

- **Pre-prosthetic Surgical Considerations**
Soft Tissue Procedures

With loss of teeth, **bony resorption**, and **remodelling**, soft tissue relationships that existed with teeth and were not problematic may become concerns. With **reduction of ridge height and contour**, **soft tissue and muscular attachments change**. These **muscular and soft tissue changes are often deleterious to prosthesis stability and function, and require removal or alteration**.

Additionally, with the **potential trauma and chronic irritation caused by ill-fitting prostheses**, the **development of hyperplasic tissues in the denture bearing and peripheral tissue areas may occur**. These hyperplasic tissues contribute to **lack of denture fit and stability**, and can contribute to **patient discomfort**. Because it is very difficult to replace oral mucosa after it has been removed, the treatment plan must detail the sequence in which the soft tissue abnormalities will be addressed. Treatment will usually address the bony abnormalities first, to achieve normal bone healing with good soft tissue coverage.

Additionally, if implant placement is part of the treatment plan, bone augmentation may be required. Preserving redundant soft tissue to provide coverage for bone augmentation should be considered. The soft tissue issues may be addressed after the grafting and or implants have healed. **In general, excised, redundant hyperplasic soft tissues are the result of chronic irritation from an ill-fitting prosthesis. However, because of the chronic irritation, pathologic changes within the tissues can occur. Therefore, as a rule, a portion of all excised hyperplasic tissues should be submitted for histopathologic examination.**

- **Maxillary Soft Tissue Tuberosity Reduction**

Inter-arch distance is a critical element for proper fabrication of denture bases, and hyperplastic **maxillary tuberosity tissues often impinge on adequate inter-arch distance**. To determine if the reduction will be primarily bone or soft tissue, a panoramic radiograph that can discriminate the soft tissue shadow from bone is required. If not available, sounding of the soft tissue with the anaesthesia needle after the region is anesthetized will provide the clinician with detail of the tissue thickness. If a great deal of tissue removal is anticipated, **a surgical guide is recommended**. A midline elliptical incision is made sharply to bone with the widest part of the ellipse directly over the area where the most tissue is to be removed. The anterior and posterior portions of the ellipse should taper into the normal portions of the ridge anteriorly and to the posterior tuberosity posteriorly. The ellipsed portion is elevated and removed. The clinician can now look into the area made by the removed section of tissue and evaluate the tissue height above the bone. Once the excess tissue has been removed and there is a uniform thickness of mucosa, digital pressure will approximate the buccal and palatal flap margins to evaluate the amount of vertical reduction that has been accomplished. **Having the patient close down gently on the clinician's fingers will allow for evaluation of the change in inter-arch distance. If the vertical reduction is acceptable, the wound margins are approximated and trimmed to get a tension-free butt joint closure.** The wound is closed with an interrupted or continuous suture technique.

- **Maxillary Labial Frenectomy**

Labial frenal attachments are thin bands of fibrous tissue/muscle covered with mucosa that extend from the lip or cheek and attach into the periosteum on the sides of, or the crest of, the alveolar ridge. Except for frenal attachments, which attach at the incisive Papillae and contribute to the midline diastema, most frenal attachments—like other soft tissue structures—are of little consequence when teeth are present. **On the edentulous ridge, which has experienced resorption and remodelling, the muscular and soft tissue attachments may directly affect the seating, stabilization, and construction of the prosthesis, as well as subject the patient to reduced function and discomfort.** Although this is a simple technique, it yields great benefit. Although other techniques exist, the following is recommended for a simple frenectomy. **Infiltration anaesthesia to the lip around the frenum is usually adequate. Injecting directly into the frenum may distort the anatomy.** After achieving good anaesthesia, two small, curved haemostats are placed with the curved sides against the tissues over the superior aspect of the frenum and the inferior aspect of the frenum.

The clinician will use a surgical blade and follow the curvature of the upper hemostat, cutting through the upper aspect of the frenum, This is repeated for the lower hemostat. The frenum will now be excised, leaving a diamond-shaped wound. Exploring the wound, any frenal remnants should be excised directly to periosteum.

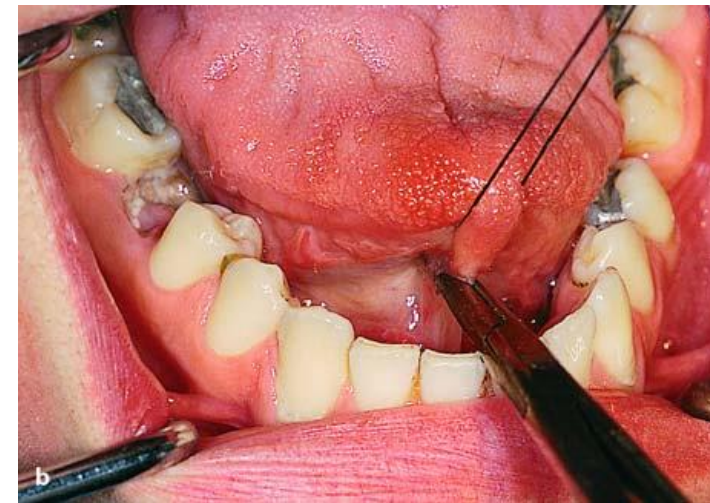
A suture is placed through the wound margin engaging the periosteum in the depth of the vestibule right below the anterior nasal spine. If the frenum extended to the crest of the ridge and was excised thorough attached tissue, all parts of the wound will close primarily except that part in the attached tissue. No attempt should be made to close that area and it should be left to granulate and heal by secondary intention



Soft tissue surgeries

❖ Frenectomy

-lingual frenum may be too short and attached till the tip of the tongue which interfere with normal tongue movement, so surgical correction is advocated in these cases.

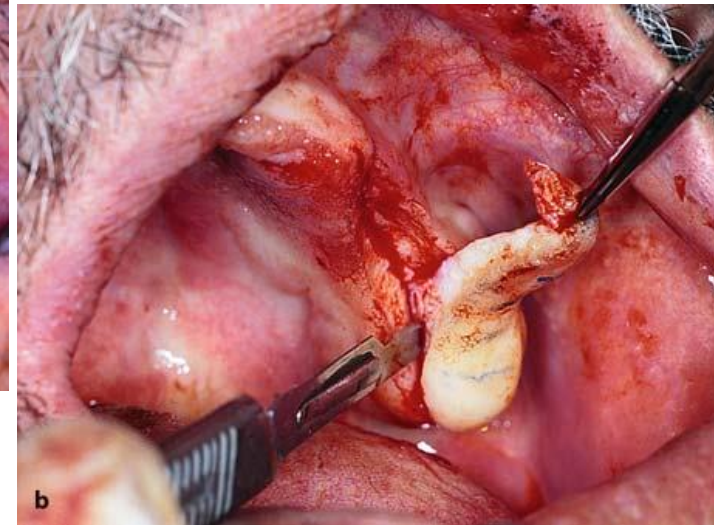
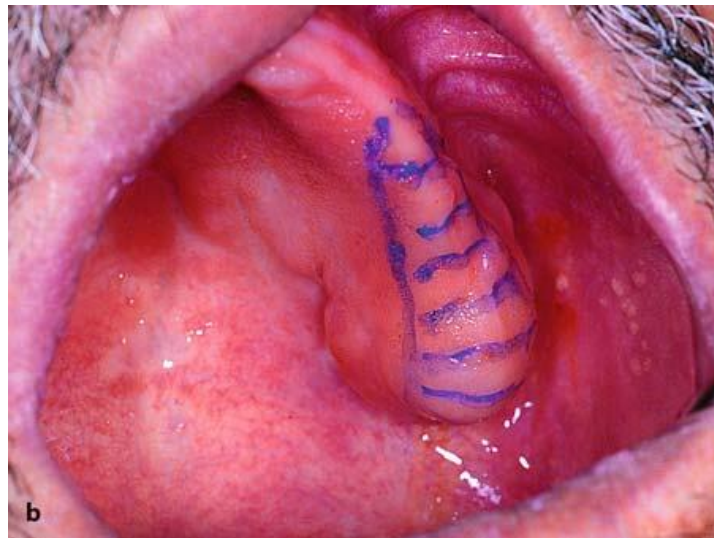
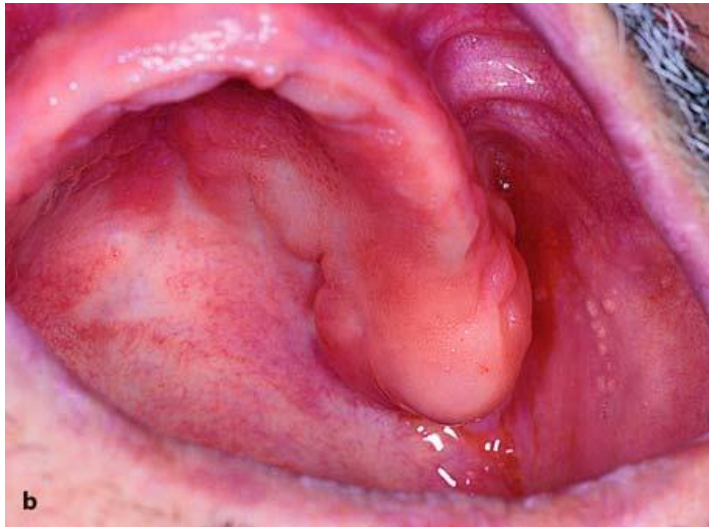


- **Excision of Redundant/Hyper mobile Tissue Overlying the Tuberosities**

Redundant hypermobile tissue is often the result of ill-fitting dentures, ridge resorption, or both. After identifying the area to be excised, parallel incisions on the buccal and lingual or palatal aspects of the tissue are made sharply to bone. The excised piece of tissue will be dissected from the bone and removed. Digital pressure is applied to check for primary closure of the wound margins. The wound is irrigated and closed primarily. Care should be taken to avoid significant undermining of the buccal/facial aspects of the flaps, and loss of vestibular depth when closing the wound

Maxillary tuberosity reduction

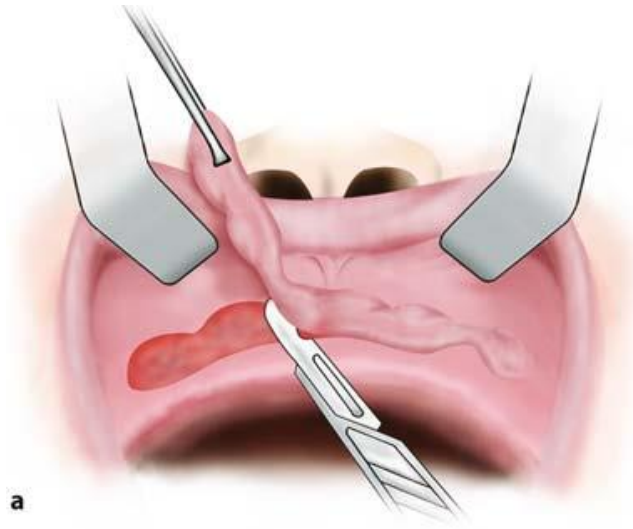
-tuberosities (soft tissue hyperplasia),



- **Excision of inflammatory Fibrous Hyperplasia (Epulis Fissuratum)**

Inflammatory fibrous hyperplasia is a generalized hyperplastic enlargement of the mucosa and fibrous tissue in the alveolar ridge and vestibular area. The etiology is most closely associated with chronic trauma to the involved areas from ill-fitting prosthesis. Inflammatory fibrous hyperplasia progresses in stages, and the surgical procedure indicated varies with the stage.

- For those lesions in the early stages, there is not a significant degree of fibrosis of the involved tissues, and nonsurgical therapies may be effective.
- In the later stages where there is significant fibrosis and hyperplastic changes, excision of the hyperplastic mass of tissue is the treatment of choice.



- Several treatment options exist based on the size of the hyperplastic mass of tissue to be removed.
- If the tissue mass is not extensive, use of lasers or electrosurgery techniques provides good results for tissue excision.
- For more extensive tissue masses, the margins of the tissue mass are elevated using tissue forceps, and an incision is made at the base of the mass, but not through the periosteum. A dissection is made under the entire mass of the hyperplastic tissue, and the mass is removed.

The normal mucosal margins are sutured in place, and the superior margins are sutured to the depth of the vestibule. In order to minimize soft tissue creeping and loss of vestibular height with **secondary intension healing**, a surgical stent with an extended anterior flange lined with soft tissue conditioner, or the existing denture with the flange extended to engage the height of the vestibule. A soft tissue conditioner should be placed, and the prosthesis should only be removed for wound care and rinsing, and cleansing of the interior surface of the prosthesis.

Secondary epithelialization will take four to six weeks

Treatment: Correction of denture irritation, placement of a softliner, electrosurgery (if small) or conventional surgery (if large)

- **Inflammatory Papillary Hyperplasia of the Palate**

Inflammatory- papillary hyperplasia of the palate is a condition affecting the **palatal mucosa**, thought to be caused by **ill-fitting prosthesis, poor hygiene, or fungal infections and the associated inflammation.**

Its clinical presentation appears as multiple nodular projections in the palatal mucosa. The lesions may be erythematous or may have normal palatal mucosal coloration



- Early treatment consists of prosthesis adjustments, tissue conditioner, and proper oral hygiene.
- In more advanced presentations, several treatment options have been suggested. Because this is primarily an inflammatory disorder, there is no need to excise the full thickness of the palatal tissue. In any of the described treatment options, the superficial inflamed layers of the palatal mucosa are removed leaving the palatal periosteum intact to heal by secondary intention.
- These techniques include removal of the inflamed mucosa with electrosurgery loops, laser ablation of the superficial layers, sharp dissection, use of coarse fluted burs, or cryotherapy. The palate is covered with a surgical stent or denture with a soft tissue conditioner to assist with patient comfort and provide coverage while secondary epithelialization takes place in the following four to six weeks.

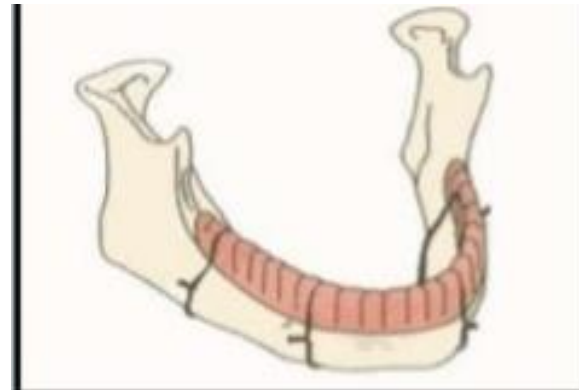
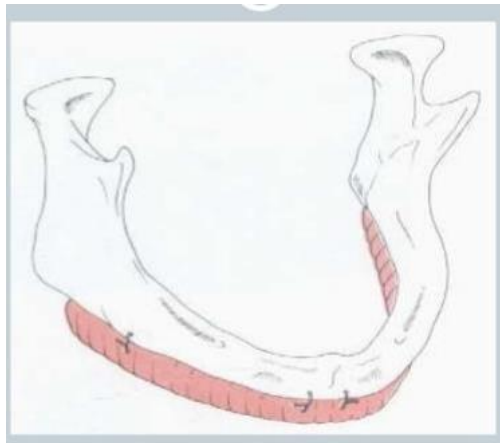
❖ Mobile soft tissue on the alveolar ridge

- The mobile and unsupported soft tissues are often associated with resorption of the bone.
- The mobile soft tissues are compressible and hence the denture becomes very unstable.
- The overlying mucosa becomes traumatized leading to ulcer formation.
- reduction of hypermobile tissue may be indicated (excision)**

If the ridge is atrophic and the bone is thin and sharp, excision may result in a greater deficiency. If the alveolar height is inadequate ridge augmentation or vestibuloplasty were done

Alveolar ridge augmentation

This procedure is done when alveolar bone has been completely disappeared to the point where in maxilla a flat surface is present between vestibule and palate and in mandible mental nerve is positioned almost at the crest.



