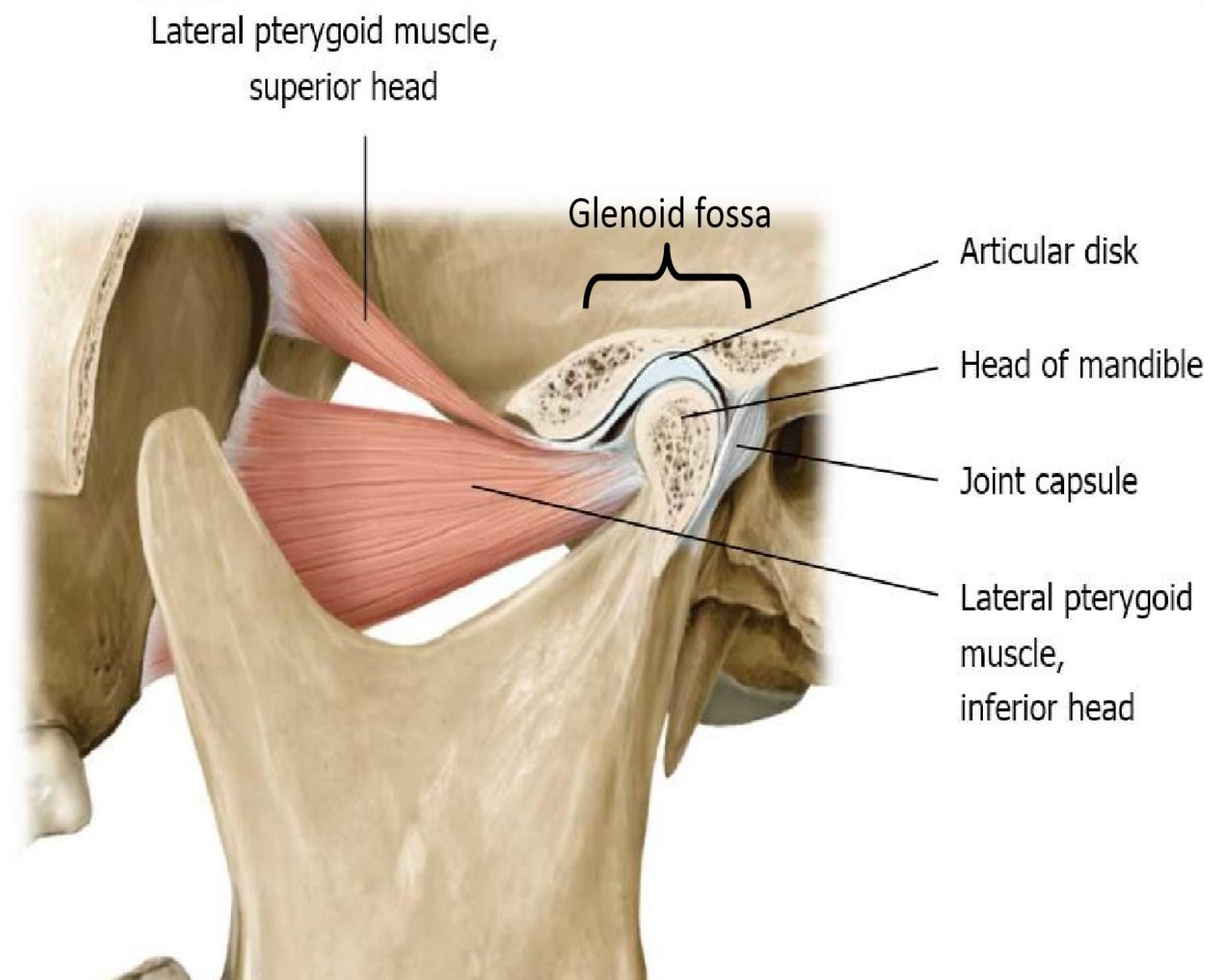


Temporomandibular joint (TMJ):

- It is the articulation of the **condyle of the mandible**, and the **inter-articular disc**; with the **mandibular fossa (glenoid fossa)** of the temporal bone.
- The joint has a **capsule** and an **articulating disc**.
- It is considered as a ***compound joint*** (a compound joint is one with more than two bones articulating); in TMJ, the articular disc acts like the third bone.

