

Maxillo-mandibular relation

Maxillo-mandibular relationship record: It is a registration of any positional relationship of the mandible relative to the maxilla. These records may be at any vertical, horizontal, or lateral orientation.

Types of jaw relation:

A- Vertical relation

- 1- Vertical relation of occlusion (OVD).
- 2- Vertical relation of rest position (RVD).

B- Horizontal relation

- 1- Centric jaw relation
- 2- Eccentric jaw relation:
 - a. Protrusive relation
 - b. Lateral relation

C- Orientation relation

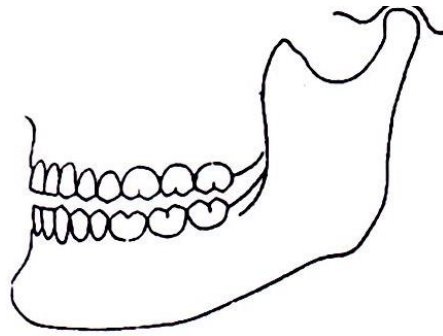
Vertical jaw relation

Occluding member: Represent the upper and lower teeth or wax bite rims.

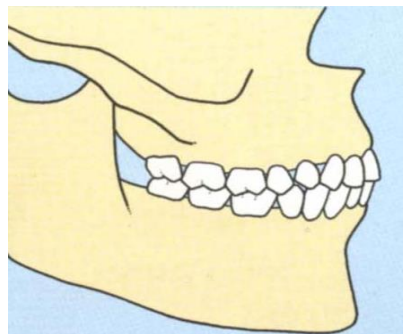
Rest position of mandible (physiological rest position):

It is a postural position of mandible when an individual is resting comfortable in an upright position and the associated muscles are in a state of minimal contraction activity.





Occlusal position of mandible: The position when the opposing occluding member are in contact.



Inter occlusal distance (free way space): The distance between the occluding surface of the maxillary and mandibular teeth, when the mandible is in its physiological rest position (it about 2-4mm).

Vertical dimension (VD): The distance measured between two selected points, one on the fixed (maxilla) and one on the movable member (mandible).

In general vertical measurements of face could be recorded between any two arbitrary selected points which are usually located one above the mouth at the tip of the nose and the other below the mouth at the tip of the chin in the mid line region.



Rest vertical dimension: The distance between the two selected points measured when the mandible in the rest position.

Occlusal vertical dimension: The distance between the two selected points measured when the occluding members in contact.

- ✚ The difference between the R.V.D (Rest vertical dimension) and O.V.D (occlusal vertical dimension) is the inter occlusal distance or free way space and equal to 2-4 mm.

$$\text{OVD} = \text{RVD} - \text{Inter occlusal distance}$$

Vertical dimension of speech: The distance measured when the occluding members are in their closest proximity during speech.

Importance of vertical dimension:

- 1- Functional roles include:
 - a- Mastication
 - b- Deglutition
 - c- Respiration
 - d- Phonetics.
- 2- Psychological role.
- 3- Esthetic role.
- 4- Comfortable role by maintenance health of tissue: mucosa, bone, muscles and TMJ.

Methods of recording rest vertical relation:

1- Facial measurements:

Put two points one on the tip of the nose and the other on the tip of the chin. Instruct the patient to sit in upright position and relax, then

ask the patient to wipe his lips with his tongue, then swallow and to drop his shoulders. When the mandible drops to rest position use roller or caliper to measure the distance between the two points of reference (nose and chin).



2- Tactile sensation:

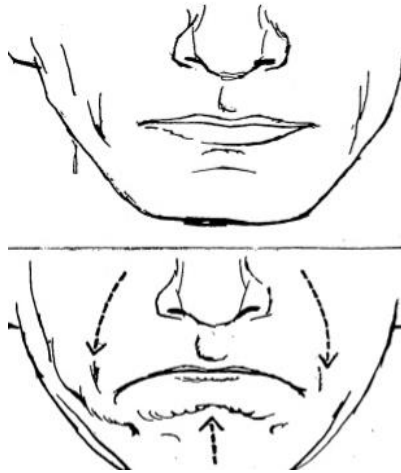
Instruct the patient to stand erect and open the jaws widely until strain felt in the muscles, when this opening becomes uncomfortable ask the patient to close slowly until the jaws reach a comfortable relaxed position. Measure the distance between the two reference points and compare with the measurements made after swallowing.