Vestibuloplasty (deeping of vestibule) is to expose and make available space for denture construction that bone which is still present.

Procedure

The surgeon detaches the origin of muscles on either facial or lingual side of the edentulous ridge. Healing occurs by secondary epithelialization or by skin or mucosal graft.

Complications: Loss of sensation if the mental nerve is dissected, sagging of the chin if the mentalis muscle is completely dissected, and hypotonia

The **indications for lowering the floor of the mouth**: As the alveolar bone is resorbed, the attachments of the mylohyoid and genioglossus muscles may interfere with the lingual aspect of the denture reattachment of muscle done

Complete Denture Diagnosis & Treatment Planning



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First appointment most important time to development of mutual trust and understanding over all condition of the patient



The Steps for dealing with completely edentulous patient in dental clinic.

Examination: is the investigation carried out for the purpose of diagnosis.

Diagnosis : is the scientific evaluation of the existing condition (Determination of the nature of a disease).

Diagnosis is the examination and evaluation of the physical and psychological state and understanding the needs of each patient to ensure a predictable result. Diagnosis involves patient evaluation, history and examination.



Treatment plan:

The sequence of procedures planned for the treatment of a patient following diagnosis.

Prognosis:

denture prognosis is a judgment or opinion for success the fabrication and usefulness of the dentures.



The factors that should be evaluated to arrive at a proper diagnosis and treatment planning:

1. Patients mental attitude.
2. Patient systemic status.
3. Past dental history.
4. Local oral condition

Mental Attitude (Psychological factor):

The success of dental prosthesis is related to many factors, includes functional, biological, technical, esthetic, and psychological. Prosthodontist must fully understand their patient because such understanding predisposes the patient to accept the kind of the treatment they need.

House classified patients into four categories:

- 1-Philosophical patient.
- 2- Exacting patient.
- 3- Indifferent patient.
- 4- Hysterical patient.

Psychological Evaluation (House Classification of Denture Patients)

1- Philosophical patient :

They desire treatment for maintenance of health and appearance and accept the complete denture treatment as a normal procedure, well **motivated, cooperative, calm**, has the best mental attitude for accepting the denture and accept treatment with denture without question. (good prognosis)

2- Exacting (critical):

Those patients may have all of the good attributes of the philosophical patients; however, they may require extreme care efforts and patience on the part of the dentist, they like each step in the procedure explained in details, they require **extra hours spent prior to treatment** in patient education until an understanding is reached is the best treatment plan

3- Indifferent patient:

They have little concern of their teeth or oral health and do not appreciate the efforts and skill of the dentist. They will give up easily if problems are encountered with the denture. These patients show least concern and often go without dentures for years. They have no desire to wear dentures and do not care much about the need for dentures and function. In most of them, questionable or unfavorable prognosis may be expected. An educational program in dental conditions and treatments is recommended before denture construction.

4-Hysterical patients:

This type is emotionally unstable, excitable, apprehensive and hypertensive. They are neglectful of their oral health and unwilling to try to adapt to wearing dentures. Although these patient may try to wear a denture, they fail to use it because they expect it to look and function like the natural teeth. The **prognosis** is often **unfavorable** and additional professional **help (psychiatric)** is required prior and during the treatment.

Social information

record of all the information obtained from the patient must be made and kept for further study and later use

Personal data

- **Patient name** (When the patient asked by his name it brings him some confidence)
- **Age** (young patient will be more adaptable to new situation such as new denture than an older person)

1. Adaptation to the new denture.
2. Coordination.
3. Bone resorption.
4. Tissue sensitivity.
5. Healing.
6. Balanced nutrition.



- **Gender** (women are more difficult to please with the appearance of their denture than men)
- **Address/ phone number**
- **Occupation and social position:**

A higher the social position----- esthetics.

A lecturer who speaks too much -----speech pattern.

A musician who plays a wind instrument-----tooth position.

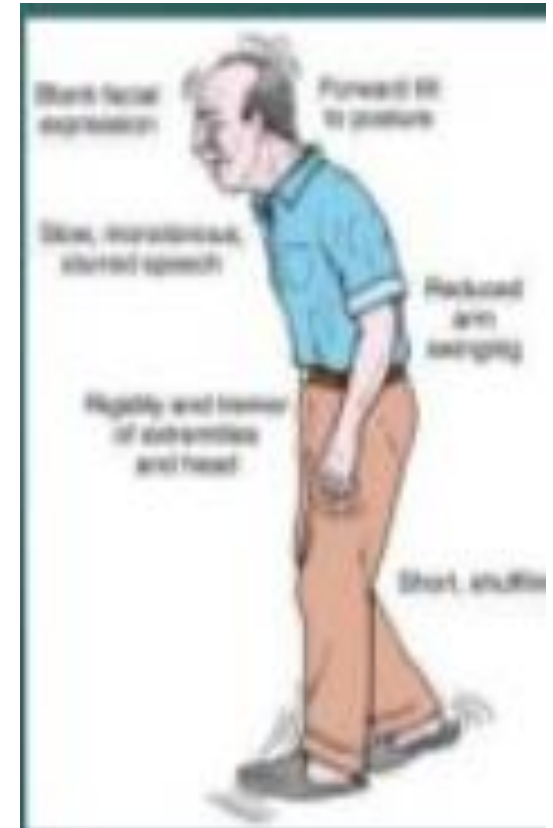
Systemic Status

Medical History

1. Debilitating diseases: Diabetes, blood dyscrasias, tuberculosis.

These patient require extra instruction on oral hygiene, eating habits and tissue rest. Consultation of physician is advisable.

Supporting bone may be affected so frequent recall is needed to keep the denture base adapted and the occlusion corrected.



Systemic Status

Diabetes: candidiasis and show delayed wound healing, bone lost. Salivary flow may also be impaired.

- There may be **wasting of tissues**.

Patients need functional rest to the tissues; therefore, they can be advised less time of wear.

- In severe diabetes, **acetone is secreted** in the mouth, which leads **to poor fit of the denture**. Hence, the patients are advised to reduce the time of wear of denture.
- **Diet** rich in vitamin B and vitamin C would have to be recommended. Calcium will have to be supplemented in the diet regime.
- **A physician** should also be consulted for appropriate control of blood sugar level.
- The condition indicates careful consideration of **impression procedure, teeth selection and type of occlusion**.

2. Cardiovascular Disease

- Patient should be given early **morning appointments**
 - The **duration** of each appointment should be **short**
 - Patients with such disease may require **consultation** with cardiologist as some denture procedures may be contraindicated.
- Such patient must be **controlled** before dental treatment

Anemia:

soft tissue fragile, bone lost, delay wounded healing

3. Arthritis (TMJ) poor mouth opening, jaw relations are difficult to record, special impression tray

4. Neuromuscular disorder Bell palsy and Parkinson disease will present problems related to denture retention, maxillomandibular records and support for the musculature

5. Skin diseases:

oral lesions are painful that prevent proper work. Pemphigus have oral manifestation which vary from ulcer to bullae. Such painful condition make the denture use impossible without medical treatment. The constant use of dentures is contraindicated.

6. Oral malignancies: radiation therapy.

A waiting period should elapse before denture construction.

Tissue having bronze color and loss of tonicity are not suitable for denture support.

the tissue should be examined frequently for radionecrosis.

Xerostomia can also occur due to radiotherapy, sialagogues and denture adhesives may have to be considered. advised to use the dentures on a limited basis.

7. Menopause condition:

osteoporosis, burning sensation and psychiatric changes in the patient.

These can influence treatment planning and the efficiency of the complete denture.

Dental History

❖ Past dental history:

Success or failure in the provision of prosthodontic care is frequently the direct result of the adequacy of the taking of the patient's dental history.

History of tooth loss: cause, Time, Edentulous period

Reasons for loss of teeth:

Periodontal disease

Caries of teeth

Other causes as accident or disease as tumor



❖ Previous denture experience

Reasons why patient needs new denture

❖ Examination of an Old Denture Wearer

- Esthetics, lip fullness, symmetry, amount of display during smiling, phonetics, teeth position, size, excessive wear
- Fracture, cracks, porosity, denture hygiene
- Occlusal vertical dimension (due to excessive occlusal wear, OVD may have reduced)



Local factors:

The local factors usually evaluated during clinical examinations. .

Examination must divided into:

Extra oral examination:

The patient head and neck region should be examined for any pathological condition. It include facial examination, muscle tone, lips, TMJ

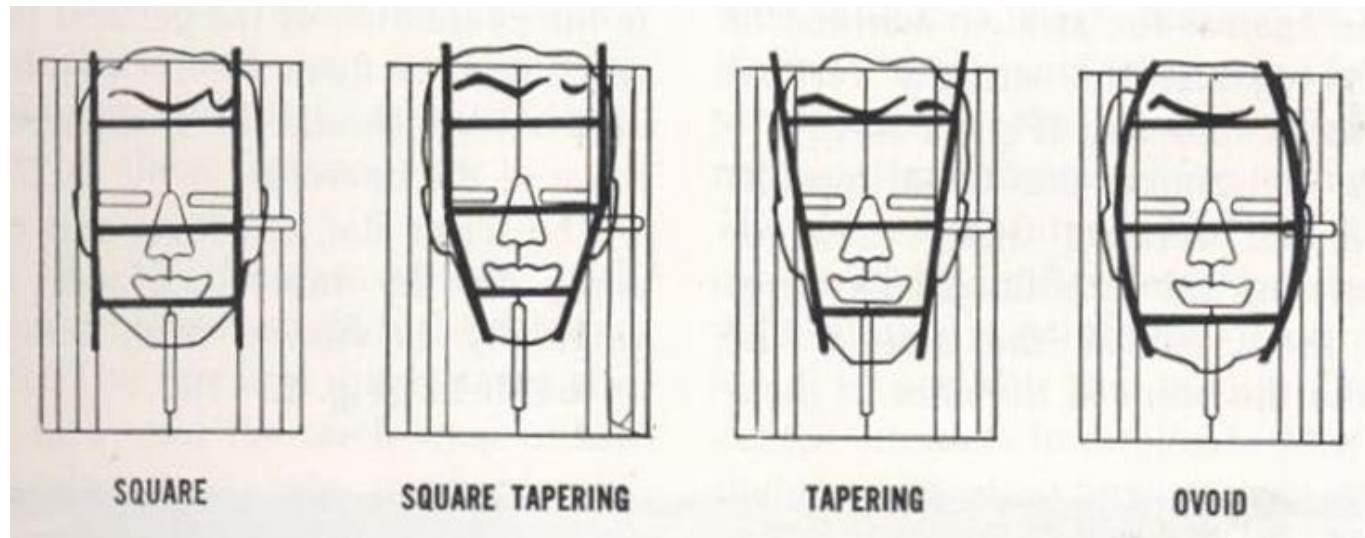
Extra-oral Examination

Face Form:

Square

Tapering

Ovoid

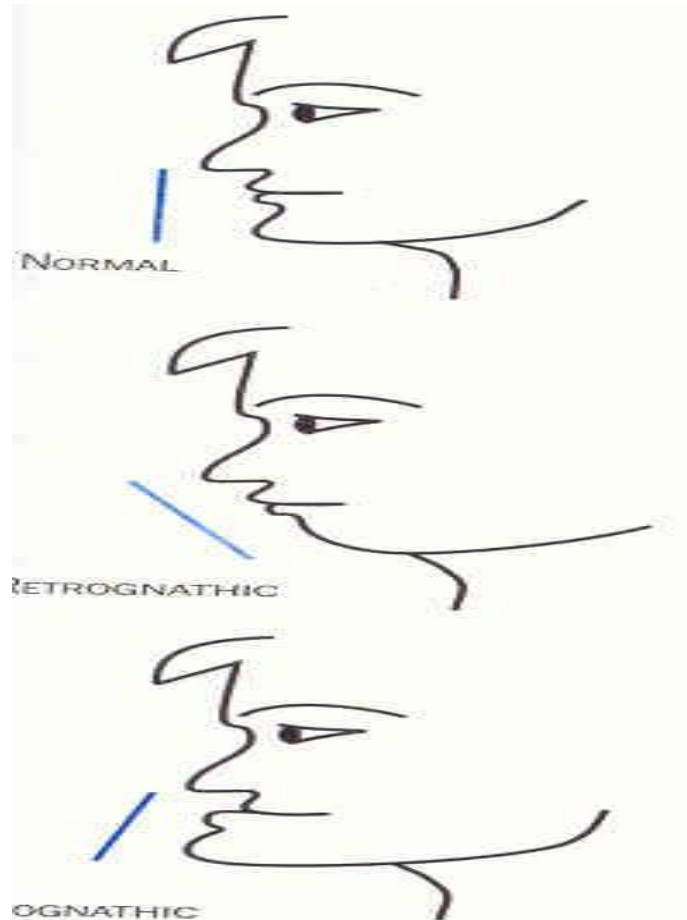


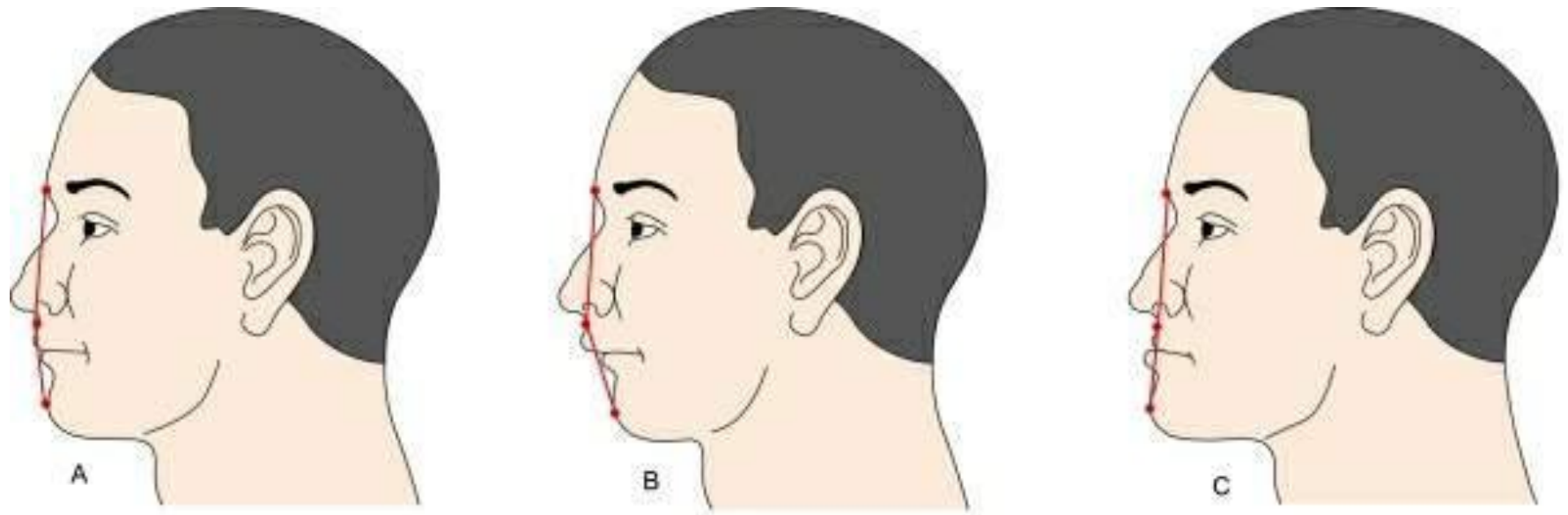
Face Profile

Normal •

Retrognathic •

prognathic •





Facial profile. **(A)** Straight, **(B)** retrognathic and **(C)** prognathic. Forehead, base of nose and chin points are considered for the classification.