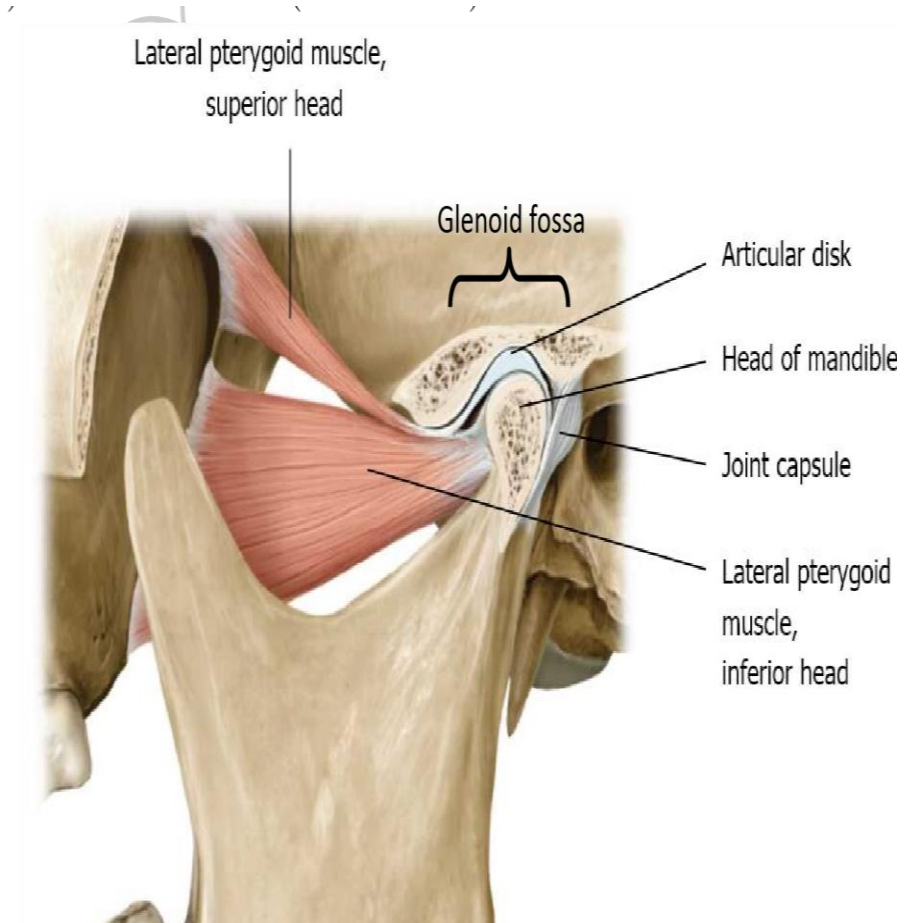
TMJ consist of the following parts

- 1- The **mandibular fossa** (glenoid fossa) of temporal bone.
- 2- The **condyle** or head of the mandible.
- 3- **Synovial cavity**.
- 4- The **articular disc** or (meniscus).



Meniscus

- ❖ Is found between the condyle and the glenoid fossa.
- ❖ It divides the synovial joint or TMJ into upper and lower (superior and inferior) compartments.
- ❖ Each compartment acts as a separate joint during function.
- ❖ The presence of the meniscus also distinguishes the TMJ from most other joints in the body, making it a bone-to-tissue (*mandible to disc*) and tissue-to-bone (*disc to skull*) articulation.



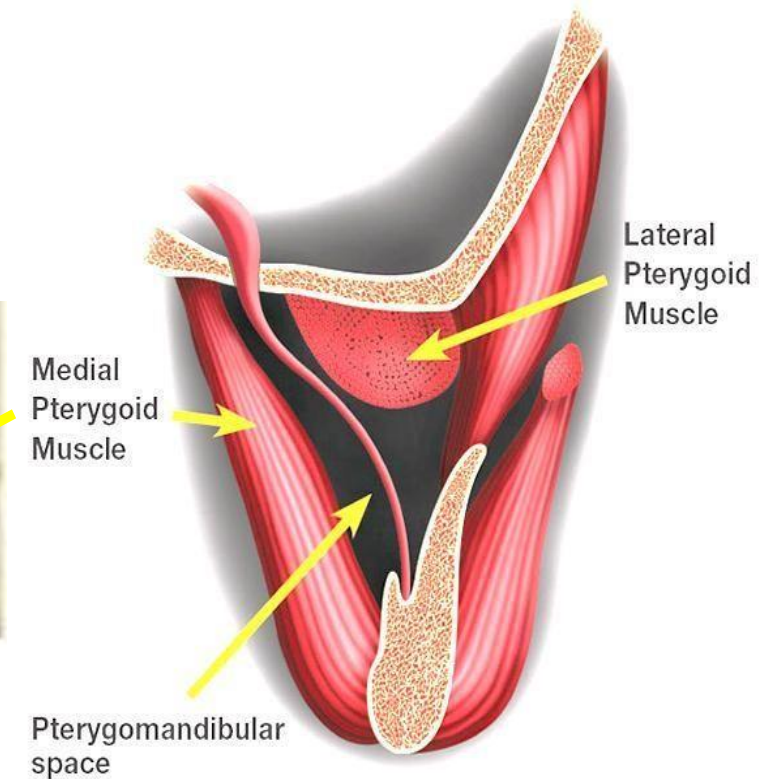
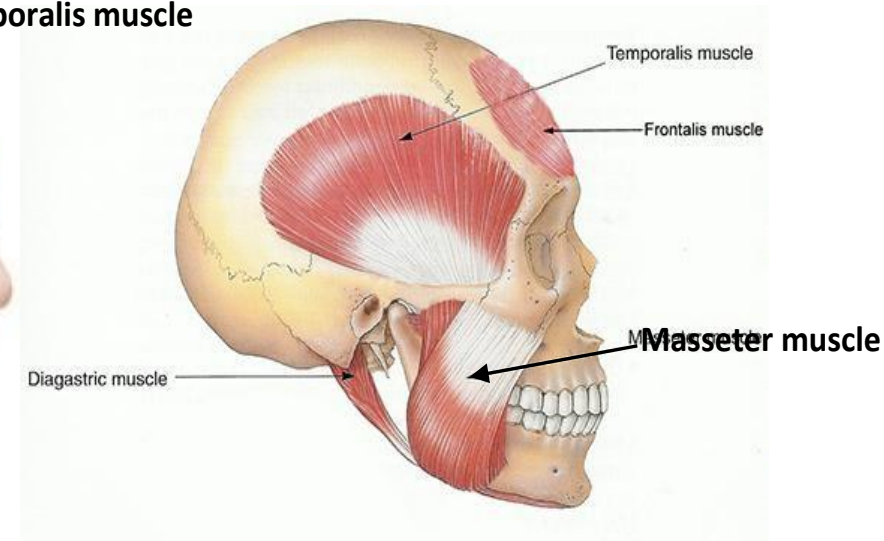
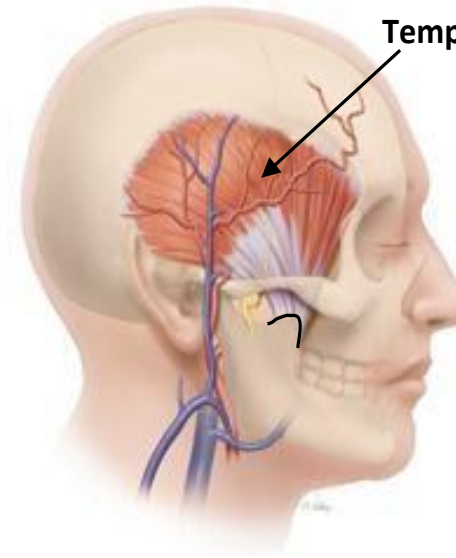
The muscles that control the movement of the mandible

There are three groups of muscles:

1. Closing muscles.
2. Gliding muscles.
3. Opening muscles.

Closing muscles

- 1- Temporalis muscle
 - 2- Masseter muscle
 - 3- Medial pterygoid muscles
- supply the power for pulling the mandible against the maxilla (elevating and closing the mandible).*



