Bite Registration

Before we start with jaw relation we have to check *Lip and cheeks support,* *height of wax rim (amount of teeth showing), orientation of occlusal plane*, and draw the *canine line* and *the midline*.

If the upper wax rim is ready, put upper and lower bite blocks together to achieve even contact. If we have space anteriorly or posteriorly, we have to adjust the lower wax rim (*not* the upper) ,either by adding or removing until even contact is achieved.

Then we remove the upper , and put the lower inside the patient mouth, and start taking the vertical and horizontal jaw relations.

The **vertical relation** consists of:\*

1- rest vertical dimension (RVD).

2- occlusal vertical dimension (OVD).

3- Interocclusal space =FWS.

The **horizontal jaw relation** is centric relation.\*

\***\*Rest vertical dimension:** is the distance between 2 selected points , one fixed on the tip of the nose(maxilla) ,and one in the least movable part in the chin(mandible) and that when the maxillofacial tissue or muscles around the oral cavity are in a tonic or an equilibrium state ( relaxed )and the lips are slightly touching.

1. Tip of the nose
2. Least movable tissues

RVD: When the patient is relaxed, sitting in an upright position and breathing from his/her nose.

\*\*\*\*BY : Facial measurement

phonitics

-Swallowing

facial expression

\*\*\*Tools that we use for measurements

Ruler or scale

willis gauge

Divider

**occlusal vertical dimension**: is the distance between 2 selected points when the teeth are occluded (in dentate patients) or when there is no space between two wax rims (in edentulous patients).

The difference between RVD and OVD is the **FREE WAY SPACE.**

*during statics*

**\*\*Closest speaking space**: is totally different from FWS (which is a static position),it is the closest relation of incisal seats and inscisal edges of the mandibular teeth to maxillary teeth *during function* ,so it is a dynamic process equal around 1mm

**\*\*\*Centric relation:**

is the most retruded relation of the mandible to the maxilla when the condyles are in their most posterior superior unstrained position in the glenoid fossa from which lateral movement can be made.

**\* Methods of retruding mandible**

Put your index on the area of the premolar or molar region and ask the patient to relax his/her jaw, the mandible will move backwards automatically.

) supine position

On the upper block put green stick or wax at the post dam area and then ask the patient to roll his tongue to that mark.

) Fatigue technique

Some difficult patients, resist the guidance of the mandible so as a last resort you ask the patient to protrude the maxilla so unconsciously he will retrude the mandible because the maxilla is fixed.

**Why should the mandible be in the retruded contact position (RCP)??**

1-because it is the only repeatable position

2- Only position that is visible on the articulator when transferred (lateral movements are possible)

3-it is the only correct clinical position to be recorded.

- Non working condyle has shown to return to the retruding position with each chewing/swallowing cycle

**Method used to measure a vertical relation:**

1. Ask the patient to relax
2. Ask the patient to close not bite (biting would distort the wax, or cause deviation)
3. Midline and canine lines should coincide
4. Tongue retrusion
5. Head position should be upright
6. Supine position if indicated
7. Fatigue technique if indicated
8. Ask the patent to relax his mandible and guide it to the CR.

Material to be used to secure both jaws(bite registration)

1-Wax (Alu wax, Modelling wax)

Silicone:

Green stick:

\*\*\*\*CR: mainly for edentulous patients

ICP: mainly in dentate patients

And the difference between them is 1 -2mm

* How does a habitual class 3 take place?

Because the patient lost his posterior upper and lower teeth first,he starts to depend on anterior teeth so class 3 develops as he tries to approximate upper and lower centrals to bite then after some time he lost his anterior teeth as well, however in his cortex in the brain the patient is still programmed to protrude the mandible so that’s how a habitual class 3 develops!

**Try in of complete denture**

To verify the vertical and horizontal relationships registered at the bite registration step.

-To check that the arrangement of the teeth is such that speech and mastication are proper.