Symmetry: Symmetrical/asymmetrical.

Facial height: Decreased/normal/increased

Facial muscle tone: Normal/flabby/spastic

(Muscle tone that is **too tense** makes cheek and lips **manipulation difficult** but if it is **too loose**, the lips and cheek may be **displaced easily** by impression material).

Lips

Length : short / average/ long

Thickness: thin/ average/ thick

Smile line: Lip smile line



High smile line



Normal smile line



- ❖ TMJ examination
- ❖ Palpation of the head & neck (lymph nodes & muscles)



Intraoral Examination

Cheeks, tongue, floor of the mouth, maxillary tuberosity, hard palate, soft palate, arch relationship, residual ridge form, saliva, undercuts

Intraoral examination

A. Color of the mucosa: Healthy mucosa have a pink color, any amount of redness indicates an inflammatory changes. Inflamed tissues provide a wrong recording while making an impression.

B. Condition of the mucosa:

Class 1: Healthy mucosa.

Class 2: Irritated mucosa.

Class 3: Pathologic mucosa.

C. Thickness of the mucosa:

Class I: firm mucoperiosteum with a uniform thickness of approximately 1mm

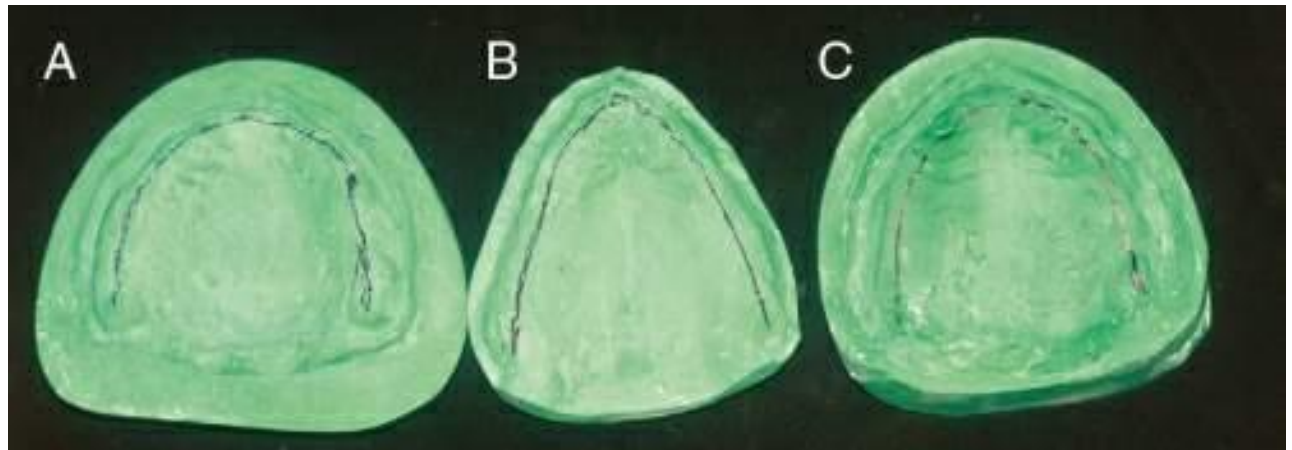
Class II: thin mucoperiosteum covering supporting bone that is highly susceptible to irritation from denture pressure.

Class III: a thick flabby tissues leading to denture displacement from its supporting area and soreness. Stability and retention are difficult to secure.

Residual alveolar ridge:

A. Arch form

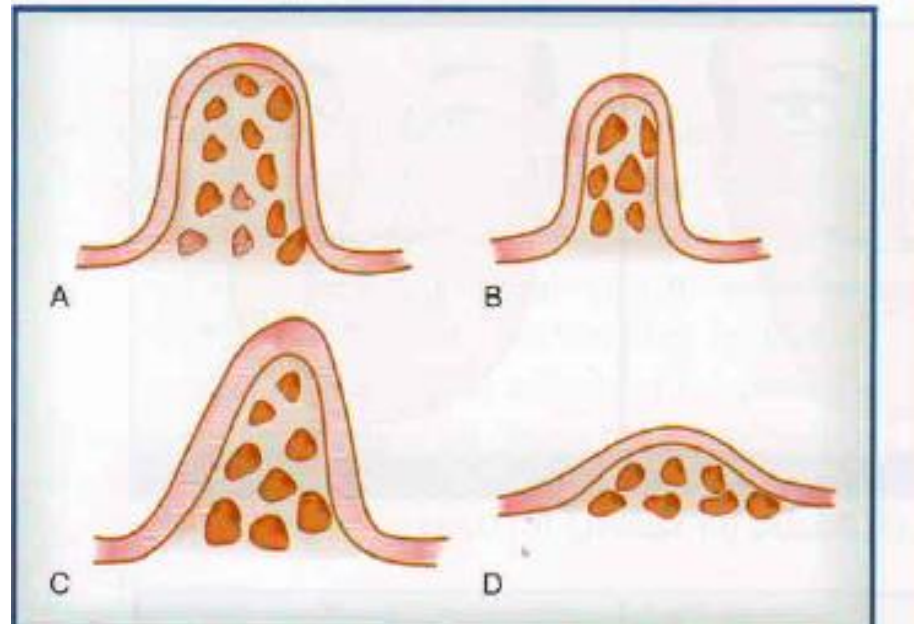
1. U-shape or square form which is the best form to prevent denture rotation.
2. Triangular (tapering) form which offers a less denture resistance to rotation.
3. Round (ovoid) form which gives little or no resistance to denture rotational movements.



B. Arch shape

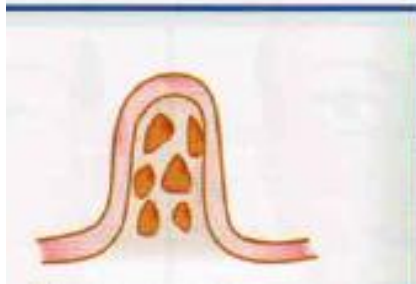
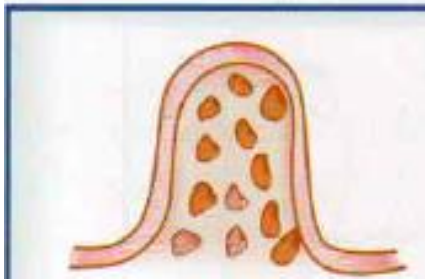
In the cross section of the ridge there is:

1. Class I: **U-shape** ridge, the **broad flat ridge crest** offers **excellent** denture base resistance to vertical displacing forces.
2. Class II: **V-shape** ridge but its crest is still **flat enough** to offer some vertical support
3. Class III: **knife edge** ridge with a narrow sharp crest that can offer little or **no vertical denture support**



C. Height of residual alveolar ridge

1. **Class I:** Adequate R.R height for denture support which can resist lateral movement of the denture base
2. **Class II:** there is some R.R resorption but there is still enough remaining bone to resist lateral movement of the denture base.
3. **Class III:** resorbed R.R and there will be little or no denture resistance to lateral forces.

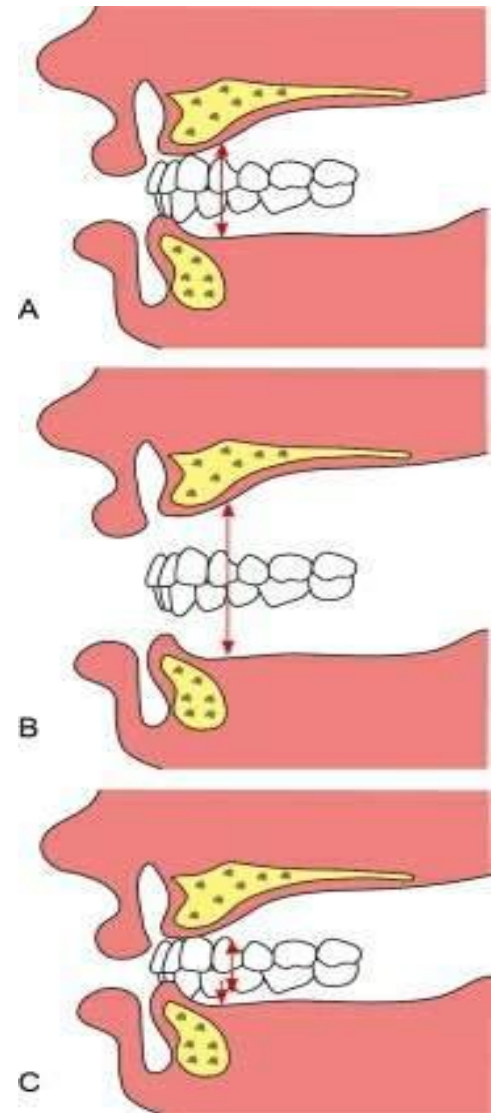


Interarch distance:

Class I: there is **enough distance** to accommodate the dentures.

Class II: there is **excessive distance**. The denture are usually less stable because the distance between the teeth and the supporting bone is great.

Class III: **limited distance**. Placement of the artificial teeth can be a difficult procedure

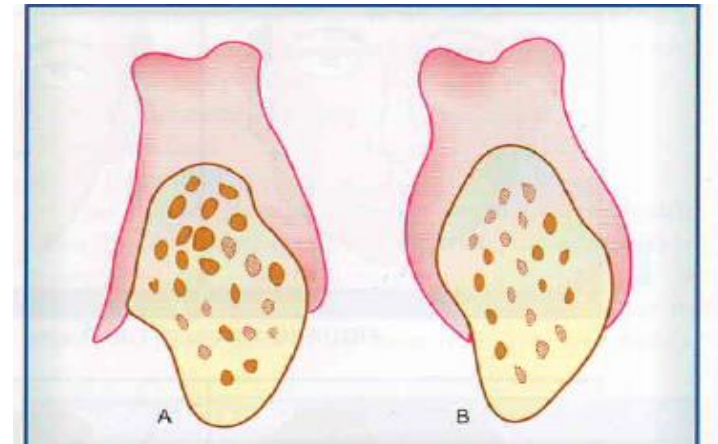


Bony undercuts

1. Class I: Bony undercut are **absent**.
2. Class II: There are **small undercuts** over which the denture can be placed by changing the path of insertion or by relieving the complete denture after pressure indicating paste has been applied to reveal pressure area.
3. Class III: **Prominent bilateral undercuts** that must be corrected by surgery. Sometimes surgery can be limited to one side only

unfavorable undercuts A

favorable undercuts B



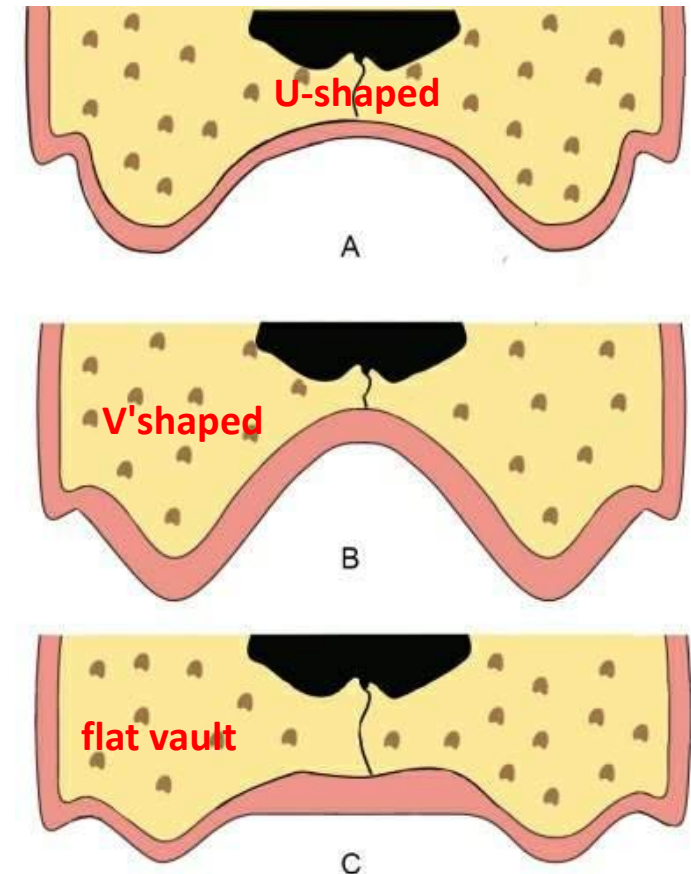
Vault of the palate

'V' shaped or 'U' shaped. It could be either high vault or flat vault.