3- Phonetics:

The patient is asked to repeatedly pronounce the letter "m" a certain number of times or ask him to said the word (emma). When the lips touch, ask him to stop all jaw movement. At this time measure the distance between the two reference points(on the nose and chin).

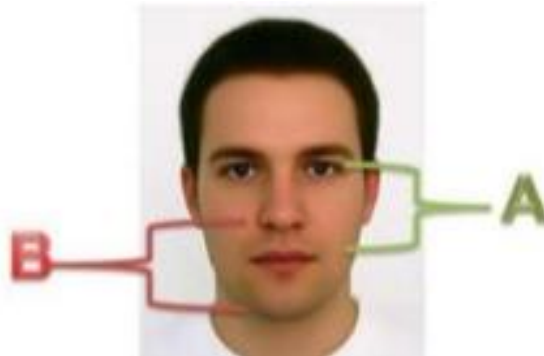
4- Facial expression:

The experienced dentist may notice the relaxed facial expression when the patient's jaws are at rest. In normally related jaws the upper and lower lips should have a slight contact. Also the skin around the eyes and chin should be relaxed. It should not be stretched.



5- Anatomical landmarks:

The Willis guide is designed to measure the distance from the pupils of the eye to the corner of the mouth and the distance from anterior nasal spine to the lower border of the mandible, if both these distances are equal, the jaws are considered at rest.



6- Electro - myographic method:

It is a special device that measures the tone of the masticatory muscles, when the tone is at its least, this means these muscles relaxed and the jaws are at rest position.



Methods of recording occlusal vertical dimension:

A- From the formula:

$$\text{OVD} = \text{RVD} - \text{Inter occlusal distance}$$

B- Methods with pre extraction records:

1. Profile photographs
2. Profile silhouettes
3. Radiographs
4. Articulated casts
5. Facial measurements
6. Measurements of former dentures

C- Methods without pre extraction records:

1. Power point method (by Boos)
2. Central bearing device (Neuromuscular perception)
3. Swallowing threshold
4. Phonetics

Consequences of increased vertical dimension:

- 1- Interference with speech.
- 2- Sensation of bulk (bulky denture).
- 3- Premature contact of upper and lower teeth.
- 4- Instability of dentures due to their excessive height.
- 5- Resorption of residual alveolar ridge
- 6- Loss of biting power.
- 7- Clicking of teeth in speech and mastication.
- 8- Muscular fatigue.

- 9- Poor esthetics due to separated of upper and lower lip.
- 10- Inharmonious facial proportion.
- 11- Excessive display of artificial teeth and gum.
- 12- TMJ problems.

Consequences of decreased vertical dimension.

- 1- Presence of wrinkles and folds not due to age.
- 2- Loss of biting power.
- 3- Muscular fatigue.
- 4- Pain in the region of TMJ.
- 5- Cheek biting.
- 6- Thin lip appearance.
- 7- Decreased lower facial height with prominence of lower jaw and chin.
- 8- Angular cheilitis due to folding of the corner of the mouth.

Horizontal jaw relations

Horizontal jaw relations: It is the relationship of the mandible to the maxilla in a horizontal plane.

It can also be described as the relationship of the mandible to the maxilla in anteroposterior and side to side direction.

Centric jaw relation (CR): The most retruded relation of the mandible to the maxillae when the condyles are in the most posterior unstrained position in the glenoid fossa from which lateral movement can be made at any given degree of jaw separation.



Centric occlusion (CO): It is the occlusion of the opposing teeth when the mandible in centric relation.

Methods for assisting the patient to retrude the mandible to centric jaw relation:

- 1- Instruct the patient by saying "Let your jaw relax, pull it back, and close slowly and easily on your back teeth".
- 2- Instruct the patient to contact a piece of wax placed on the posterior palatal seal area with his tongue and slowly close.
- 3- The patient is asked to try to bring his upper jaw forward while occluding on the posterior teeth.
- 4- The head is tilted back and close the mouth, so that the resulting tension of muscles under the chin makes protrusion more difficult.
- 5- The patient is asked to swallow and close the mouth slowly.

Importance of centric jaw relation (significance):

- 1- It is a reference position from which the mandible can move to any eccentric position and return back to centric relation involuntarily.
- 2- It is the start point for developing occlusion.
- 3- It is learnable, repeatable and recordable position.
- 4- It is a reliable jaw relation, because it is bone to bone relation.
- 5- Functional movement like chewing and swallowing are performed in this position, because it is the most unstrained position.