Medial pterygoid muscle

RM

Masseter muscle

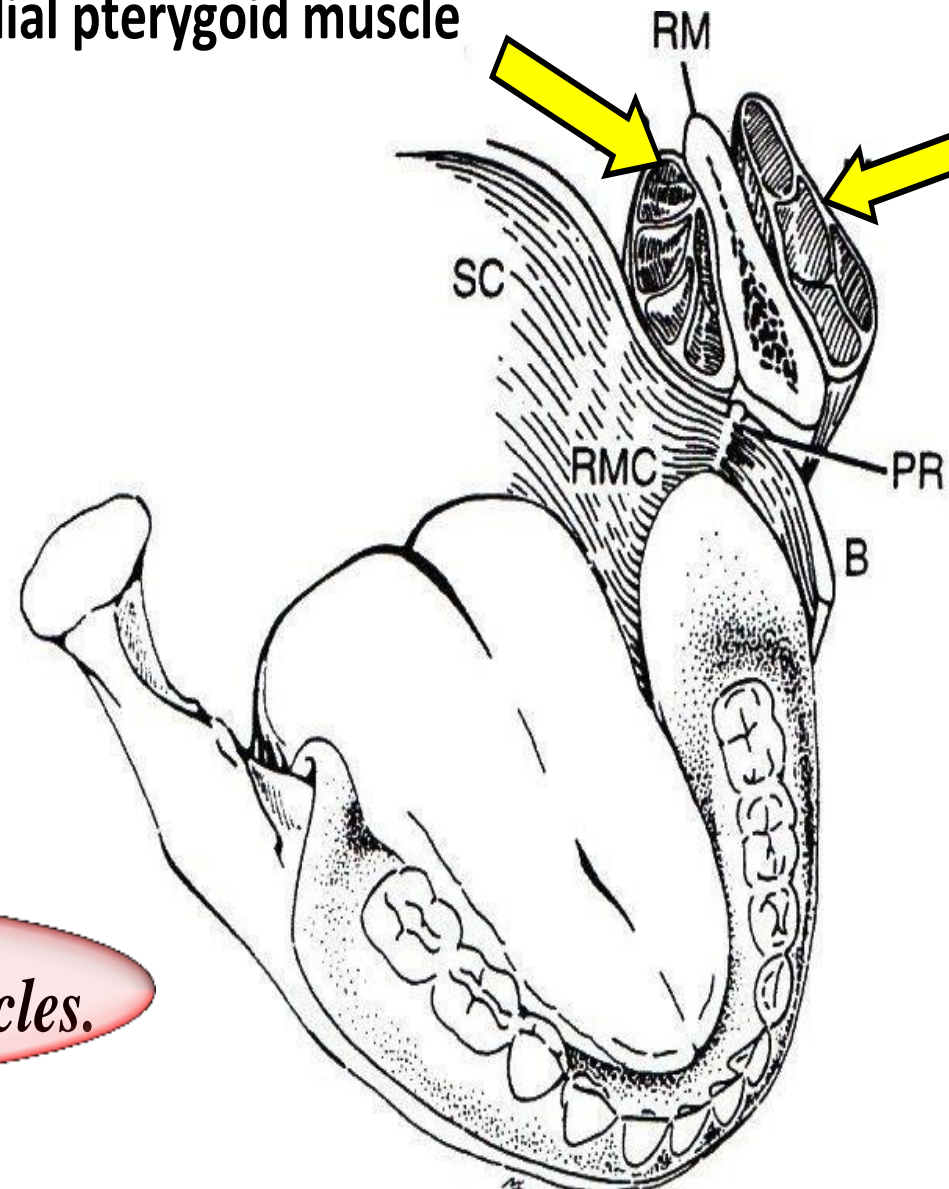


Figure (5-4): Closing muscles.

Gliding muscles

The *lateral pterygoid muscle* connects the mandible to the lateral pterygoid plate in such a way as to act as the steering mechanism for the mandible and act to *protrude the jaw or to move it laterally*.