First we determine the vertical dimension

horizontal relationship

Appearance

-Centre line (midline)

-Anterior occlusal plane

-Shape of the teeth

-Size of the teeth

-Shade and blend of the teeth

-Profile of the lip form

-Amount of tooth visible

-Regularity of the teeth

-Balanced occlusion (the last step)

Put first the maxillary wax denture, check everything that you have checked during the bite registration  
-lip support  
-incisal show  
-occlusal plane anterior and posterior   
-phonetics  
Phonetics specifically related to the upper:  
mainly ‘F’ sound   
  
Only then you can put the mandibular wax denture  
 -midline should be coincidence with the upper midline  
-check vertical dimension. Make sure that the FWS that you have achieved during bite registration is actually maintained in the try in

Last step is to check the centric relation

You should verify VDR, VDO and calculate amount of FWS.

-The freeway space should be 2-4mm

If we ended up with -2mm FWS, we have two options:  
1)Remove the upper and lower teeth, make new upper and lower wax rims and repeat the bite registration.  
2) fix it chairside (only if we have used facebow)

Facebow is a device used to transfer the relation of the maxilla to the hinge axis.

How do we check occlusion?  
-Guide your patient slowly, watch the very first contact.  
-If there’s a premature contact on one sidethen we have a problem in centric relation. If all the teeth contact at the same time right and left then our centric relation is good

Here we had a premature contact on posterior teeth, which made the CR in error.  
We removed the posterior teeth (premolars and molars) on each side.  
In order not to mix them up and make the procedure clean and tidy you bring a piece of beading wax and set your acrylic teeth accordingly; right side andleft side.

Then you make new posterior wax rims. The height of these wax rims should be up to the cusp of canine

Posteriorly: wax rims  
anteriorly: acrylic teeth that we have already checked for esthetics, phonetics and vertical dimension   
-we are happy with everything, but we had a problem in CR registration

Put it in the patient mouth

At this point you guide the patient  
Upper posterior teeth into the lower wax rims, so now you obtain new centric relation, transfer it to the articulator and remount it.

Causes for inaccurate centric relation (Differential diagnosis):

1. Wrong CR registration in the clinic.
2. We did proper softening, but when the patient bite down we didn’t have firm grip.
3. the wax wasn’t hard enough when we removed it from the patient mouth
4. mounting was not proper

*Check appearance:*

Check the lip form

Check the midline

Check the arrangement of the teeth to ensure that they give a pleasing appearance.

*Then we check the speech*

Check that the shade and mould of teeth are satisfactory

Check the orientation of the occlusal plane.

Denture base thickness around 2mm  
I should have at least 20mm, 10mm for each denture  
If the arches are touching each other. This patient doesn’t have enough inter-arch space; we should send him for alveolectomy or alveoloplasty.

The critical step to determine if the patient has enough inter-arch space is bite registration.

*Protrusive registration:*

Suppose we are dealing with semi-adjustable articulator

You put a piece of wax on the posterior area, bilateral (molars and premolars), not horseshoe-shaped (don’t put on the anterior area)

After you have put it in the patient mouth, ask the patient to protrude his mandible (bring his teeth edge to edge).  
At this point you record the indentation of the upper posterior teeth into the lower wax.

A protrusive record is achieved

The condylar guidance angle is about 30 degrees (average is 33 degrees)  
Our average value articulator is manufactured with 33 degrees condylar guidance angle

After we have set the condylar guidance angle we need to check if the balanced occlusion was maintained

*Posterior palatal seal area:*

2 anatomic landmarks

fovea palatinae

hamular notches

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ask your patient to say “AHH” or to close his nose and blow strongly “Valsalva maneuver”  
-the movable part of the soft palate is going to be elevated, and a clear line will appear between the movable and non-movable tissues of the soft palate  
We call this line:  
-vibrating line  
-“AHH” line

1. Valsalva maneuver:  
   In surgery; when you extract upper molar and suspect that we got into the sinus or created a communication between the sinus and the oral cavity, we ask the patient to close his nose and blow   
   If air bubbles are getting out through the sinus that means we have a communication between the sinus and the oral cavity  
   If there are no air bubbles getting out that means that everything is intact.