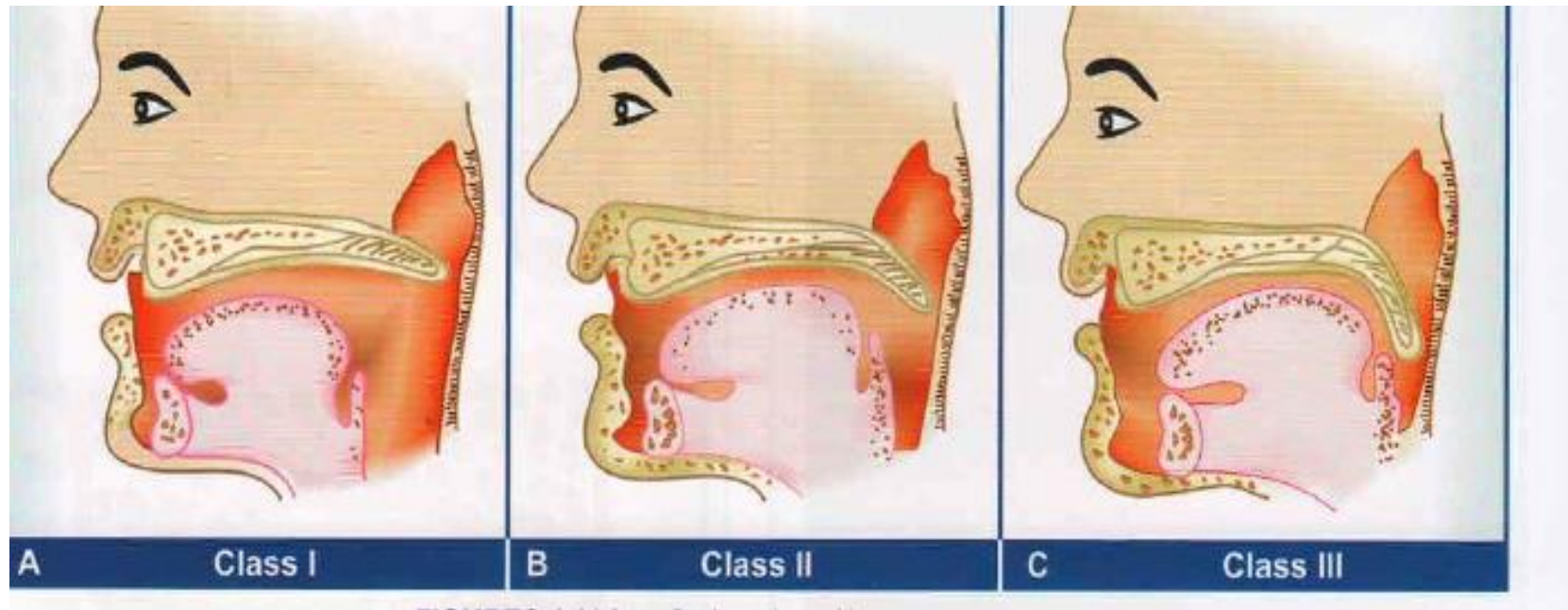
U-shape h.p which gives **adequate** denture support, stability and retention.

V-shape h.p which offers **little** vertical denture support. Retention is less as peripheral seal is easily broken

Broad flat h.p which offers the **best** maxillary denture vertical **support and retention** but can be easily dislodged by a laterally, anteriorly directed forces or rotating forces



Junction of hard and soft palate



Slope of soft palate (s.p):

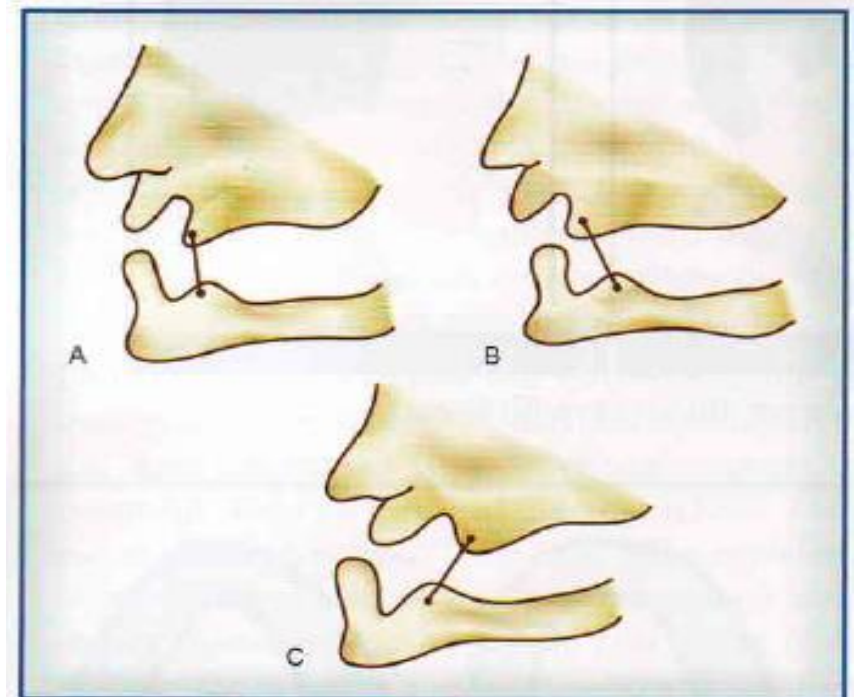
- ***Class I:** S.P slopes gradually down from the h.p which allows several millimeters of immovable part of the s.p to form a good posterior seal at its junction with the movable part of s.p.
- ***Class II:** S.P slopes more sharply than Class I thus limiting the seal area and posterior denture length.
- ***Class III:** S.P slopes sharply down from the h.p which restrict the seal area.

Residual ridge relation

Normognathic : Class I (A)

Retrognathic : Class II (B)

Prognathic: Class III (C)



Post mylohyoid space (Lateral throat form)

Class 1: deep lateral throat form about 0.5 inch of space exist between the mylohyoid ridge and floor of the mouth. This is favorable for lower denture.

Class 2: Moderate lateral throat form.

Class 3: Shallow lateral throat form in which retention of lower denture is weak.

Saliva

Class I: saliva is normal in amount & consistency.

Class II: excessive amount of thin watery or thick ropy saliva

Class III: insufficient saliva (xerostomia).

Tongue

A. Size of tongue:

Class 1: the tongue adequate in size to fill but not overfill the floor of the mouth.

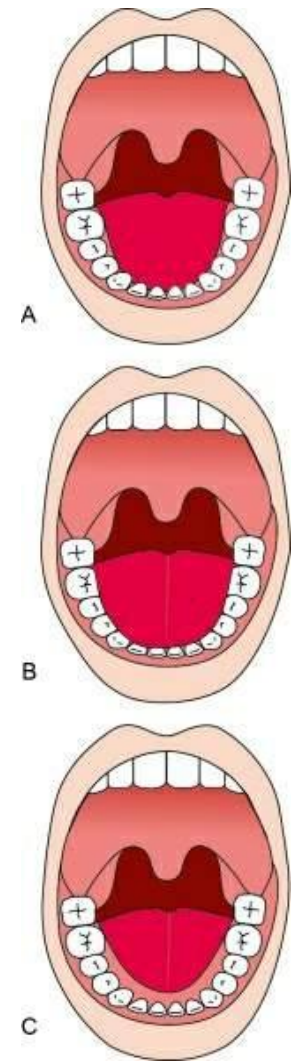
Class 2: the tongue slightly overfill the floor of mouth.

Class 3: the tongue completely overfill the floor and cover the ridge, **impression making is difficult and denture stability decreased.**

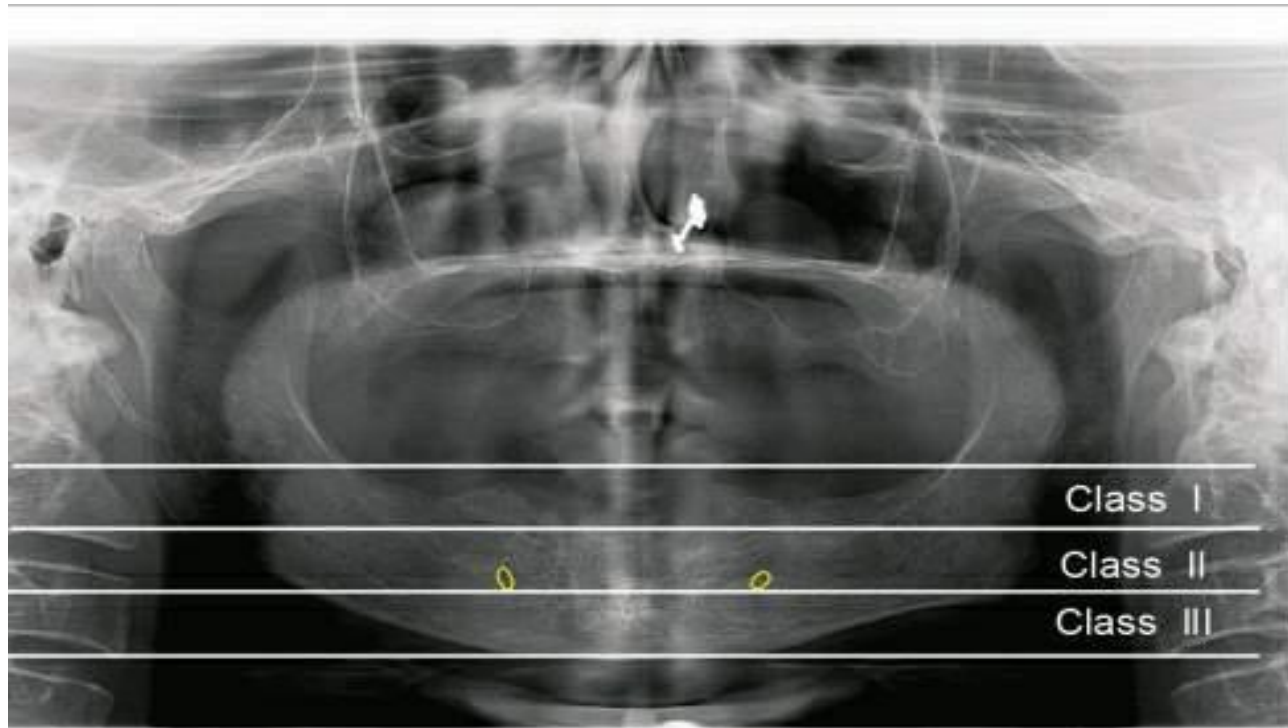
B. Tongue position:

Favorable tongue position is when the tip rest at the lingual surfaces of lower ant. teeth and the lateral border of tongue contact the lingual surfaces of post. teeth and denture base.

Unfavorable tongue position when it is retruded and the tip does not touch the lower denture or ridge. The seal will be broken causing difficulty in wearing denture



- **Radiographic examination** Panoramic, cephalometric, occlusal, and periapical radiography are important because they image: retained root, un erupted teeth, cysts, tumors, foreign bodies, TMJ disorder, osteoporosis and bony pathological changes.



- **Diagnostic cast-Advantages:**

1. Allow for an evaluation of anatomy and relationship in the absence of patient.
2. Evaluation of inter arch distance.
3. Confirmation of intra oral observation.
4. Arch size, anteroposterior relation, and lateral and cross bite relation especially posteriorly will be observed by the dentist.
5. Undercuts determination with surveyor.
6. Soft tissue disease may be more obvious in absence of saliva and color.
7. Displacement from the pressure of old denture more obvious in dry cast.
8. Planning of pre-prosthetic surgery.
9. Education of patient.

Intra oral videography:

Digital videography could display well magnified image on a monitor, this will provide the dentist with rich visual information when developing a treatment plan.

Prognosis is influenced by the following factors:

1. Bearing surface anatomy, tongue position and floor of mouth posture
2. Neuromuscular control.
3. Denture history.
4. Psychological classification.

Finally; Patient education:

An initial and continuing activity integral to, and supportive of a treatment plan.

Purposes of education:

1. Inform the patient of their **dental health and its significance**.
2. Give the patient understanding of **significance of edentulism**.
3. **Match** the patient expectation with reality of treatment potential.
4. **Explain** nature, use, and shortcomings of prostheses.
5. Identify **alternative treatment** and their consequences.

THANKS FOR NICE
ATTENTIONS



Insertion, Adjustment and Servicing For Removable Partial Denture



At the initial placement stage of the definitive Co/Cr fabricated removable partial denture (RPD), a procedure of certain preclinical and clinical steps should be followed to produce a biologically acceptable prosthesis.

This procedure includes several steps that are performed in a specific sequence:

First: Final inspection of the prosthesis before insertion

Second: Verifying the framework fit.

Third: Assessment of acrylic resin denture base adaptation.

Fourth: Assessment of peripheral extension of the denture base.

Fifth: Evaluating occlusion.

Sixth: Adjusting retentive clasp assembly, if needed.

Seventh: Providing instructions for the patient how to use and care the prosthesis.

First: Final inspection of the prosthesis

Prior to the insertion appointment, the dentist should check and adjust the following:

1. **Nodules or spicules of acrylic resin on the tissue surface of the prosthesis:** The simplest way to locate these nodules is to run a finger over the intaglio surface (tissue side) of the prosthesis. **Once identified and marked, the nodules can then be removed with a small, acrylic bur mounted in a slow - speed hand piece.** When the nodules have been removed, do not polish the intaglio (tissue) surface; leave the surface finish as processed against the master cast.
2. **Surface and internal porosity** in the acrylic resin reduces both the quality and ultimate strength of the completed RPD. A porous surface will be difficult to keep free of denture plaque. **A rebase of the RPD is recommended.**
3. **Examine denture teeth for any fractures** that may have occurred during the processing or finishing procedures. **Replace fractured teeth before the RPD is inserted.**
4. **Evaluate the denture tooth - acrylic resin junction.** If the junction of the denture tooth and acrylic resin denture base is improperly contoured and finished after processing, any crevices left in this area will become a potential site of food entrapment or staining.

First: Final inspection of the prosthesis

5. **Examine the acrylic resin/metal framework junction.** The junction should be a butt joint with no overlap of the acrylic resin onto the metal framework. **All acrylic resin flash should be removed so there is a smooth,** continuous exactly duplicate the borders recorded in the transition between the two materials.
6. **Finally, inspect the finish and polish of the RPD.** A poorly finished and -polished prosthesis may unfavorably affect the patient's attitude towards the dentist and diminish patient - dentist rapport. The polished surface contours should have a smooth, high luster appearance without surface defects (a brand-new appearance).

Store the RPD until the insertion appointment in a plastic bag partly filled with sterile water or diluted denture-soaking solution. This will **keep the prosthesis moist to prevent dehydration and possible distortion** of the acrylic resin base until the prosthesis is inserted.

Second: Verifying the framework fit

It is highly recommended to check the fit of the cast metal framework intraorally before try-in and insertion appointments. Nevertheless, the completed RPD should be carefully inserted into position on the abutment teeth. **If there is considerable resistance to seating, stop and check for the following problems:**

1. **Clasp** assemblies or other components of the framework may have been **bent or distorted**.
2. **Acrylic resin** may have been **cured** into **undercuts adjacent** to the abutment teeth, preventing the uniform seating of the prosthesis.
3. A layer of **acrylic resin flash** may be **covering part of the metal casting**.

Remove the acrylic resin before attempting to seat the RPD. A sharp dental explorer or dental floss can be used to check for the complete seating of the occlusal rests. There should be an intimate fit between the teeth and retentive clasp assembly.

If the occlusal rests on the prosthesis **do not seat** completely in their respective rest seat preparations, a **minor discrepancy in the cast metal framework can be identified and corrected**.

Third: Evaluation of denture base adaptation

When the cast metal framework has been fully seated, check the fit of the acrylic resin portions of the prosthesis. An accurately **fitting acrylic** resin denture base is a primary consideration in the **comfort and acceptance** of an RFD.