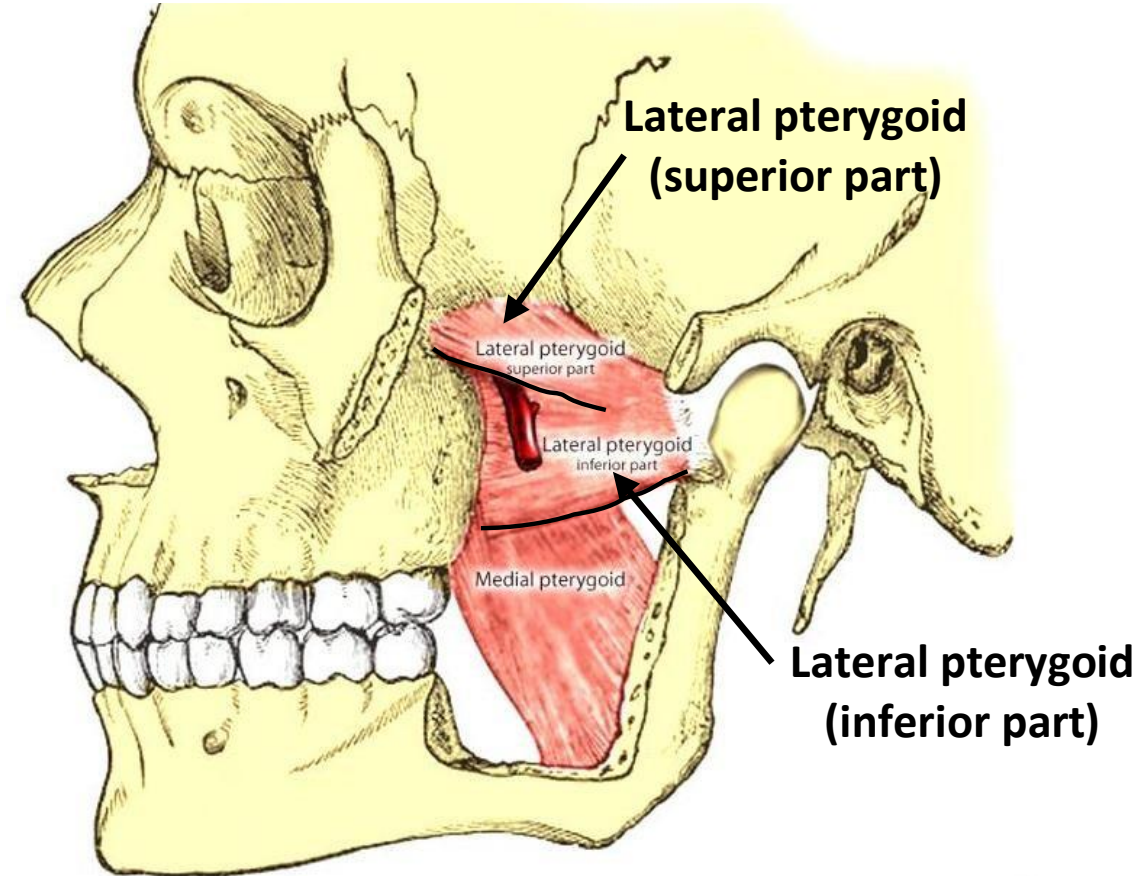
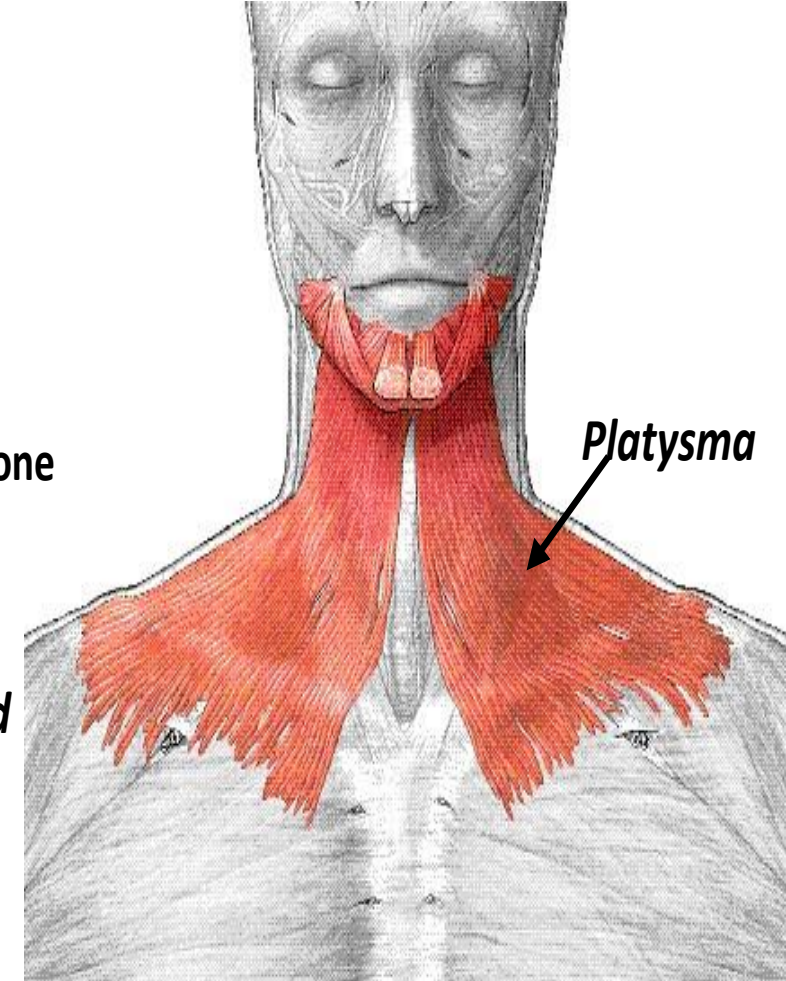
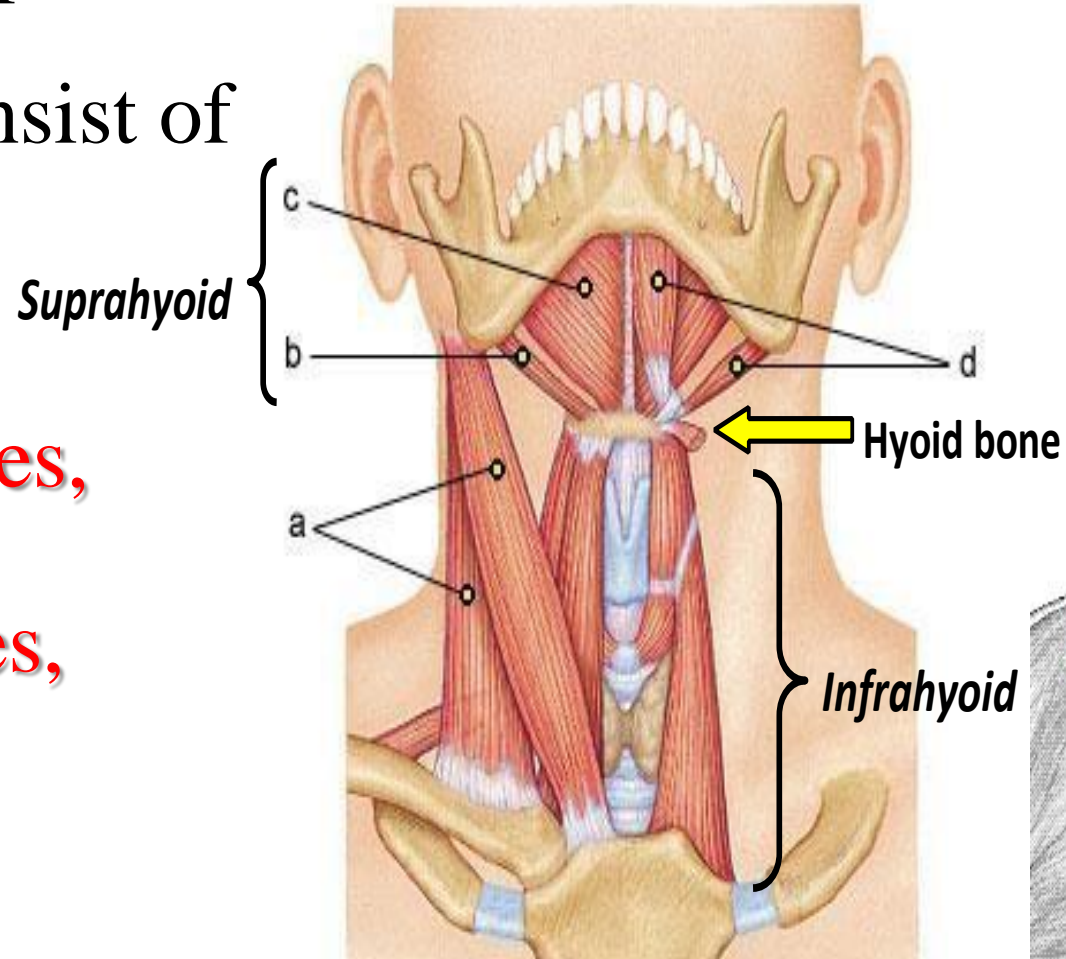


Figure (5-5): Gliding muscle.