Methods of recording centric jaw relation:

- 1- Functional (chew-in) methods.
- 2- Graphic method.
- 3- Tactile or inter occlusal check record method.

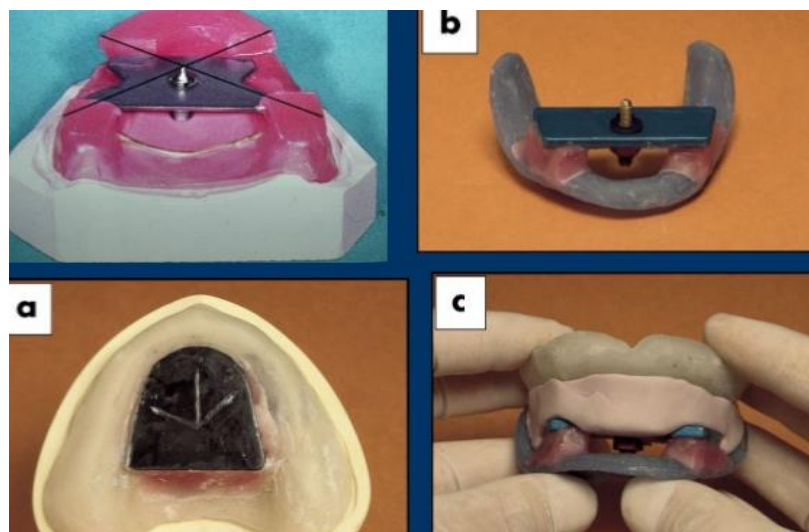


Graphic methods include:

A- Intra oral method.

B- Extra oral method.

The extra-oral is preferable to the intra-oral tracing, because the extra-oral is more accurate, more visible and larger in comparing with intra-oral tracing.



The graphic methods record a tracing of mandibular movement in horizontal plane. In this method tracing table coated with carbon or wax attached to the maxillary record base and tracing needle attached to the mandibular record base. When the mandible movement obtained the tracing needle draw a figure on the tracing table, this figure known as the Gothic arch tracing, also known as arrow point tracing. The apex of the tracing arrow represent the centric relation position, with the two sides of the tracing arrow represent the limits of lateral movements.



Tactile or inter occlusal check record method: In inter occlusal method the centric relation is recorded by placing a recording medium between the occlusal rims when the jaws positioned at centric relation. Materials that are commonly used for inter occlusal records include (Bite registration materials):

- a) Plaster.
- b) Wax
- c) Zinc oxide eugenol.
- d) Cold cure acrylic.
- e) Impression compound.
- f) Silicon and polyether.

After complete the vertical dimension record we do a -V- shape notch in the wax rims then reinsert the rims inside patient mouth and apply the bite registration material on the lower bite rims.

The patient close his mouth with the lower jaw in its most retruded position (CR) and the closure stop at the predetermined vertical dimension.



Indications of inter occlusal check record:

- 1- Abnormally related jaws.
- 2- Uncontrollable mandibular movements.
- 3- Large tongue.

- 4- Displaceable and flabby tissue.
- 5- For patients already using a complete denture.

Factors that complicates centric relation record:

- 1- Resiliency of the tissues supporting the denture bases.
- 2- Stability and retention of the record bases.
- 3- The TMJ and its neuromuscular mechanism.
- 4- Amount of pressure applied in making the record.
- 5- Technique employed in making the record.
- 6- The ability of the dentist and the cooperation of the patient.

Eccentric jaw relations: Any relationship between the jaws other than centric relation.

Lateral jaw relations: The relation of the mandible to the maxillae when the lower jaw is in a position to either side of centric relation.

Protrusive jaw relation: The relation of the mandible to the maxillae when the mandible is thrust forward.

The main reason in making an eccentric jaw relation:

- 1. To adjust the articulator to simulate the eccentric movement (lateral and protrusive) of the mandible to maxilla
- 2. To establish balanced occlusion.

The records are made in the same manner as for centric relation record and these include the functional, graphic and inter occlusal record for protrusive, left and right lateral movement.

Inter occlusal eccentric records may be made on the occlusion rim. before the teeth are set up or on the posterior teeth at the try-in appointment.



Orientation relations

Means recording the relation of maxilla to the TMJ and transfer this relation to the articulator (aid in mounting the upper cast on the articulator).

It is recorded by using either bonwill triangle or facebow device.