Excessive pressure may lead to **discomfort, pain, and soft - tissue damage**. A common contributor to **excessive pressure** is the **dimensional changes** that occur in the acrylic resin denture base during **processing**. Apply thin layer of pressure indicator paste (PIP) evenly on the intaglio (tissue) surface of the prosthesis with a stiff, short, coarse - haired brush. A coarse brush will leave thin brush marks (**distinct stroke pattern**) in the paste on the acrylic resin surface that displace under pressure. Currently, there are a variety of pastes that may be used in denture base evaluation. These materials, consist principally of zinc oxide powder combined with a medium consistency vegetable fat. Other ingredients are added to improve the flavor and consistency of the paste. The material should be rinsed in water so it will not stick to the soft tissue, and then digital pressure should be applied to the denture in a tissue-ward direction.

The patient cannot be expected to apply a heavy enough force to the new denture bases to register all of the pressure areas present. The dentist should apply both vertical and horizontal forces with the fingers in excess of what might be expected of the patient. The removable partial denture is then removed and carefully inspected. Where **no contact between the denture base and the soft tissues has occurred**, the brush strokes will remain in place; where **moderate contact has occurred**, the brush stroke pattern will be indistinct or obliterated where **heavy contact has occurred**, the pink denture base material will clearly show through the **white paste**. Areas of heavy contact should be relieved using appropriate rotary instruments and the procedure repeated with a new film of indicator until excessive pressure areas have been eliminated..



Pressure areas most commonly encountered are as follows:

In the mandibular arch:

- (1) the lingual slope of the mandibular ridge in the premolar area.
- (2) the mylohyoid ridge.
- (3) the border extension into the retromylohyoid space.
- (4) the distobuccal border near the ascending ramus and the external oblique ridge.

While in the maxillary arch:

- (1) the inside of the buccal flange of the denture over the tuberosities.
- (2) the border of the denture lying at the molar prominence.
- (3) the point at the pterygomaxillary notch where the denture may impinge on the pterygomandibular raphe or the hamulus.

In addition, bony spicules or irregularities in the denture base that will require specific relief may be found in either arch. The amount of relief necessary will depend on the accuracy of the impression, the master cast, and the denture base. It is therefore essential that discrepancies in the denture base are detected and corrected before the tissues of the mouth are subjected to the stress of supporting a prosthetic restoration.

Fourth: Assessment of denture base peripheral extensions

The peripheral borders of the denture base have a direct effect on retention, stability, and patient comfort.

Overextension of the prosthesis denture borders may cause the following:

1. The muscles and frenum will tend to dislodge the RPD during function. The resultant dislodging force may be transferred to the abutment teeth by the retentive clasp assemblies. These forces may be especially destructive when the denture base borders of a bilateral distal - extension RPD are overextended. The longer the distal-extension base, the longer the lever arm, and the greater the potential for transmitting destructive forces to the supporting structures of the abutment teeth.
2. Denture base overextension may cause ulceration, pain, and swelling of the vestibular tissues. If this is not corrected, over an extended period of time, redundant tissue (denture hyperplasia) may form in the vestibule as a response to chronic irritation.
3. Impingement on the muscles of mastication may interfere with muscle function during mastication and speech.
4. Denture border extensions of modification spaces may interfere with the complete seating of the RPD.

Evaluating the denture base extension

Extension of acrylic resin denture flanges plays an important role in the support and stability of a removable partial denture. Maximum flange extension, within physiologically tolerable limits, provides optimal support and stability for the prosthesis. Extension of denture flanges into the facial vestibules and lingual sulci enhances resistance to horizontal displacement. Therefore, acrylic resin denture base flanges should not be arbitrarily reduced. Rather, they should be critically evaluated and adjusted only when physiologic limits have been exceeded.

Visual and digital evaluation of the resin flanges should be performed during the insertion appointment for purposes of examination. The extension of the peripheral borders is determined by performing border-moulding movements and checking for lifting of denture. the buccal tissues should be held between the thumb and index finger and moved apically, laterally, and then occlusally. Overextensions are easily detectable due to the displacement of the prosthesis during function by the movement of soft tissue adjacent to each denture flange.

Disclosing wax can be placed on denture base flanges to help identify areas of overextension. Over extension of the borders also may result in the application of dislodging forces by the movable soft tissues. In addition to restriction of soft tissue movement can lead to irritation. Therefore, while maximum tissue coverage is essential to support and stability, it is equally important to avoid overextension of denture borders.

Mandibular lingual and distolingual flange lengths may be evaluated using **physiologic movements of the tongue and floor of the mouth**. Clinical evaluation is accomplished by placing an index finger on the occlusal surfaces of the denture teeth on one side of the patient's mouth. The patient is then instructed to extend the tongue straight forward and then into the cheek on the opposite side of the mouth. If lingual or distolingual flanges are overextended, the denture base will lift away from the supporting tissues. This displacement is readily identified by pressure against the operator's index finger, allowing necessary flange adjustments to be made.

Where it is difficult to observe border extensions, disclosing wax can be placed on denture base flanges to help identify areas of overextension. Unfortunately, the flow characteristics of disclosing wax are not well suited to this application. Mixing petroleum jelly with the disclosing wax improves the flow characteristics of the disclosing material. This mixture is more reliable when used routinely to disclose regions of flange overextension. Any areas of overextension will be visible where the wax has been flattened or displaced by muscle action. The use of **disclosing wax is especially effective on the distobuccal border of a mandibular RPD, which is controlled by the masseter muscle.**

The most common areas of overextension of a maxillary RPD are the tissue side of the distobuccal flange and continuing through the pterygomaxillary notch area.

In general, posterior denture base flanges should be **at least 2mm thick** and should display **rounded borders**. Flanges should be slightly **thinner at the distolingual aspects** of **mandibular** extension base removable partial dentures and **distofacial aspects** of maxillary extension base removable partial dentures.

Decreased flange thickness in these areas provides additional tongue space in the mandibular arch and freedom of movement for the coronoid processes in the maxillary arch. The **leading edges of maxillary and mandibular posterior** denture base flanges also should be **thinned**. This helps to disguise the presence of the flange when the patient is viewed from the front during normal conversation and while smiling. **Thick leading edges of posterior denture base flanges are often esthetically unattractive.**

Contouring the anterior denture base flange

When designing a denture base for the anterior portion of the mouth, consideration must be given to the **esthetic requirements** of the patient. Slight **overextension or over-contouring** of the labial flange may cause a successful prosthesis to be **esthetically failed**.

The first step in anterior denture base adjustment is the application of **pressure indicator paste to the intaglio surface of the resin**. The removable partial denture is then positioned in the mouth and seated with gentle pressure. As resistance to the seating of the labial denture base flange is encountered, the partial denture is removed. Careful evaluation of the pressure indicator paste often will reveal excessive tissue contact along the border of the denture base.

Correction of this interference involves vertical reduction of the flange length to the point of contact with the edentulous ridge. Following adjustment, the pressure indicator paste and grinding residue are wiped from all denture surfaces and fresh paste is applied. This procedure is repeated until the removable partial denture can be completely seated without encountering resistance, producing blanching of the soft tissues, or causing patient discomfort.

Fifth: Occlusal adjustment

Correction of occlusal contacts must **not be initiated until** the denture can be completely and comfortably seated in the patient's mouth. **Faulty occlusion** can produce severe tissue reaction like excessive ridge resorption, damage to the temporomandibular joint. Teeth **arrangement** of the prosthesis should be accomplished to **provide bilateral simultaneous contact at the maximal intercuspal position (MIP)**.

At the try-in visit, the maxillomandibular relationships and the esthetic, phonetic and arrangement of the denture teeth are verified. Therefore, the occlusal adjustment of the RPD following processing of the denture bases should involve **only minor processing changes**.

Processing changes can be corrected with a **laboratory remount** of the prosthesis before removal of the master cast.

Minor interceptive occlusal contacts can be corrected by **selective grinding** adjustments, which are made after the contacts are marked with **articulating paper (intraoral approach)**.

If **gross premature occlusal contacts** are noted, a **new interocclusal** (centric relation) record should be made. **Remount the RPD on a dental articulator** and make the necessary occlusal corrections by **selective grinding at an acceptable vertical dimension** of occlusion. This is accomplished **outside** of the mouth and away from the patient (**extraoral approach**) by clinical remount which is the most efficient method of adjusting occlusion because it allows direct observation during adjustment.

The master cast is usually destroyed when the RPD is finished and polished. So to obtain an accurate remount cast to correct occlusal disharmonies, make an intraoral irreversible hydrocolloid (alginate) impression of the prosthesis correctly positioned 'on the supporting tissues; that is, a pickup impression.

To remount removable partial dentures in an articulator, it is necessary to secure casts of both the dental arch restored by the removable partial denture and the opposing arch. An irreversible hydrocolloid impression is made with the removable partial denture completely seated in the patient's mouth. In most instances, the prosthesis will remain in the impression when the impression is removed from the mouth. If the prosthesis remains in the mouth, it must be retrieved and carefully repositioned in the impression. Undercuts within the removable partial denture are then blocked out using baseplate wax, clay, wet paper towels, or wet facial tissues.

Dental stone is mixed and vibrated into the impression. When the dental stone has hardened, the cast is recovered and trimmed in preparation for mounting procedures. A cast of the opposing dentition must also be fabricated, at this stage of the procedure; the maxillary cast is mounted on the articulator using a face bow record. The mandibular cast is mounted using jaw relation record.

After the occlusion of the RPD has been refined on the articulator, appropriate occlusal anatomy is restored using fine burs and a low speed hand piece.

- **Criteria to be followed before adjusting occlusion:**

- 1- It is better to consider **one arch as an intact arch** so that the other one can be adjusted according to the intact arch.
- 2- If one partial denture is **tooth supported and the other tissue supported**, the **tooth-supported arch** is first adjusted and is considered as the intact arch for adjustment of the tissue supported denture.
- 3- If both partial dentures are **entirely tooth borne**, the one occluding with the **most natural teeth** is adjusted first, and considered as the **intact arch**.
- 4- If both dentures are **tissue supported**, the **final adjustment** of occlusion on opposing tissue supported base is usually done on the **mandibular denture**, since this is the moving member. Hence, even if the mandibular denture opposes more natural teeth and is considered as the intact arch, the final occlusal adjustments are made only on it.

One should have a clear idea about the source of occlusal interference before treating such conditions. Sources for occlusal interference include:

1. Denture extension.
2. Occlusal Interference from Denture Framework.
3. Contact between the natural and artificial teeth (occlusion).

Sixth: Adjusting retentive clasps

In the practice of removable partial prosthodontics, two pliers are generally sufficient. These are the No. 139 or "bird-beak" plier, and the No. 200 or "three-prong" plier. Proper technique for adjusting a clasp involves holding the clasp stationary between the beaks of a No. 139 plier and applying a bending force with the fingers of the opposite hand. This results in a gentle curvature of the clasp arm and minimizes the likelihood of clasp fracture. Clasp adjustment may also be performed using a No. 200 Plier. This is accomplished by engaging the clasp arm with the beaks of the plier and gently squeezing the handles until the desired bend has been achieved.



Seventh: Patient Instructions

Oral hygiene:

Providing the patient with **appropriate oral hygiene instructions** is extremely important. The patient must understand that meticulous home care is a prerequisite to removable partial denture success. Inadequate home care will hasten the destruction of the remaining teeth.

❖ Though provided earlier in the **patient education** stage, instructions regarding the care and maintenance of the remaining natural teeth and oral soft tissues must now be reviewed. Proper brushing techniques and the use of dental floss as a routine part of the patient's home care should be emphasized.

❖ The patient must accept the need for **periodic dental evaluation** of oral tissues and dental prostheses. The interval between **successive** examinations will vary **depending on the oral conditions and type of prosthesis, but should not exceed 1 year**.

❖ Use of **plaque-disclosing tablets** is an excellent way to shed the light on the need for thorough attention to oral hygiene. Areas that are susceptible to plaque accumulation are readily visualized. The patient should be instructed to chew the disclosing tablets with the partial denture in the mouth. The denture can then be removed and examined for areas of plaque accumulation, although accumulation on the removable partial denture will not be evident at the insertion appointment, the disclosing tablet technique should be demonstrated so the patient can periodically check the **effectiveness of home care efforts**.

❖ Appropriate methods for denture hygiene should be demonstrated. Emphasis should be given to **physically brushing the denture** on a daily basis, **rather than relying on a cleaning or soaking agent to remove debris**. The use of common toothpastes should be avoided since these pastes often contain abrasive particles.

❖ **Scouring powders and abrasive household cleaners should also be avoided** because of their potential for **damaging both acrylic resin and metal components** of a removable partial denture.

❖ The patient must understand that the denture should **never be brushed while in the mouth**. Instead, the prosthesis should be removed to permit access to all surfaces.

❖ The patient should also be **instructed to clean the denture** over a partially **filled basin of water** so as to prevent denture fracture if the denture is dropped.

❖ The patient should be **cautioned against using any cleansing solution containing chlorine**. A popular and effective solution for cleaning acrylic resin complete dentures is a mixture of Clorox, Calgon, and water. However, if a chromium-based metal framework is soaked in this solution, the **chlorine will irreparably damage the metal**.

❖ The patient should also be instructed to **remove the prosthesis** (or prostheses) **before going to bed at night**. The **soft tissues** covered by the denture bases and the major connectors must be given the opportunity to **recover from constant mechanical stresses applied when the prosthesis is in place**. While in place, the removable partial denture prohibits the beneficial bathing effects of saliva, which **flush food and bacterial debris** from the hard and soft supporting tissues. The risk of **enamel decalcification** and **soft tissue inflammation** is greatly increased when the prosthesis is worn for long periods.

If a patient has only a few remaining natural teeth and has a history of bruxism, less damage may be done to the remaining natural teeth if the denture is worn at night. If night-time denture wear is necessary, the patient must identify several hours each day when the prosthesis can be removed from the mouth.

❖ The patient should also be told to store the **prosthesis in water** when it is not in the oral cavity. **Failure to do so may result in drying, cracking, and warpage of acrylic resin components**. This is extremely damaging to the prosthesis and may necessitate repair or refabrication.

Prosthesis placement and removal:

❖ Teaching the patient how to insert and remove a dental prosthesis is essential. The patient's ability to adequately manage this task depends to some extent on his or her manual dexterity, muscular coordination, visual acuity, and physical condition.

❖ Additionally, design of the removable partial denture, the number and position of direct retainers, and the total amount of retentive force affect the ease with which the prosthesis can be removed from the mouth.

❖ Insertion of a removable partial denture is generally less of a problem than is denture removal. The patient should be positioned in front of a wall-mounted mirror while the dentist inserts the prosthesis. It is important that the patient understand the need to properly align the removable partial denture over the abutments before applying seating pressure. The patient should be cautioned about trapping soft tissues of the cheeks, lips, or tongue between a clasp and its abutment. The amount of force needed to seat the prosthesis should be demonstrated, and the patient warned that if excessive pressure is required, alignment of the denture is probably incorrect. Seating the denture with biting pressure should be discouraged because damage to the denture, natural teeth, or soft tissues can easily result.