The vibrating line is found 2mm anterior to the fovea palatine, and on the cast we have prominent foveapalatinae and hamular notches

*Width of posterior palatal seal area:*  
-Width of the area to be carved is measured through a burnisher or any blunt instrument

Do a compression and measure the amount of compressible tissues

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-Width of the area to be carved is measured through a burnisher or any blunt instrument

Do a compression and measure the amount of compressible tissues

-Carving in the midline is around zero   
-Middle part is 1.5mm deep   
-hamular notch around zero

**Steps of denture insertion**

We should clean the denture and inspect it visually and palpate it all around with our fingers on the polish and fitting surfaces and on the flanges to make sure there are no sharp edges or rough areas and **relief** it before putting it in the patients mouth.

Ideally the patient is instructed to keep his previous denture out of the mouth for 12 or 24 hours because there is a high possibility that the old denture is ill-fitting and it is harming the tissues in a way or another so we have to make sure that the tissues are in a relaxed and undistorted state.

**Next step** is to use pressure indicating paste to relief any pressure area or point and that will reduce the patients complains from ulcers in the post insertion sessions.

\*Most commonly you will find the pressure areas or undercuts in the maxilla **posteriorly around the tuberosity** and in the mandible **lingually posteriorly**

Once we finished with PIP and made sure there are no pressure areas we start checking **support,** **stability** and **retention.**

-We check support by applying vertical pressure toward the tissues on one side then the other one so we make sure the denture is not sinking in the tissues. Of course it will sink if **all** the tissues are flabby.

Stability is resistance to lateral forces. We check it by applying pressure on one side and check if the denture is moving from the other side and then try to apply lateral force to the denture on the lingual and buccal surfaces and see if the denture will be dislodged.

Something important about stability is that in the lower denture it should not extend to the ascending ramus, otherwise occlusal pressure will dislodge it. So as we said before we usually cover only two-thirds of the retromolar pad area.

-Retention: we check retention in the upper denture anteriorly and posteriorly. Anteriorly, we just hold the central incisors and try to put them down. If there

is a resistance, this means we have a good peripheral seal in the anterior area. To check posteriorly the post dam area, we place our finger on the lingual of the upper centrals and try to push it outwards. If it comes out, this means the post dam area is not making good contact and proper seat between the denture and the post dam area.

After checking support, stability and retention, we should check again **esthetics** to make sure that teeth are in the same position we left them in try in. Check also **midline** and **orientation of occlusal plane.** After that, we check **phonetics** to make sure phonetics are proper and the free way space is enough.

Last thing to check is **occlusal relationship** because it might change after try in because of the polymerization shrinkage of polymethyl methacrylate that could lead to occlusal discrepancies. So every denture needs occlusal adjustment but it differs in the amount of discrepancy.

mall errors are adjusted in the clinic by using articulating paper (dry the teeth with gauze after denture insertion so that saliva won’t interfere with the actual points) and grinding high points and inclines. The heaviness of the carbon should be even on all functional areas of the teeth and contacts are equally distributed. Remember that there should be no contact on anterior teeth in centric relation. If there is interference on protrusion on the anterior teeth as the case the doctor showed us, we can grind the edge of the lower incisors or the palatal surface of upper incisors so we don’t compromise esthetics.(remember there should be contact on posteriors and anteriors on protrusion in complete dentures).

Moderate errors need clinical remount. We transfer the denture to an articulator. This has several advantages including extaoral occlusal adjustment which means easier and cleaner. You will have no saliva while dealing with the articulator because when the saliva is spread on the teeth it is difficult to get the proper marks on the acrylic teeth. So clinical remount eliminates the continual removal and replacement of the denture and it is more accurate because you can see all the aspects of teeth including the lingual surfaces. Also if you are using the articulating paper inside the patient mouth, the patient could be biting with a small shift that could change all the occlusion so clinical remount is better and it also reduces complains in post insertion appointment. It also saves time and avoids any reflexes caused by pain or instability of the dentures.