Opening muscles

The muscles that depress (open) mandible consist of three groups,

- ❖ suprahyoid muscles,
- ❖ infrahyoid muscles,
- ❖ platysma.



Ligaments affect the movement of mandible consist of

1. Temporomandibular and capsular ligaments.
2. Sphenomandibular ligament.
3. Stylomandibular ligament.

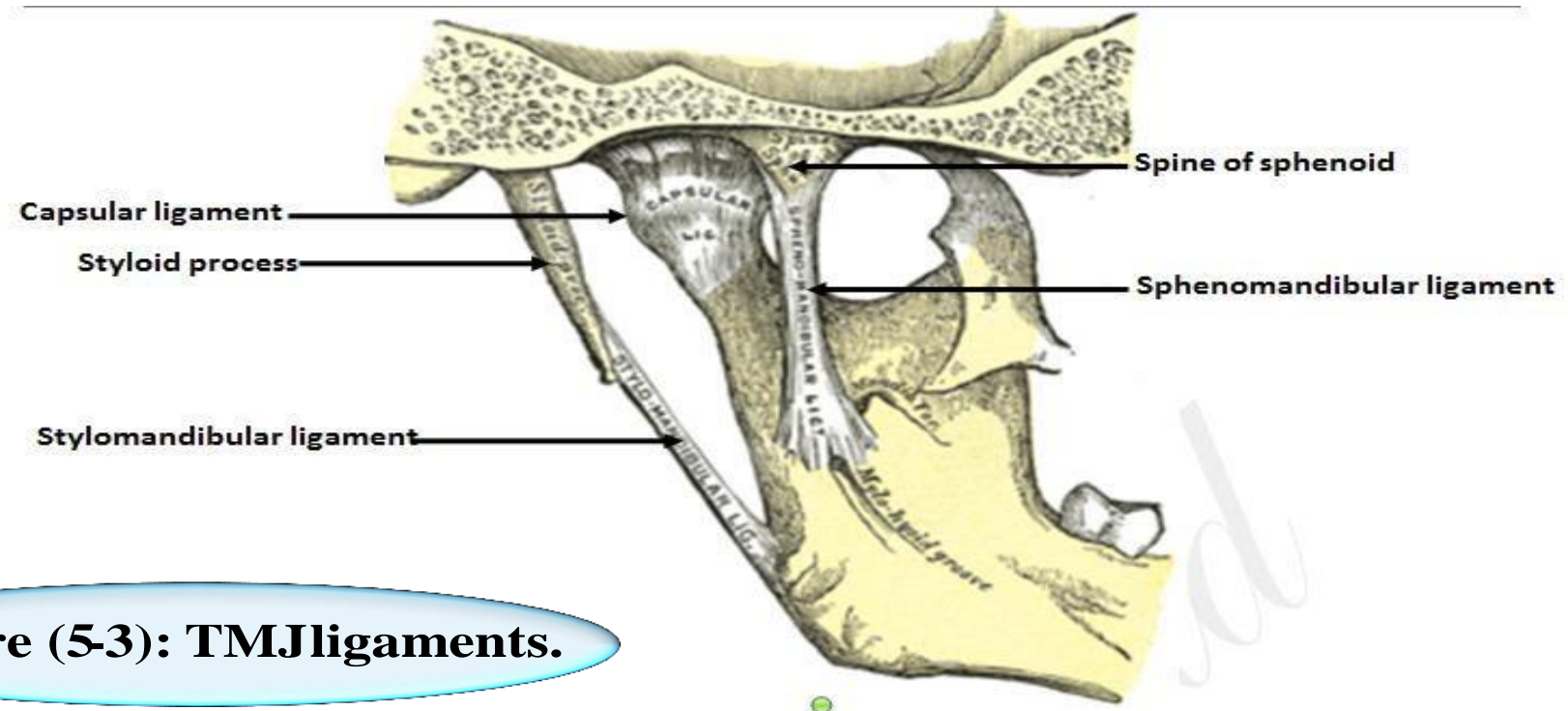


Figure (5-3): TMJ ligaments.