❖ After the patient has observed insertion of the removable partial denture, its removal also should be demonstrated. The **most convenient method** for engaging the prosthesis is to position a **fingernail or thumbnail apical to a facial clasp arm** on each side of the dental arch and to move the clasp occlusally. **This method is acceptable when cast circumferential clasps are readily available.** However, if only wrought-wire clasps are available, this technique should be avoided. Wrought-wire clasps are easily distorted when using this technique. **When wrought-wire clasps are present, the patient should grasp the acrylic resin denture bases on each side of the arch and carefully remove the removable partial denture from the mouth.**

❖ For a prosthesis that incorporates one or more **infra-bulge clasps**, positioning a fingernail apical to the approach arm and forcing the clasp occlusally is **not an acceptable method of removal.** This technique may lead to laceration of the adjacent soft tissues by the patient's fingernail. Additionally, this approach tends to force the retentive terminus of the clasp toward the abutment, making removal of the prosthesis even more difficult.

The best method of removing a denture of this design is to engage the non-retentive portion of the T-clasp and apply occlusal pressure. The denture will disengage easily. **Before leaving the office, the patient should be asked to demonstrate the proper methods of removable partial denture insertion and removal for the dentist.**



THANKS

Try-in of removable partial denture



By: Lec. Marwa M. Shehab
م. مروة مروان شهاب



- (This may be at the fourth visit or according to clinical requirements).

This is the **last stage** at which **modifications** can be made before the wax is replaced by acrylic.

- **Reasons for seeking treatment**

- ✓ Improved function
- ✓ Biologic requirements
- ✓ Esthetic requirements
if anterior teeth are to be replaced,
an esthetic try-in is essential.



Try-in

Indications

1. Replacement of anterior teeth.
2. Verification of jaw relation records.

A try-in appointment allows the patient to view the prosthesis and provide feedback.

This appointment also allows the practitioner to evaluate the esthetic and phonetic characteristics of the prosthesis and to make appropriate changes in the arrangement of teeth to verify the accuracy of jaw relation records made during the previous appointment.

- **Aesthetic (anterior) try-in**

The artificial teeth are verified for the following:

1. Anteroposterior position.
2. Tooth length in relation to lip length and existing natural teeth.
3. Width.
4. Overjet and overbite.
5. Midline and vertical alignment.
6. Shade – in a variety of light sources.

- **The trial dentures should firstly be examined on the mounted casts in respect of:-**

1. Adaptation of partial dentures on the casts.
2. Occlusion.
3. Position of artificial teeth with regard to adjacent natural ones.
4. The arrangement of anterior teeth.
5. Extension and contouring of wax flanges



- **In the mouth the trial dentures should be examined in respect of:-**

1. Adaptation of the dentures. Comfort, and function of the appliance.
2. Vertical dimension including the vertical dimension of occlusion and rest.
3. Occlusion, check centric jaw relation and centric occlusion
4. Evaluate the shade, mold, and arrangement of the teeth. (Esthetic and phonetic).
5. Appearance. Modify positions of teeth and incisal edges of anterior teeth to achieve a pleasing result.
6. Ask for patient's comments on appearance. Show the patient the dentures in the mirror and ensure that they are satisfied.
7. Note any changes on the laboratory prescription.



- **Esthetic try-in**

The patient should be seated in a treatment room that provides a quiet, relaxed atmosphere. This helps to alleviate the tension that may develop as the patient views the tooth arrangement for the first time.

The dentist should evaluate the positions of anterior teeth and assess lip support. There is a tendency to position the artificial teeth lingual to the positions occupied by the natural teeth. If anterior teeth have been missing for 6 months or more, the patient may report a sensation of abnormal fullness at the upper lip. A short period of accommodation usually will eliminate this problem.



- **A. Teeth length:**

Tooth length should be carefully evaluated. If all anterior teeth are being replaced and the upper lip is of normal length, the edges of the central incisors should be visible when the lip is relaxed. When the lip is drawn upward (e.g., in an exaggerated smile), the gingival contours of the denture base should be minimally evident.



- **B. Short space:**

If an anterior edentulous **space** has been **decreased** by drifting of the teeth, a **decreased number** of teeth should **not be placed**. This technique usually results in an **abnormal appearance**. Instead, attempts should be made to **rotate or overlap the denture teeth** in order to achieve an acceptable esthetic result



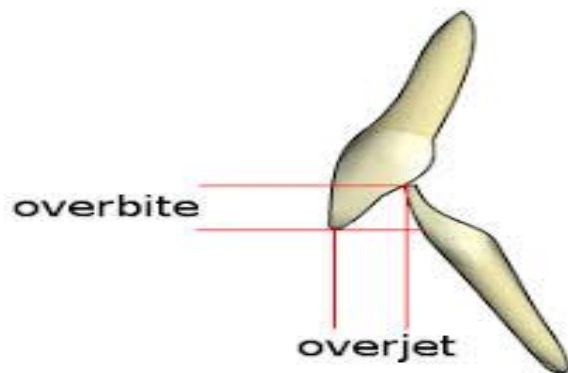
- **C. Large space:**

If the anterior edentulous **space** is relatively **large**, **diastemata** may be incorporated into the tooth arrangement. If this is to be accomplished, the patient should be informed of potential difficulties associated with interdental spacing. **Spacing complicates oral hygiene procedures, increases the likelihood of food impaction, and may create difficulties with phonetics**



- **D. Overlap of the anterior teeth:**

Attention should be paid to the **horizontal and vertical overlap** of the anterior teeth. If some **natural anterior teeth remain**, the **overlap** should be **duplicated**. If **no natural** teeth remain, care should be taken to **avoid excessive vertical overlap without accompanying horizontal overlap**. This could result in the application of undesirable forces to the artificial teeth and associated soft tissues.



- **E. Vertical alignment of the teeth:**

Vertical alignment of the teeth also should be evaluated. A slight deviation from the vertical can produce an acceptable esthetic result, but a significant deviation can create esthetic difficulties. The practitioner should pay particular attention to the maxillary midline. This midline must be examined for its vertical alignment and for its midface position. Any error in the position of the maxillary midline can be extremely distracting



- **F. Tooth shade:**

Verification of tooth shade should be accomplished during the evaluation process. The presence of natural teeth makes shade selection and patient acceptance a critical component of removable partial denture therapy. To ensure selection of an appropriate shade, the prosthesis should be viewed using a variety of light sources (e.g., natural, fluorescent, and incandescent).



G. Tooth position:

The positioning of any posterior is **compare with the position of the remaining natural teeth**.

The arrangement of the anterior **should be harmonize with the abutment**. The appearance may need to be modified, if incisal wear is present on the natural teeth it should be simulated on the denture.



- The shade, mould and arrangement of the artificial teeth should harmonize with the natural teeth. **(The incisal edges of the natural anterior teeth tend to follow the curve formed by the lower lip when smiling).**

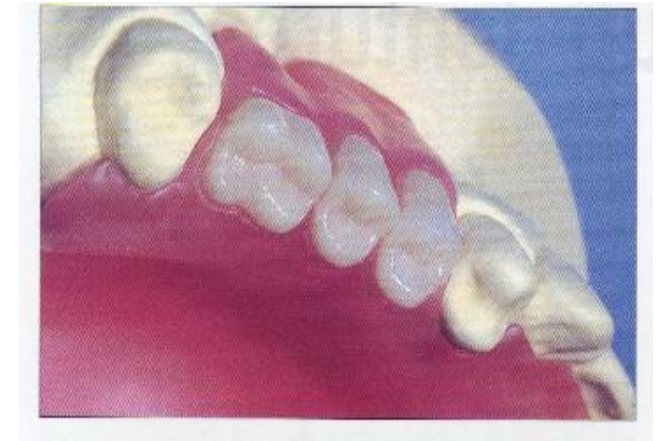
Reproduction of this relationship when positioning artificial anterior teeth can contribute significantly to a pleasing appearance.



- **Denture base consideration**

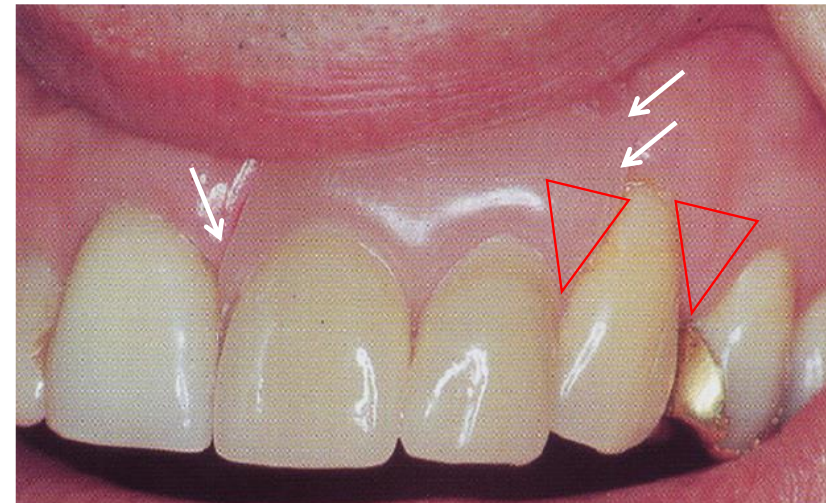
A. Wax flanges should be of a **thickness and extension corresponding to the amount of bone resorption** in the area so that they only replace the tissue that has been lost, restoring the former contour of the alveolar ridge.

Mesial and distal borders should be thin so that the flange blends with the adjacent mucosa, thus avoiding food trapping and promoting patient comfort.

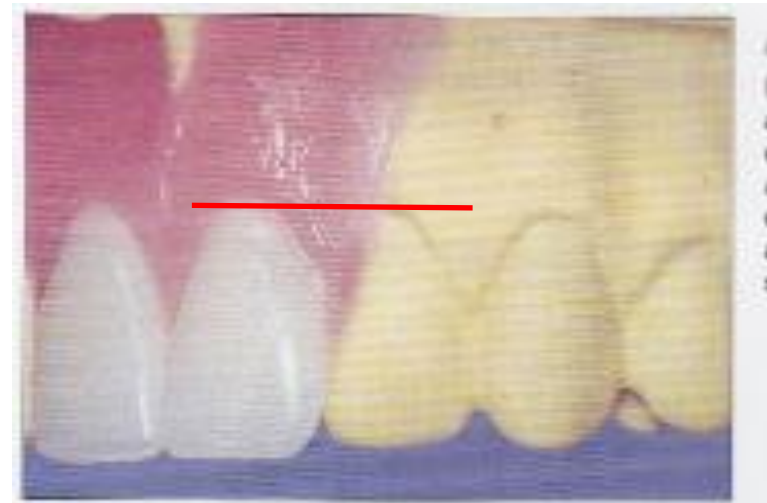


- **B. The path of insertion and withdrawal** permits the lateral borders of any anterior flange should be thinned and should **terminate over the convexities** produced by the roots of the abutment teeth.

This arrangement should also permit the labial flange to restore the papilla of the abutment tooth next to the edentulous space. The positioning and contour of papillae and gingival margins around the artificial teeth should harmonies with those of the adjacent natural teeth.



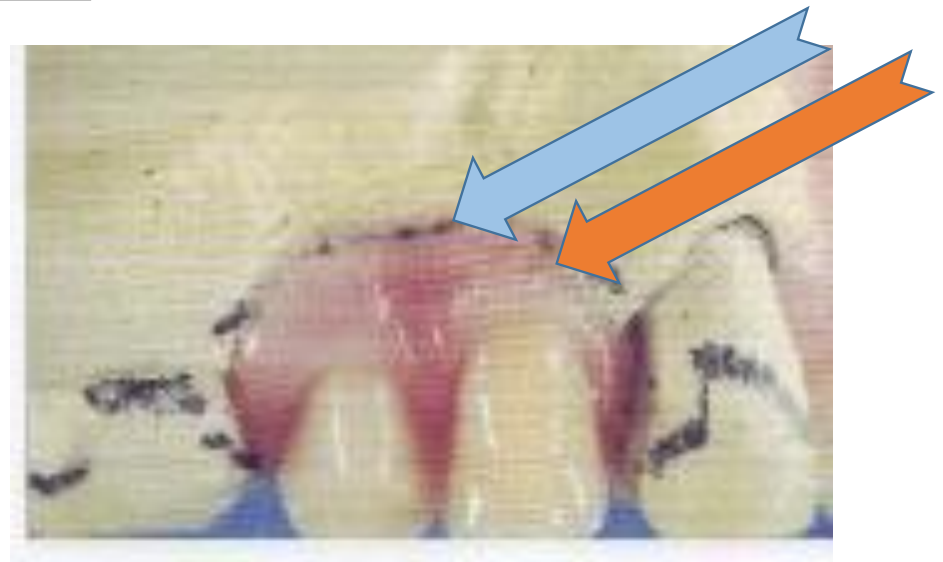
- **C.** A common error, which **creates a poor appearance**, is to place the gum margin of the artificial maxillary premolars at a lower level than that of the adjacent natural teeth . This may be overcome by careful waxing up and by the selection of an artificial tooth of appropriate crown length .



- **D.** The **borders of mucosa**, or partially mucosa-supported saddles, should **extend to the full depth of the sulci recorded on the cast**. This is so that the occlusal forces may be distributed as widely as possible and so that the adjacent musculature may be utilized to reinforce the retention and stability of the prosthesis.



- **E.** If the **chosen path of insertion and withdrawal** for the denture **does not eliminate undercuts** on the labial or buccal sides of the ridge, the flanges should be thinned as they pass over the survey line and end approximately 1mm beyond it.



- **Phonetics evaluation**

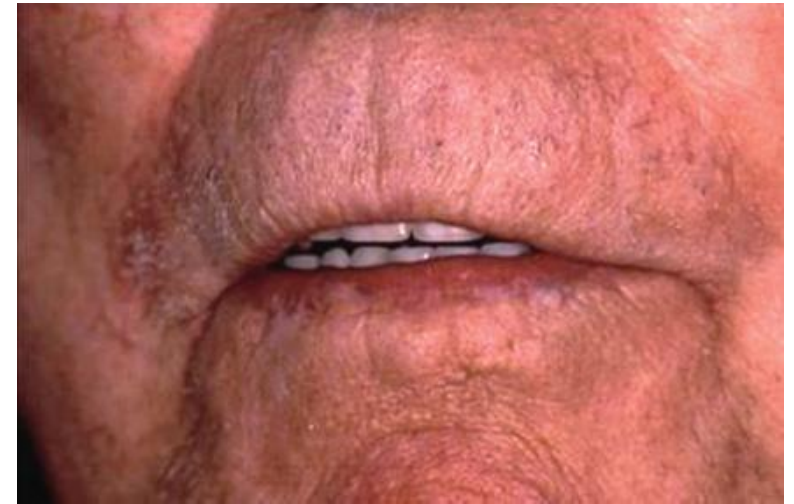
As fricative (“ f ” and “ v ”) sounds are made by the patient, the maxillary incisors touch the wet - dry line of the lower lip.

- As the patient makes the “ s ” sound, the maxillary and mandibular incisors should just miss contact (less than 1 mm is ideal).
- However, in some instances, patients are able to provide the proper air escape at slightly greater distances. These patients are generally skeletal Class II patients.





Maxillary incisors contact wet - dry line of lower lip when making the “ f ” sound).