To make Clinical remount, we should record the pre-centric relation. We put pieces of wax bilaterally only on the posterior teeth and guide the patient to bite in centric relation till the first interference starts so that we will have indentation in the wax sheet not perforations .so we are able in this way to capture any premature contact.

We start adjustment in **centric relation** then **lateral** movement then **protrusive.** Starting with the *centric relation*, we put the articulating paper between the upper and lower dentures and start opening and closing several times. After that we flip the articulating paper so we change the color between red and blue and begin making lateral movement. Then we inspect the teeth. Any cusp that has two colors on it (interference in centric and lateral movements) we make grinding for it regardless it is functional cusp or not. Any cusp with one color (interference only in centric), we make deepening for the opposing fossa, not grinding.

Now after finishing the centric we move on to check *lateral movement*. From now on, it is unacceptable to touch any functional cusp. On the **working** side, we use the BULL rule which is Buccal upper, Lingual lower. So any interference on the working side, we remove from the lingual incline of the upper buccal cusp and from the buccal incline of the lower lingual cusp

Moving to *Protrusion,* we have two scenarios. Either premature contact posteriorly and openbite anteriorly, or premature contact on anterior teeth. In posterior interference we reduce the distal of the upper and the mesial of the lower. In anterior interference, we adjust the labial surface of lower anteriors or the palatal surface of the upper incisors

\*Make sure you have no anterior contact in centric relation, uniform simultaneous bilateral centric contact, and smooth extrusive movements (there is no jump when you move laterally on the articulator). Make sure there is balancing contacts that are not heavier than the working contacts, and light grazing contact of the anterior teeth in extrusion.

Any area you did grinding to it should be polished with pumice on a **wet** track wheel (use sterile water). After pumice which is coarse, we use a softer material which is tin oxide.

\*\*\*Instructions to give the patient before he leave:

start eating soft diet and small pieces of food in the first month and to masticate bilaterally to stabilize the denture

Reassure your patient that his speech will not be perfect in from the first day

get the denture out during night time

cleaning the denture daily with a soft brush on the polish and fitting surface as well as brushing their residual ridges with that soft brush

**Denture Cleansers**

might deteriorate denture mechanical properties or may cause toxicity

**Requirements** for Denture Cleansers in general:

non toxic, non irritant, easy to apply and remove

, able to remove organic portion of denture deposits as well as inorganic material mainly calcium phosphate and calcium carbonate

**Types** of denture cleansers

mechanical and chemical

2 ways of *Mechanical* cleaning

**abrasive paste**

. **Ultrasonic cleaners**

for patients with problems with their manual dexterity

costy

*Chemical* Action

1. Effervescent peroxide
2. Alkaline hypochlorite
3. Acids
4. Disinfectants like chlorhexidine
5. Enzymes
6. There is a research showing us that chemical cleaning on its own is not enough because always you will have some bacterial plaque that should be removed mechanically.
7. So instruct your patients to brush their dentures first with soft brush with water and soap then use which ever recommended chemical cleansers.

For acrylic resin dentures the best cleanser is alkaline hypochlorite

Any denture containing metal, we recommend the **alkaline** Effervescent peroxide.

Dentures with **temporary** soft liners

So because they are soft, we don’t recommend brushing. Use Effervescent peroxide for 20 minutes.

with permanent soft liners use Effervescent peroxide

Dentures with fixatives (patient might use adhesives to gain more retention

**Mechanical Scraping** should be used to remove the adhesive then soak it with the specific chemical.

**Advantages** of denture cleansers that it prevents malodor, provide better esthetics and prevent plaque and calculus accumulation and then consequently healthier mucosa

***Post Delivery Complains***

Immediate complains like

Pain and discomfort (most common)

Appearance problems

Inability to eat

Nausea

Lack of Retention and stability

Clicking of teeth

Inability to tolerate the denture

Biting cheek and tongue (could also be a delayed problem)

Difficulty in speaking

Food underneath the denture

***Pain and discomfort***: could be caused by many problems. Most commonly, **overextension** in the periphery and **poor fit** and many others

-Overextension could be caused by and overextended impression.