Mandibular axes & mandibular movements

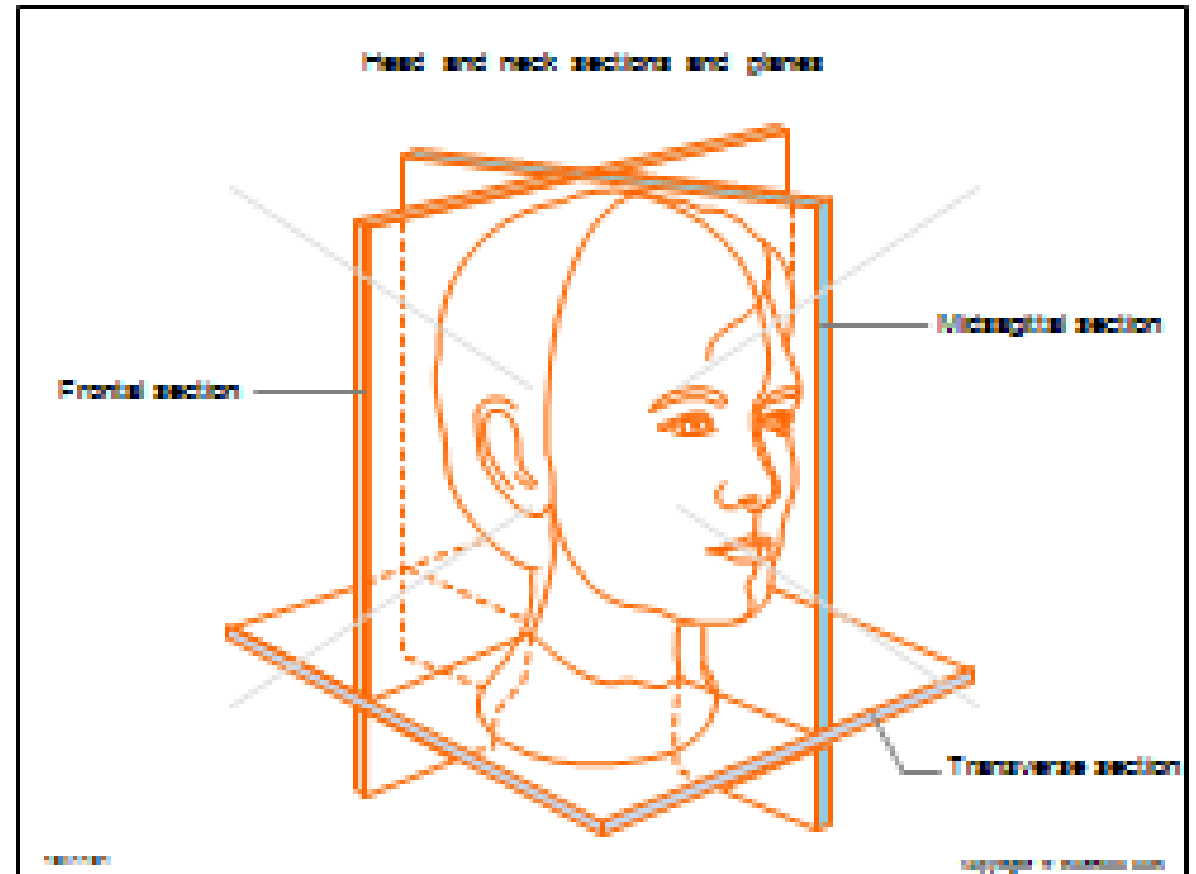
- ❖ Good prosthodontic treatment bears a direct relation to the structures of the temporomandibular articulation, since occlusion is one of the most important parts of treatment of the patients with complete dentures.
- ❖ The temporomandibular joints affect the dentures and likewise the dentures affect health and function of the joints.

Mandibular axes & mandibular movements

- ❖ The mandibular bone has specific relationships to the bones of the cranium.
- ❖ The mandible is connected to the cranium at the two temporomandibular joint by the temporomandibular and capsular ligaments.
- ❖ The sphenomandibular and stylomandibular ligaments also connect the bones in such a way as to limit some motions of the mandible.

Mandibular axes

- ❖ There are three axes around which the mandibular movements take place, the mandibular movements are related to three planes of skull
- ❖ sagittal
- ❖ transverse (horizontal)
- ❖ coronal (frontal))

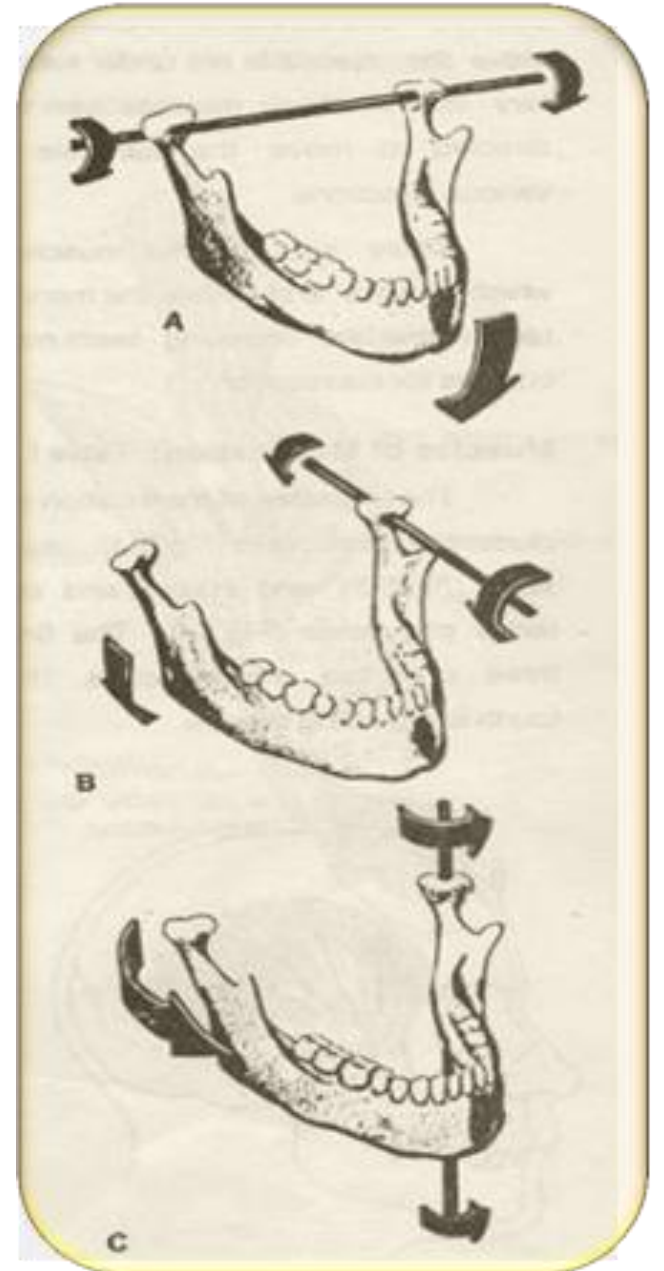


Mandibular axes include:

1- **Hinge axis or transverse axis** It is an imaginary line around which the mandible may rotate within the sagittal plane (during opening and closing movement).

2- **Sagittal axis of the mandible** It is an imaginary anteroposterior line around which the mandible may rotate within the frontal plane.