In making the “ s ” sound, the maxillary and mandibular incisors are out of direct incisal contact, with generally less than 1 mm of space between incisal edges)

- **The patient evaluation**

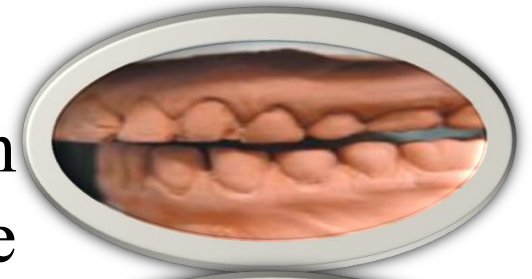
The patient should stand **several feet from a wall mirror to examine** the teeth critically. The use of a **hand mirror should be discouraged** because the patient's attention will be focused on individual teeth and not on the overall effect of the prosthesis. The patient's remarks should be noted, and required changes should be made. **Arrival at mutual acceptance by the patient and dentist frequently demands a high level of communicative skill combined with psychological insight.**



Verification of Jaw Relation

The jaw relation only needs to be verified in limited instances:

- If problems were encountered during jaw relation procedures and there is any doubt regarding the accuracy of the **articulator mounting**.
- If the partial denture is **opposed by a complete denture**.
- If **all posterior teeth** in both arches are being replaced.
- If there are **no opposing natural teeth in contact** and verification of the occlusal vertical dimension is necessary.



A dentist should never complete a prosthesis without confidence in the accuracy of the jaw relation records and the articulator mounting. A considerable amount of unnecessary work can be avoided if the practitioner pays close attention to detail throughout these procedures. To ensure accuracy, it is essential that the practitioner evaluate the mounting using additional jaw relation records. As a result, the importance of a **face-bow transfer** becomes particularly evident at this stage of treatment. For a mounting to accept additional jaw relation records, **the arc of rotation for the articulator must be the same as the arc of rotation for the patient's mandible.**

- **Making a polyvinylsiloxane verification record**

The patient is instructed to open the mouth moderately. The fingers of one hand are positioned to permit visualization of the dental arches . The polyvinylsiloxane registration material is mixed and introduced into the patient's mouth . The operator's remaining hand is then positioned on the facial surfaces of the mandibular anterior teeth, and the patient is guided into the prescribed closure . This position is maintained until the polyvinylsiloxane material has reached a suitable consistency.

When the recording medium has set, the patient is instructed to open the mouth. The record and removable partial denture (or dentures) are removed from the oral cavity. The record is carefully examined to determine its acceptability. There should be no signs of penetration through the record. If the record is acceptable, it is properly trimmed using a surgical scalpel.



Polyvinylsiloxane is expressed onto the mandibular occlusal surfaces.



The record is trimmed using a surgical scalpel.

- **Choice of tooth materials**

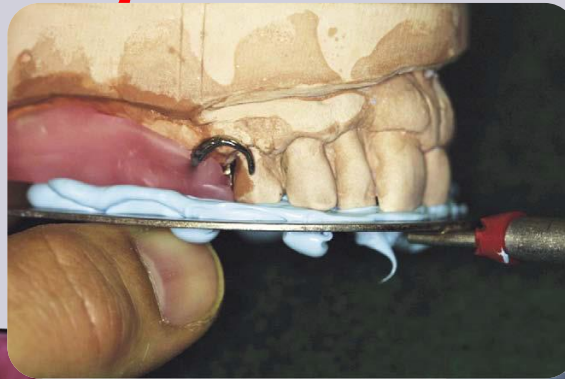
Acrylic resin pontics are the teeth of choice for most patients. Current cross - linked polymers resist abrasion and are compatible with opposing occlusal surfaces of enamel or metal.

- if the RPD pontics **oppose porcelain restorations**, consideration should be given to more wear - resistant materials such as **metal occlusal surfaces or porcelain** denture teeth. **Since porcelain teeth are attached to the denture base by mechanical retention, they require additional interocclusal space** when compared to acrylic resin denture teeth, which have the ability to bond to the denture base. Some patients also report unnatural sounds — for example, “clacking” — when porcelain denture teeth oppose each other.
- Other, recommend that **custom glass ceramic occlusal** surfaces be fabricated and cemented to prepared acrylic resin denture teeth in order to reduce the wear caused by opposing ceramic occlusal surfaces.





Occlusion and Jaw relations in removable partial denture



By: Lec. Marwa M. Shehab
م. مروة مروان شهاب

The **fourth phase** in the treatment of patients with removable partial dentures is the **establishment of a functional and harmonious occlusion**. Occlusal harmony between a removable partial denture and the remaining natural teeth is a major factor in the preservation of the health of their surrounding structures.

In removable partial dentures, **occlusal stresses** can be transmitted **directly to the abutment teeth and other supporting structures** because of the attachment of the removable partial denture to the abutment teeth.

Purpose of Recording the Jaw Relations

- ◎ To establish and maintain a **harmonious** relationship
- ◎ To ensure that all the effects of **occlusal loading be distributed**
- ◎ To best **control the undesirable effects of rotational or torquing forces** on the prosthesis.
- ◎ To **prevent any deflective contacts** of the teeth during centric or eccentric closures

Failure to provide and maintain adequate occlusion on the removable partial denture is primarily a result of:

1. Lack of support for the denture base,
2. The fallacy of establishing occlusion to a single static jaw relation record.
3. An unacceptable occlusal plane.

In establishing **occlusion** on a removable partial denture, the influence of the **remaining natural teeth** is usually such that the **occlusal forms** of the teeth on **the removable partial denture** must be made to conform to an already established occlusal pattern.

Occlusal adjustment or restoration may have altered this pattern. However, **the pattern present at the time the removable partial denture is made dictates the occlusion on the removable partial denture.**

In order to **successfully** build an artificial occlusion that will fulfil the **needs of the patient**, the needs must be **determined during the diagnostic phase of treatment.**

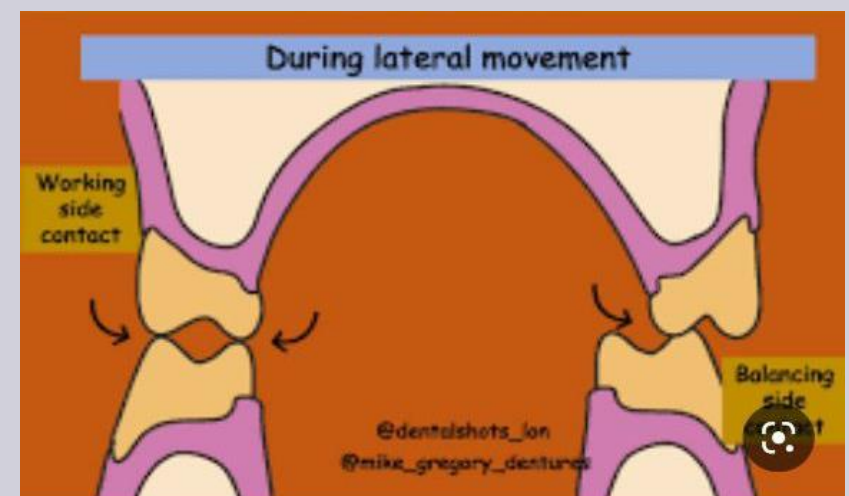
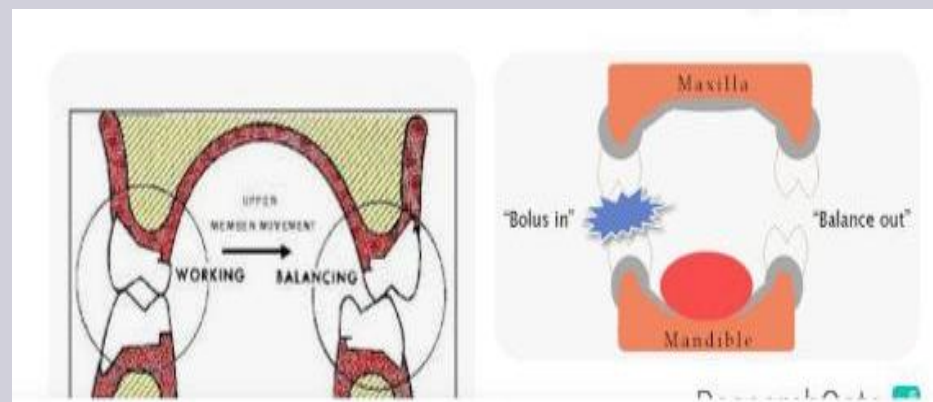
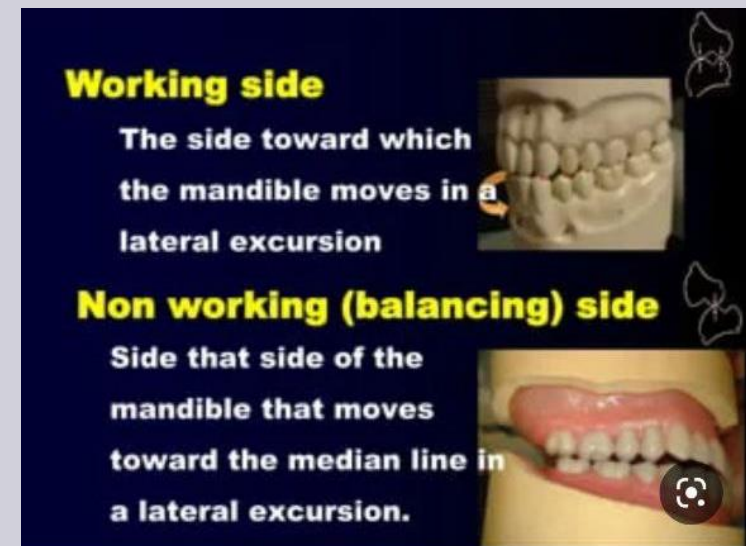
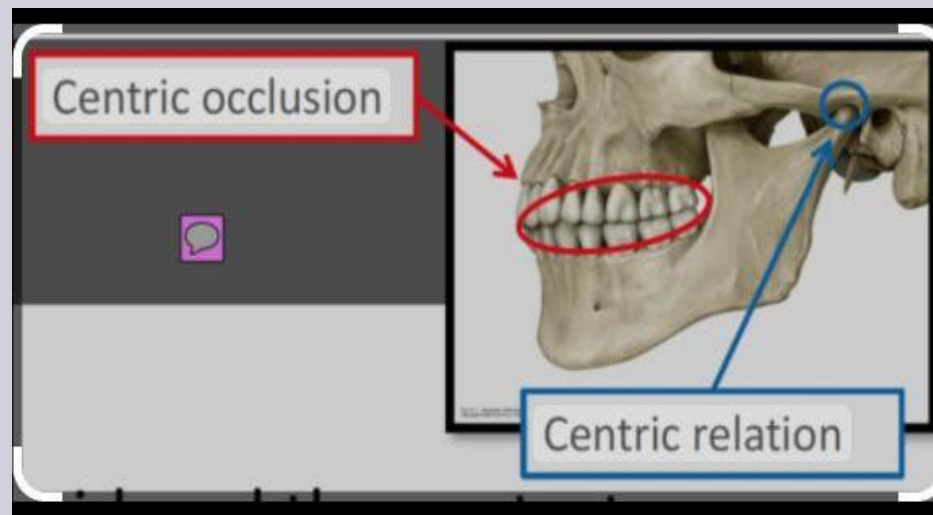
Objective in RPD occlusion is harmony between natural and artificial dentition. Stable RPD will cause fewer undesirable changes in its supporting structures.

Occlusion is one of the most important factors in developing a stable RPD

The establishment of satisfactory occlusion for RPD should include:-

1. Analysis of the **existing** occlusion.
2. Correction of the existing occlusal **disharmony**.
3. Recording of **centric relation** or an adjusted **centric occlusion**.
4. Harmonizing of **eccentric jaw movements** for a functional eccentric occlusion.
5. **Correction** of occlusal **discrepancies created** by the fit of the **framework** and during processing of the removable partial denture.





Desirable occlusal contact relationships for various RPD:

The following occlusal arrangements are recommended to develop a **harmonious occlusal** relationship among removable partial dentures and to enhance **stability** of the removable partial dentures:

1. Simultaneous **bilateral contacts of opposing posterior** teeth must occur in **centric occlusion**.
2. Occlusion for tooth-supported removable partial dentures may be **arranged similar to the occlusion seen in a harmonious natural dentition**, since stability of such removable partial dentures results from the effect of the direct retainers at both ends of the denture base
3. **Bilateral balanced occlusion in eccentric positions** should be formulated when a maxillary complete denture opposes the removable partial denture. This is accomplished primarily to promote the stability of the complete denture. However, **simultaneous contacts in a protrusive relationship** do not receive priority over appearance, phonetics, and/or a favorable occlusal plane.

4. Simultaneous working and balancing contacts should be formulated for the maxillary bilateral distal extension removable partial denture whenever possible. Such an arrangement will compensate in part for the unfavorable position the maxillary artificial teeth must occupy in relation to the residual ridge, which is usually **lateral to the crest of the ridge**. Working side contacts can be obtained **without resorting to excessively steep cuspal inclination**
5. Working side contacts should be obtained for the mandibular distal extension denture. These contacts should **occur simultaneously with working side contacts of the natural teeth** to distribute the stress over the greatest possible area. Masticatory function of the denture is improved by such an arrangement.
6. **Only working contacts** need to be formulated for either the maxillary or mandibular unilateral distal extension removable partial denture. **Balancing side contacts would not enhance the stability of the denture because it is entirely tooth supported by the framework on the balancing side.**

7. In the Kennedy Class IV removable partial denture configuration, **contact of opposing anterior teeth** in the planned intercuspal position **is desired to prevent a continuous eruption of the opposing natural incisors**, unless they are **otherwise prevented from extrusion by means of a lingual plate, auxiliary bar, or by splinting**. Contact of the opposing anterior teeth in eccentric positions can be developed to enhance incisive function but should be arranged to permit balanced occlusion without excursive interferences.

8. **Balanced contact of opposing posterior** teeth in a straightforward **protrusive relationship and functional excursive positions is desired only** when an opposing complete denture or bilateral distal extension maxillary removable partial denture is placed.

9. **Artificial posterior teeth should not be arranged farther distally than the beginning of a sharp upward incline of the mandibular residual ridge or over the retromolar pad**. To do so would have the effect of shunting the denture anteriorly

A harmonious relationship of opposing occlusal and incisal surfaces alone is not adequate to ensure stability of distal extension removable partial dentures. In addition, the relationship of the teeth to the residual ridges must be considered.

