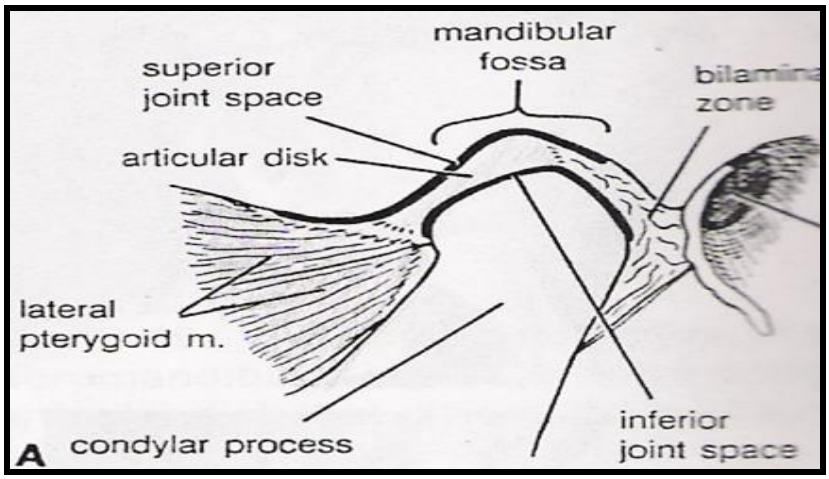
Maxillomandibular relation

Before recording maxillomandibular relation, mandibular movements must be understood which is directed by the TMJ, muscles and ligaments.

Tempromandibular joint (TMJ)

TMJ: is a joint which involves the articulation the condylar process of the mandible with the mandibular(glenoid) fossa of the temporal bone. It is enveloped by an articular capsule.
It is a complex joint because it covered with dense fibrous connective tissue (articular disk or capsule) instead of hyaline cartilage. It is a synovial joint which secretes synovial fluid.



Parts of TMJ

1. Mandibular or glenoid fossa of the temporal bone.
2. Condylar process of the mandible.
3. Articular disk or meniscus which is dense fibrous connective tissue structure placed between the condyle and the glenoid fossa, it divides the joint space into superior and inferior or upper and lower compartments that contain synovial fluid

4. Synovial cavity, a synovial membrane lines the articular capsule and it secretes synovial fluid which serves as a natural lubricant and source of nutrition for some of the joint tissues.

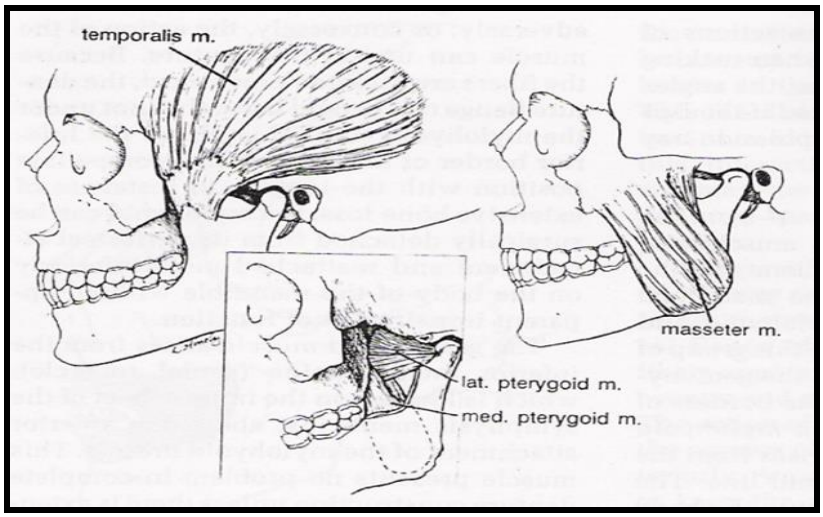
Facial muscles

The muscles that control the movement of the mandible may be considered in 3 groups are closing, opening and gliding muscles.

Muscles of mastication: they are very powerful muscles; they have masticatory and nonmasticatory function (deglutition, speech, respiration, bruxing and clenching).

All of these muscles originate from the bones of skull and attach to the mandible, they include 4 muscles:

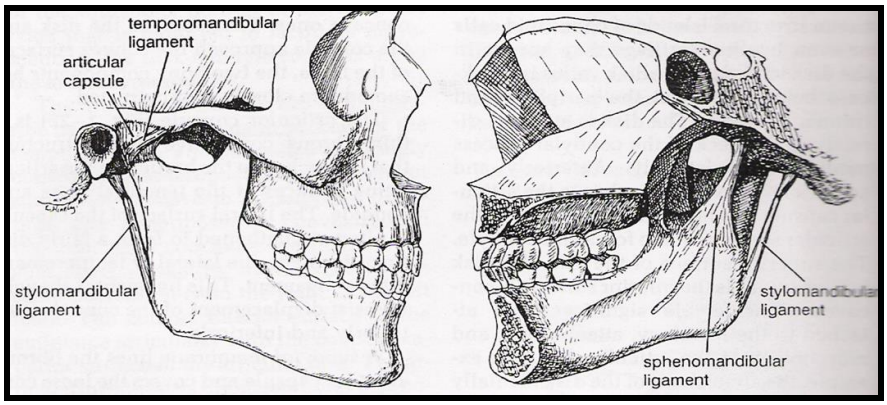
1. *Masseter muscle:* it elevates the mandible.
2. *Temporalis muscle:* anterior and middle fibers elevate the mandible while its posterior fiber can elevate and retract the mandible.
3. *Medial pterygoid muscle*: it elevates the mandible.
4. *Lateral pterygoid muscle:* superior head elevates the mandible while inferior head depresses and protrudes the mandible.