3- **Vertical axis of the mandible** It is an imaginary line around which the mandible may rotate through the horizontal plane



MANDIBULAR MOVEMENTS

The mandibular movements can be classified as following

Based on the dimension involved in the movement

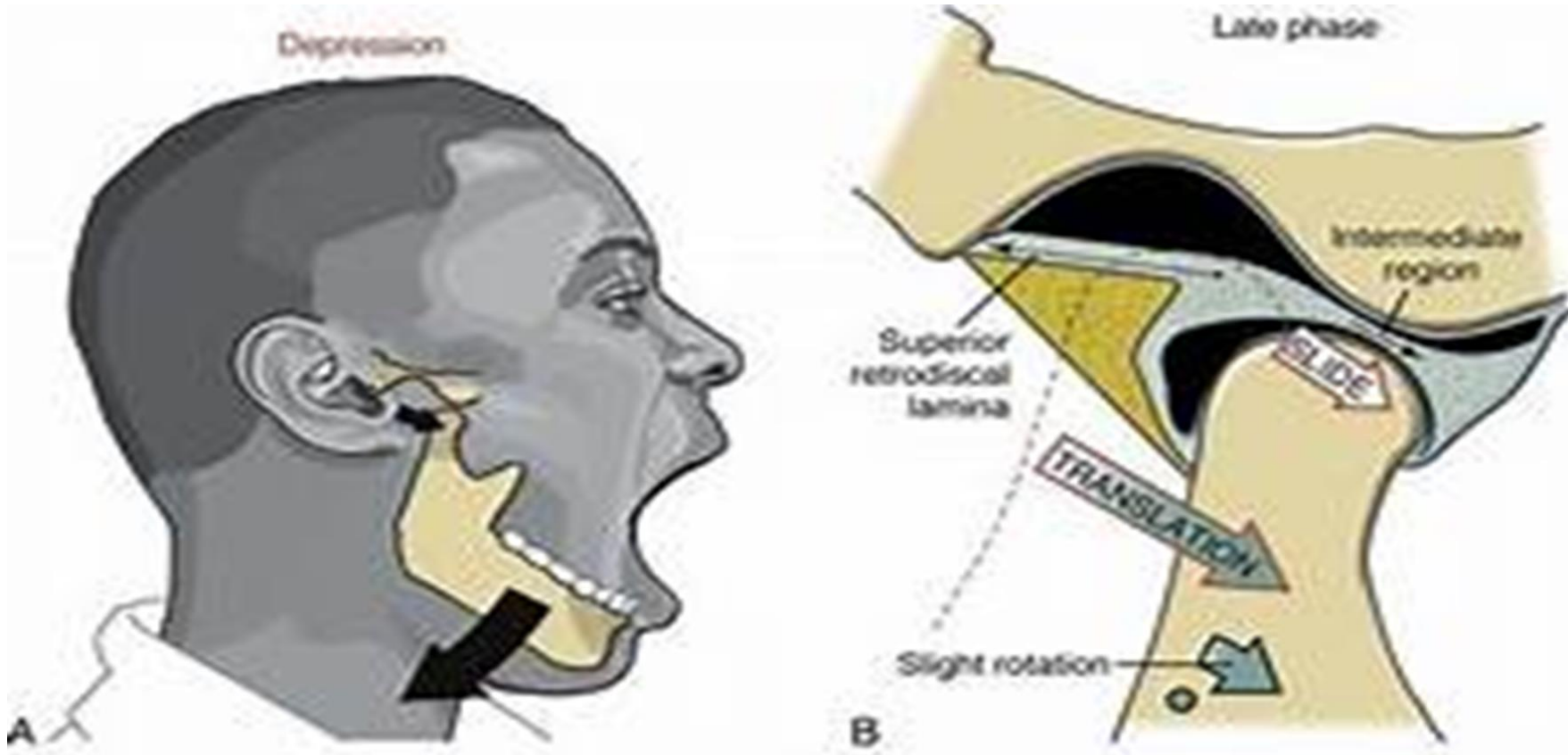
1- Rotational

- a-** Rotation around the transverse or hinge axis.
- b-** Rotation around the anteroposterior or sagittal axis.
- c-** Rotation around the vertical axis.

2- Translational or gliding

They are considered as *basic movements* of the mandible.

- ***The upper compartment*** shows anteroposterior gliding movement, when this movement takes place, the condyle and the disc move as a single unit against the glenoid fossa.



- ***The lower compartment*** shows hinge movement, during hinge movement the condyle moves against the articular disc and the glenoid fossa, which together act as a single unit. True condylar rotation is 12° with the maximum incisal separation of 22 mm



Mandibular movements also can be classified

Based on the type of movement

1- Hinge movement.

2- Protrusive movement.

3- Retrusive movement.

4- Lateral movement.

a- Lateral rotation or (laterotrusion).

Right.

Left.

b-Lateral translation or (Bennett movement).

Immediate side shift.

Progressive side shift.

Precurrent side shift.



(1)



(2)



(3)



(4)

1- Closed mouth. 2- Hinge movement. 3- Protrusion. 4- Retrusion.



Figure (5-11): Laterotrusion (left and right).

