Jaw relations and jaw relation records

Jaw relations can be classified into 3 categories

1-Orientation jaw relation
2-Vertical jaw relation
3-Horizontal jaw relation

1-Orientation relation:
It is the reference to cranium in such a way that the mandible is kept in most posterior position to the cranium and can rotate around an imaginary transverse axis which passes through both condyles. Face bow used to transfer this relation.

2-Vertical jaw relation:
It is the relation of the mandible to the maxilla in vertical dimension

3-Horizontal jaw relation:
It is the relation between the mandible and maxilla in the anterio-posterior and side to side direction.

*Physiologic rest position:
The usual position of the mandible when the patient is rest comfortably in the upright position and the condyles are in natural unstrained position in the glenoid fossae with minimum tonic contraction of the mandibular muscles to maintain posture.

*Vertical dimension:
The distance between two selected anatomic or marked points usually one on fixed member (maxilla) above the mouth at the tip of the nose in the midline region on the middle third of the face and the other on movable member (mandible) bellow the mouth at the tip of the chin in the midline region on the lower third of the face. It can be classified into: -
A-Occlusal vertical dimension (vertical dimension of occlusion) (OVD)

The distance measured between two points when the occluding members are in contact. (when the teeth or bite rims are in contact with each other)

B-Rest vertical dimension (vertical dimension at rest position) (RVD)

It is the distance between two points one on maxilla and the other on mandible passing through midline when the mandible is in the physiologic rest position. It depends on several factors: muscle activity and gravity.

Interocclusal distance (freeway space):

It is the distance between the occluded surfaces of maxillary and mandibular teeth when the mandible is in the physiologic rest position. This space can be calculated by the difference between the rest vertical dimension and occlusal vertical dimension. it is about 2-4mm in normal patient. RVD-OVD=2-4mm

Patients can be divided into two categories for the purpose of vertical jaw relationship records in partially edentulous patients:

*Patients with occlusal contacting the intercuspal position (vertical stops). at least 3 points of contact between 2 opposing casts: two points posteriorly one on each side of casts and one point anteriorly for recording correct OVD.

*Patients without an occlusal stop to indicate correct intercuspal position or vertical dimension of occlusion.

Methods of determining OVD

1-Pre- extraction records

a-Cast of teeth in occlusion: diagnostic upper and lower casts mounted on an articulator.

b-Profile radiograph

c-Profile photograph: profile photograph is made and enlarged to fit size of face. Measurements of the anatomical landmarks on the photograph are compared with measurements using the same anatomical landmarks of the face. The measurements
can be compared when the records are made and again when the artificial teeth are tried in.

d-Profile silhouettes

e-Clear acrylic transparent mask: made for the lower third of the face, this had been fabricated before the extraction of teeth and is used as a guide to be tried on the face at the try-in stage of the artificial teeth.

f-Facial measurements: take measurements before extraction of teeth and when the patient occluding teeth together, two tattoo points have been placed, one on the upper half of the face and the other on the lower half. The distance is measured and these measurements are compared with measurements made between the artificial teeth are tried in.

2-Without pre- extraction records:

a-Direct methods: it is direct in recording the OVD

b-Indirect methods: we record occlusal vertical dimension (OVD) through the determination of the rest vertical dimension (RVD) and we reduce 2-4mm to get OVD.

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a-Direct methods:

1-Power point by Boos: attach the biometer device to an accurately adapted mandibular record base; the gauge indicates the pound of pressure generated during closure at different jaw separation. The maximum power point of biting force recorded when the patient is in correct OVD.

2-Swallowing method: this is based on hypothesis that during swallowing process, the patient passes through the OVD; the technique involves building cones of soft wax on the lower denture base so that it will contact the upper occlusion rim with the jaws too wide open. Then the flow of saliva is stimulated by the piece of candy or else. The repeated action of swallowing of saliva will gradually reduce the height of the wax cones to allow the mandible to reach the level of vertical dimension of occlusion. When the OVD is corrected and the occluding rims are properly oriented the patient is ready for centric occlusion registration.
**b-indirect methods**

the most popular indirect methods are

1-Phonetic method:
A-We used words have certain sounds as (M, P) also called bilabial sounds. During pronunciation the mandible will be at rest position, then measurement made between two points one on the nose and the other on the chin. Then insert the bite rims and adjust according to these points.  

B-Silverman method: by using the (S) sound. There is space called the closest speaking space and this distance exist between upper and lower central incisors which vary from 1-2mm. If the distance is too large, a vertical dimension of occlusion is too small. If the teeth click together during speech, the vertical dimension of occlusion is too great.

2-Willis theory: the distance between the outer canthus of the eye and the corner of the mouth is equal to the distance from the base of the nose to the base of the chin during rest. Rest vertical dimension is measured by Willis bite gauge.

3-Golden number method: it is when the patient opens widely as much as he can this is equal to 5/3 of the rest vertical dimension. RVD= maximum opening ×3/5.

4-Electro myographic method: to keep the mandible in rest position we should have minimal muscle activity just to equalize the effect of gravity.

5-Cephalometric radiograph made at physiologic rest position:
The distance between the junction of the nasal and frontal bone and most protrusive point on the symphysis of mandible is measured. The record bases with the bite rims adjusted until there will be 3mm of jaw separation between RVD and OVD.

6-Esthetic method: after insertion of bite rims look to patient esthetic (pleasant)

7-Swallowing method: based on several swallowing the patient will pass through RVD (measured between 2 points: one on the nose and one on the chin).
**The effect of increased OVD:**

1. Discomfort, due to alteration of vertical height which the patient was used to.
2. Trauma, the most sudden contact of teeth causes soreness.
3. Loss of freeway space, create inability to find a comfortable resting position.
4. Clicking of teeth, the cusps are frequently meeting each other producing embarrassing clicking sound during speech and also difficulty bringing lips together during pronouncing (P, B, M) sounds.
5. Appearance, elongation of the face and the lips are parted also strained unpleasant appearance may show all teeth.
6. Pain in TMJ.
7. Speech problems (S) sound pronounces (SH) sound.
8. Bulky denture.
9. Loss of biting power
10. Appearance of inability to open mouth widely.

**The effect of decreased OVD**

1. Poor appearance of the face due to loss of the muscle tone, looking older as the lower half of the face is compressed and the chin protrudes causing wrinkles and mouth corner dropping.
2. Angular chelitis, soreness at the angle of the mouth.
3. Decrease of biting force pressure when the teeth are in contact.
5. Marked decreased in OVD may lead to pain in TMJ and muscle dysfunction.