Ligaments

Ligament that are associated with the T.M.J are:

1. Temporomandibular ligament
2. Sphenomandibular ligament
3. Stylomandibular ligament



The mandible has a specific relationship to the bones of the cranium; it is connected to the cranium at the right and left TMJs by the ligaments, and is connected to maxilla through occlusal surfaces of the teeth. For this reason, the occlusion of the teeth must be in harmony with the jaws relations when the teeth are in contact.

Mandibular movements:

1. Basic movements: the presence of the articular disk on the TMJ allows two types of movements:

A) *Rotational movement (hinge):* This occurs in lower compartment between the inferior surface of the articular disk and the condyle, which include:

- Terminal hinge movement (the basis for recording the centric relation).
- Opening and closing movement.

B) Translatory (gliding or sliding): This occurs in upper compartment between the superior surface of the articular disk and the glenoid fossa of temporal bone, in which the condyle and the disk move as one unit, which include:

- Forward and backward movement.
- Posterior to terminal hinge movement

2. Functional movements: it is a combination of rotational and translatory movements and includes all the mandibular movements except the terminal hinge movement.

They are including:

- Opening and closing movements.
- Symmetrical forward and backward movements.
- A symmetrical side-wise or lateral movement.

Mandibular axis:

There are 3 axes around which the mandibular movements take place these axes are:

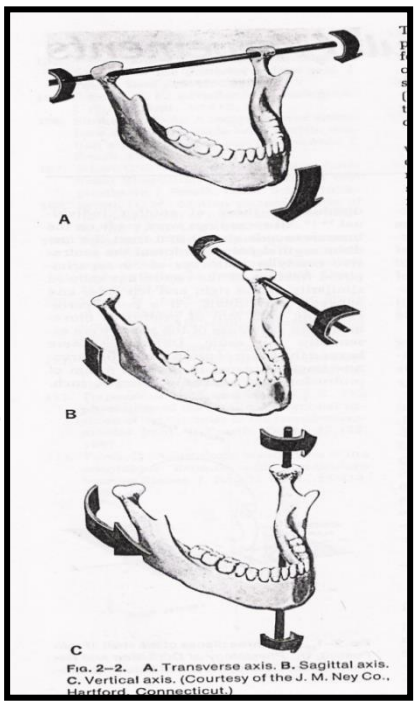


FIG. 2–2. A. Transverse axis. B. Sagittal axis. C. Vertical axis. (Courtesy of the J. M. Ney Co., Hartford, Connecticut.)

1. Hinge axis or transverse horizontal axis:

It is an imaginary line around which the mandible may rotate within the sagittal plane.

2. Capital axis: It is an imaginary anterior-posterior line around which the mandible may rotate when view in the frontal plane.

3. *Vertical axis:* is an imaginary line around which the mandible may rotate when view through horizontal plane.

Maxillomandibular relation

It is any spatial relationship of maxilla to mandible, it is classified into:

1. Vertical jaw relation. including centric jaw relation (opening and closing movement).
2. Horizontal jaw relation: including eccentric jaw relation (lateral and protrusive).

Centric jaw relation: it is the most retruded physiologic relation of the mandible to the maxilla when the condyles are in the most posterior unstrained position in the glenoid fossae.

Centric occlusion (maximum intercuspation): It is the relationship between the maxilla and the mandible when the teeth in maximum contact (teeth to teeth relation).

Eccentric jaw relation: Any relation of the mandible to the maxilla other than centric relation. Eccentric relations that are recorded and used in complete denture construction.

Vertical jaw relation: It is a vertical relation of the mandible to maxilla that provides adequate interocclusal distance between physiologic rest position (centric relation) and centric occlusion.

Physiologic rest position: It is a position assumed by the mandible when the head is in an upright position, the maxillofacial musculature in a state of tonic equilibrium and the condyles are in a neutral unstrained position.

Vertical dimension of physiologic rest position (V.D.R): It is the vertical dimension of the jaws separation at rest when the maxillofacial musculature is in a state of tonic equilibrium and the teeth or bite rims are not in contact, they must be separated by a space called free way space (2-4mm).

Vertical dimension of occlusion (V.D.O): It is the vertical relation of the jaws when the teeth or bite rims are in occlusion, it must be 2-4mm (free way space or interocclusal distance) less than vertical dimension of physiologic rest position.