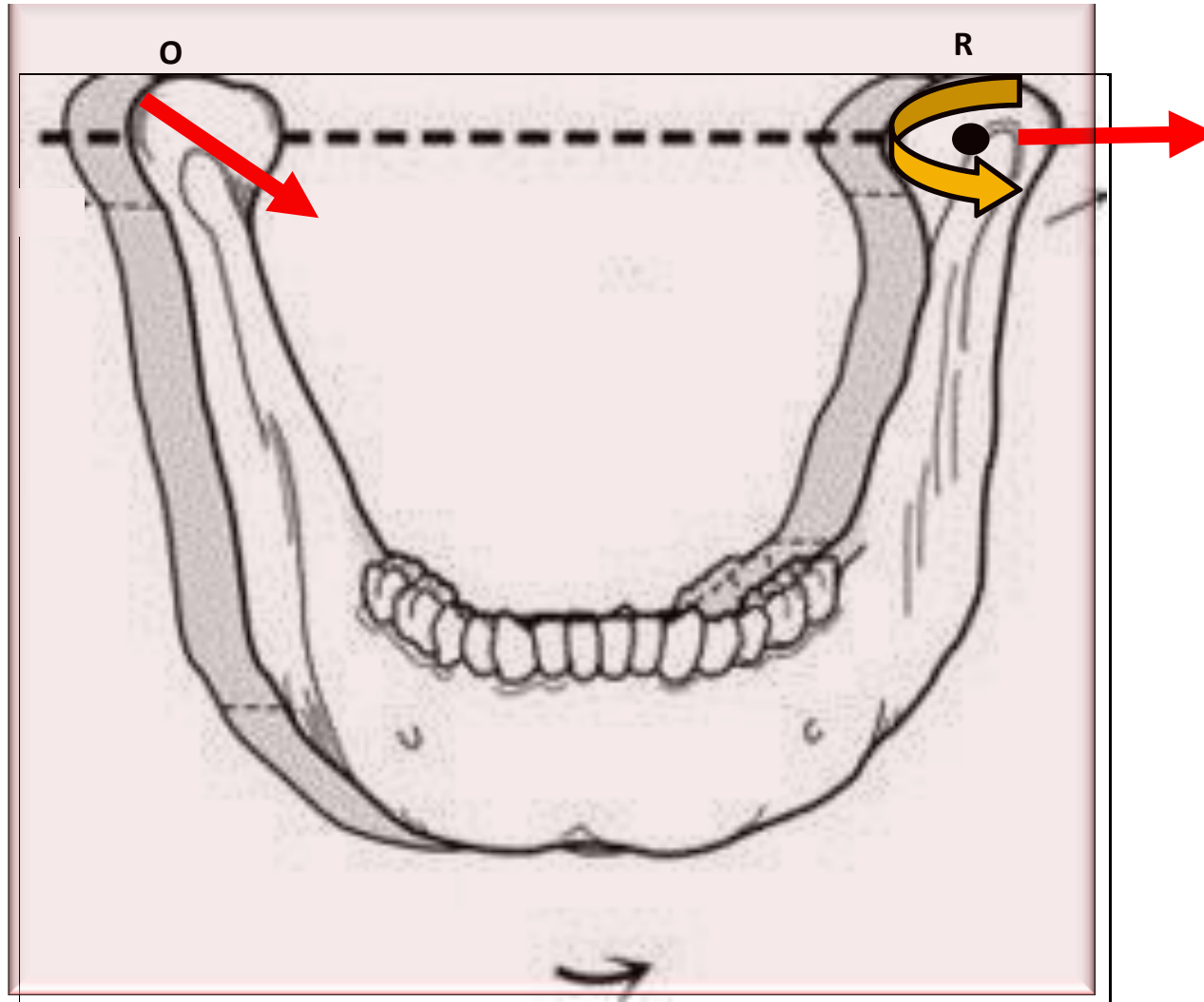


Figure (5-12): Bennett movement.

BASED ON THE EXTENT OF MOVEMENT

1- Border movement

- a-** Extreme movement in the sagittal plane.
- b-** Extreme movement in the horizontal plane.
- c-** Extreme movement in the frontal plane.
- d-** Envelope of motion.

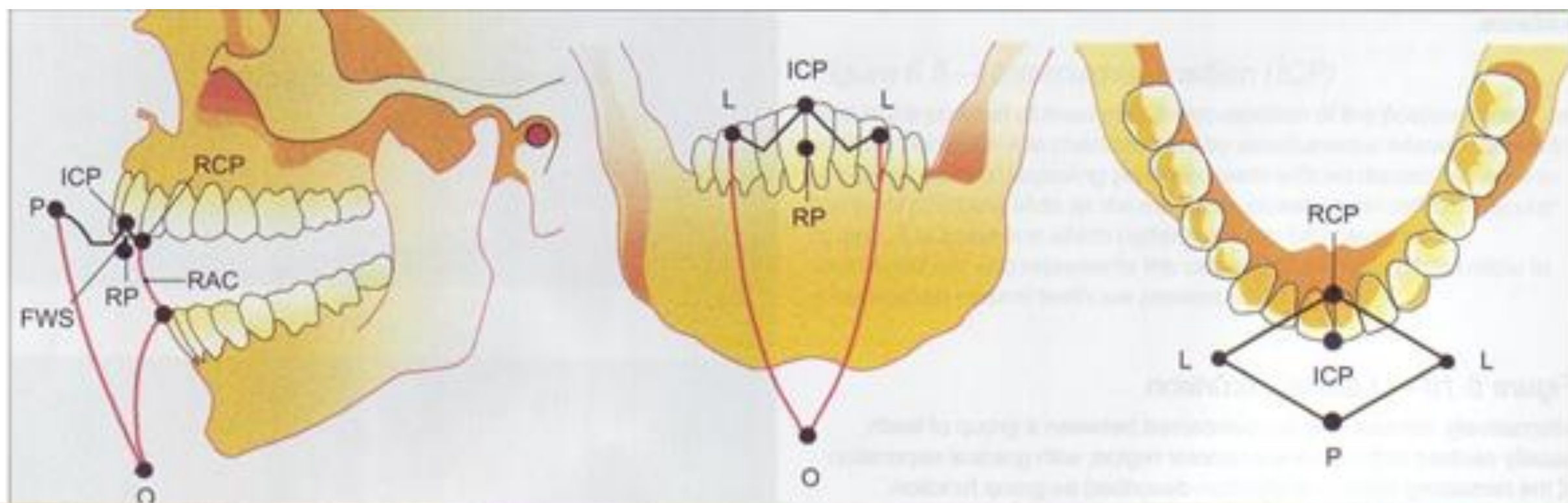
2- Intra-border movement

a- Functional movement.

- Chewing cycle.
- Swallowing.
- Yawing.
- Speech.

b- Para-functional movement.

- Clenching.
- Bruxism.
- Other habitual movements.



KEY

ICP = Intercuspal position

RCP = Retruded contact position

RAC = Retruded arc of closure

RP = Rest position

FWS = Freeway space

(judged to be the distance between the rest position and the intercuspal position).

P = Maximum protrusion

O = Maximum opening

L = Maximum lateral excursion

— Contact movements

— Non-contact movements

•When we combine the border movements of all the three planes, we get a three dimensional space within which mandibular movements is possible, this three dimensional limiting space is called the *(envelope of motion)*.



THANK
YOU