Clinically you will find hyperemic area or ulceration if the overextension is more advanced

We treat it by using pressure indicating paste

Poor fit could occur if there is **no enough retention** (improper impression or severely resorbed ridge or shrinkage while setting of PMMA).

adjustments to the denture then to use tissue conditioner to make the patient comfortable for a temporary period until we construct a new denture.

Poor fit could occur as a delayed problem after years when the alveolar ridge becomes resorbed

Insufficient relief leads to pain and discomfort

proper use of **PIP**.

. Usually occurs when the patient has bony tori, prominent bony areas like buccal canine area, maxillary tuberosity, and Lingual posterior area of the mandible (retromylohyoid area).

\*If the patient needs alveoplasty or other preprosthetic surgery to remove excessive severe undercuts, this decision should be taken before denture construction.

**Occlusal problems** leading to pain and ulcers

\*Wrong anterior posterior relationship.(Mismatch between centric relation and intercuspal position)

The solution is to fix the occlusion. If it is a slight error, you do chair-side adjustment to the occlusion. If it is a moderate error do clinical remount. If it is a gross error we need to remake one or both dentures.

\*Uneven Pressure. Patients will complain they bite on one side before the other and they have pain. In this case, pain is confined to the crest of the ridge on one side and may be related to the buccal aspect of the ridge on one side and lingual aspect of the ridge on the other side.

To diagnose it, we use mylar strip (0.5 micrometer) on one side and ask the patient to bite then we try to pull it. If it pulls out, there is no occlusion on this side and then switch to the other side. We could also use the pieces of thin transparent paper between the articulating paper

. If it is a slight error, you do chair-side adjustment to the occlusion. If it is a moderate error do clinical remount. If it is a gross error we need to remake one or both dentures. We can **add** tooth colored self cure acrylic to the occlusal surfaces of teeth on the side we don’t have occlusion on it and then do refining to the added acryl with composite finishing burs

If you grind teeth on the heavy side occlusion, you will compromise your vertical dimension!!

One of the causes of problems in occlusion is *excessive vertical dimension* of occlusion (VDO). There are many causes for it. First there could be an error during bite registration that went unnoticed in try in and insertion. Also, incomplete closure of denture flask during processing is another cause.

Patients with excessive VDO will complain from localized pain on the crest of the lower ridge **bilaterally.** Also patients will complain from teeth clatter or feeling the teeth are too high or in the way (when they want to swallow or speak, teeth touch and click before swallowing or speaking). There is no free way space so when the patient wants to swallow or speak, he elevates his mandible and since there is no free space, teeth will hit each other before swallowing or speaking. Patients will complain that they have muscle fatigue because of stretching the muscles beyond the natural limit of their adaptation.

To diagnose it, first we use PIP as a regular method to relief pressure areas but the patient will come again complaining from the same thing. You should stop here from removing from the fitting surface and start to think about excessive VDO.

Treatment: We check the upper denture. If occlusal plane of upper is acceptable, we remove lower teeth and set them again after taking a new VDO. If the problem is also with the upper, unfortunately we should remake both dentures

Insufficient VDO causes problems that would also translate as pain and discomfort. It is usually a delayed problem (several years) occurs after **bone resorption** or wear and attrition of the **acrylic teeth.** This decreases VDO and increases freeway space.

Patients complain from indefinite pain which they can’t locate.

This could be associated with tempromandibular joint dysfunction so we should examine TMJ to exclude problems with TMJ

dimension. At that point we make new denture at the new vertical dimension.

Treatment is to make a new denture, but if the patient comes with freeways space of 16mm,for example, the patient will not adapt a new denture with 2-3 mms freeway space. So we make occlusal pivots to increase vertical dimension gradually until the patient is comfortable with the new vertical