Bilateral eccentric contact of the mandibular distal extension removable partial denture need not be formulated to stabilize the denture. The buccal cusps, however, must be favorably placed to direct stress toward the buccal shelf, which is the primary support area in the mandibular arch. In such positions the denture is not subjected to excessive tilting forces

Occlusion in RPD's (Requirements):

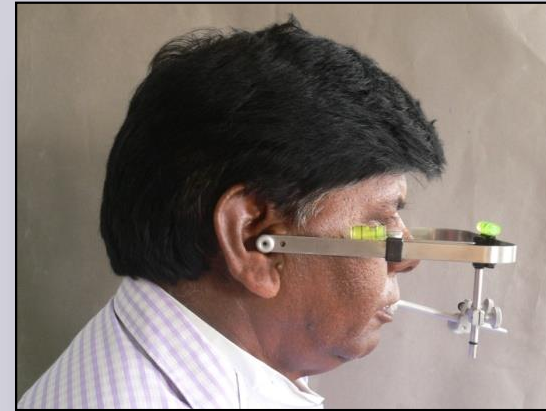
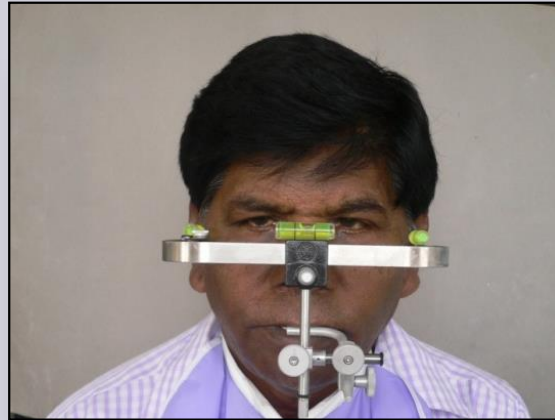
1. Whatever is the treatment of choice, it must be capable of function within the pattern of the patient's own functional requirements
2. The combined occlusal patterns of natural and artificial teeth must be adjusted to function harmonically with other parts of the masticatory system.
3. When posterior teeth of one jaw are brought into contact with their antagonists in centric occlusion, they should touch simultaneously with no deflective occlusal contacts,
4. Opposing, contacting teeth should glide freely and without cuspal interference throughout the functional range of occlusal movement.
5. Attempts to create artificial occlusal surfaces should be preceded by the elimination of any occlusal discrepancies in the natural teeth.
6. Artificial posterior teeth should be smaller bucco-lingualy than the natural teeth which they replace.
7. Artificial teeth should be arranged so the tongue will not be inhibited nor will the shape of the palatal vault be substantially altered.
8. The horizontal jaw position to which the RPD's will be constructed-centric relation or centric occlusion, when these factors do not coincide in the remaining natural teeth – is an important decision which must be made prior to the construction of the restorations.

Methods for establishing occlusal relationship

- a) Direct apposition of cast.
- b) Interocclusal records with posterior teeth remaining.
- c) Occlusal relations using occlusion rims on record base.
- d) Jaw relations records made entirely on occlusion rims.
- e) Establishing occlusion by the recording of occlusal pathways

Five methods of establishing occlusal relationships for RPDs, vary from simple apposition of opposing casts by occluding sufficient remaining natural teeth to the recording of jaw relations (vertical and horizontal) in the same manner as for completely edentulous patient. It is necessary that the use of **face-bow for mounting of maxillary cast in relation to the condylar axis of articulating instrument are acceptable for a RPD** when needed of maxillary cast.

The horizontal jaw relation (planned intercuspal position or centric relation) in which the restoration is to be fabricated should have been determined during diagnosis and treatment planning.



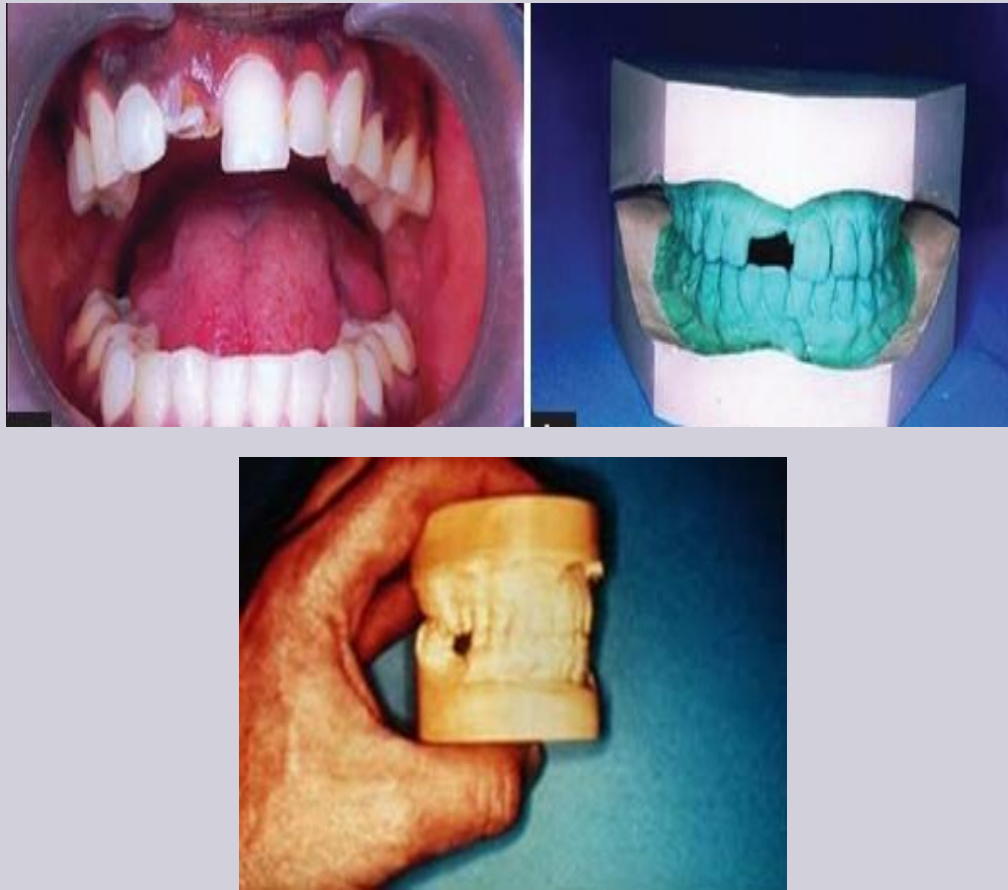
Recording Jaw Relationships for RPD

For the purpose of jaw relationships and their registration partially dentate patients can be divided into two categories:-

1. Patients without an occlusal stop to indicate the correct intercuspal position or vertical dimension of occlusion.
2. Patients with occlusal contact in the intercuspal position.

Methods of recording Jaw relation

A- Direct apposition of cast.



Direct apposition of cast.

The first method is used when sufficient opposing teeth remain in contact to make the existing jaw relationship obvious,

or when only a few teeth are to be replaced on short denture bases and no evidence of occlusal abnormalities is found.

With this method, opposing casts may be occluded by hand. The occluded casts should be held in apposition with rigid supports attached with sticky wax to the bases of the casts until they are securely mounted in the articulator.

2- Interocclusal records with posterior teeth remaining



Interocclusal records with posterior teeth remaining

A second method, which is a modification of the first, is used when **sufficient natural teeth remain** to support the removable partial denture (Kennedy Class III or IV) but the relation of opposing natural teeth **does not permit the occluding of casts by hand**. In such situations, jaw relations must be established as for fixed restorations with some type of **interocclusal record like using metallic oxide paste, interocclusal wax, impression plaster, and modelling plastic**

The least accurate of these methods is the interocclusal wax record. The bulk, consistency, and accuracy of the wax will influence the successful recording of centric relation.

Therefore a definite procedure for making interocclusal wax records is given as follows:

A uniformly softened, metal-reinforced wafer of baseplate or set-up wax is placed between the teeth, and the patient is guided to close in centric relation. The wax then is removed and immediately chilled thoroughly in room-temperature water. It should be replaced a second time to correct the distortion that results from chilling and then again chilled after removal

Any excess wax is removed, in these cases a contact between upper and lower natural teeth occurs at acceptable vertical dimension



A wax record can be **further corrected** with a **freely flowing occlusal registration material, such as a metallic oxide paste**, which is used as the final recording medium. The occlusal registration material then is mixed and applied to both sides of the metal-reinforced wax record. It is quickly placed, and the patient is assisted to close into centric relation, which will be guided by the previous wax record. After the occlusal registration material has set, the **corrected wax record** is removed and inspected for accuracy.



- the advantages of using a metallic oxide paste over wax as a recording medium for occlusal records include:
 1. Uniformity of consistency.
 2. Ease of displacement on closure.
 3. Accuracy of occlusal surface reproduction.
 4. Dimensional stability.
 5. The possibility of some modification in occlusal relationship after closure, if it is made before the material sets.
 6. Reduced likelihood of distortion during mounting procedures

3- Occlusal relations using occlusion rims on record base

Indication

- 1) one or more distal extension areas are present
- 2) a tooth supported edentulous space is large
- 3) when opposing teeth do not meet



In these instances occlusion rims on accurate bases are used where the occlusal surface of a rim opposes standing teeth, a layer of modelling wax approximately 2mm depth is added to occlusal surface of the rim, and the wax is thoroughly softened by using a hot wax knife. The rim is seated in the mouth and the mandible guided carefully into closure until maximal intercuspal contact for natural teeth occurs.

4- Jaw relations records made entirely on occlusion rims

indication

- 1) When an opposing maxillary complete denture is to be made concurrently with a mandibular removable partial denture
- 2) When either arch has only anterior teeth present.
- 3) Used in those rare situation in which the few remaining teeth do not occlude and will not influence eccentric jaw movements.

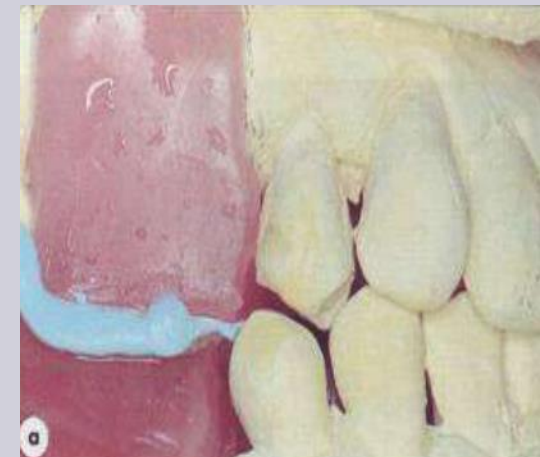


4- Jaw relations records made entirely on occlusion rims

This method is used when no occlusal contact occurs between the remaining natural teeth, such as when an **opposing maxillary complete denture is to be made concurrently with a mandibular removable partial denture.**

In any of these situations, jaw relation records are made entirely on occlusion rims. The occlusion rims must be supported by accurate jaw relation record bases. Here, the choice of method for recording jaw relations is much the **same as that for complete dentures**. As with complete denture fabrication, the use of a facebow, the choice of articulator, the choice of method for recording jaw relations, and the use of eccentric positional records are optional, based on the training, ability, and desires of the individual dentist.

4- Jaw relations records made entirely on occlusion rims



5- Establishing Occlusion by the Recording of Occlusal Pathways (Functionally generated path)

This technique records all possible functional movements of the teeth opposing the edentulous span, and the artificial teeth are set accordingly so that they remain in harmony with their antagonist in all times. The pathways are generated by the patient on a wax occlusal rim. (The fifth method of establishing occlusion on the removable partial denture is the registration of occlusal pathways and the use of an occluding template rather than a cast of the opposing arch. When a static jaw relation record is used, with or without eccentric articulatory movements, the prosthetically supplied teeth are arranged to occlude according to a specific concept of occlusion. On the other hand, when a functional occlusal record is used, the teeth are modified to accept every recorded eccentric jaw movement. These movements are made more complicated by the influence of the remaining natural teeth)

5- Establishing Occlusion by the Recording of Occlusal Pathways (Functionally generated path)

- ⦿ Support the wax occlusion rim with a denture base
- ⦿ occlusion rim must be worn for 24 hours or longer except when eating and consuming hot or chilled drinks
- ⦿ .After 24 hours, the occlusal surface of the wax rim should show a continuous gloss, which indicates functional contact with the opposing teeth in all extremes of movement.
- ⦿ After a second 24- to 48-hour period of wear, the registration should be complete and acceptable



Advantages of functionally generated pathways

1. Harmonious occlusion.
2. No recording of complex mandibular movement required.
3. Recovery of lost vertical dimension of occlusion.
4. Errors in occlusion are minimized.
5. Eliminate the need of complex articulator (simple hinge articulator is enough)

- **Interocclusal records**

These An interocclusal record or occlusal registration is usually necessary to orient the maxillary and mandibular diagnostic or master casts to each other properly.

Three widely separated tripod points of occlusal contact are necessary to relate the two casts accurately. contact points may be tooth-to-tooth or tooth-to-interocclusal recording material.

- A stable orientation of the opposing casts may exist if sufficient teeth remain, and in these patients no interocclusal relation recording is necessary. It is suggested, however, that orientation lines be drawn on the casts to guarantee proper cast alignment in the future.

- An interocclusal recording will be necessary if insufficient teeth remain to allow a stable cast-to-cast relationship. Some mention must be made of the ridge on which the record bases are formed. If the prosthesis is to be tooth supported or if a distal extension base is to be made on the anatomic ridge form, the bases will be made to fit that form of the residual ridge. But if a distal extension base is to be supported by the functional form of the residual ridge, it is necessary that the recording of jaw relations be deferred until the master cast has been corrected to that functional form

- When a recording is necessary, a record base, occlusion rim, and occlusal recording material are needed to make the recording accurately. It has been suggested that the record base be fabricated using auto-polymerizing acrylic resin, although they often are fabricated of light polymerized resin. The record base must be made on the cast to be attached to the articulator. The occlusion rims most often are made using hard baseplatewax.

◎ **Excellent occlusal recording materials include:**

- 1- zinc oxide eugenol impression material,
- 2- plaster impression material,
- 3- modeling compound,
- 4- polyether,
- 5- Polyvinyl siloxane.
- 6- Wax records made in edentulous areas with or without the support of record bases may not be sufficiently stable to be acceptable

- The interocclusal recording is most often made after fabrication of the removable partial denture framework. Following the fitting of the framework and the making of a corrected cast impression (if indicated), the record base is fabricated on the edentulous areas of the framework/master cast. Occlusion rims are added, and an occlusal recording material is used to make the record. The cast is oriented to the opposing cast with the recording, and desired denture teeth are selected.

This fabrication is followed by a trial insertion appointment.



THANKS

Fitting the removable partial denture



By: Lec. Marwa M. Shehab
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**PROVIDE THE PATIENT
WITH THE HIGHEST QUALITY OF
CARE OVER THE LONG TERM**



- **Examination of framework**

On the master cast, the framework is examined for the following:

1. Design
2. Fit
3. Occlusion
4. Finishing and polishing

- **Initial inspection**

1. metal casting should be carefully **inspected both off and on the master cast.**
2. The surface of the frame-work should be **smooth and free from scratches and other defects.**
3. Careful inspection should be made to ensure that the framework **follows exactly the design submitted to the laboratory.**
4. Ensure that **all** rest seats, indirect retainers, retention clasps, reciprocating clasps, major and minor connectors, and other components **are present and well-constructed** as requested on the design cast
5. Metal **framework components** and connectors should be **measured with calipers to ensure a minimum of 1.5 mm base metal alloy thickness for strength.**
6. Casting imperfections such as **voids and nodules** should be identified and **removed or smoothed as indicated**

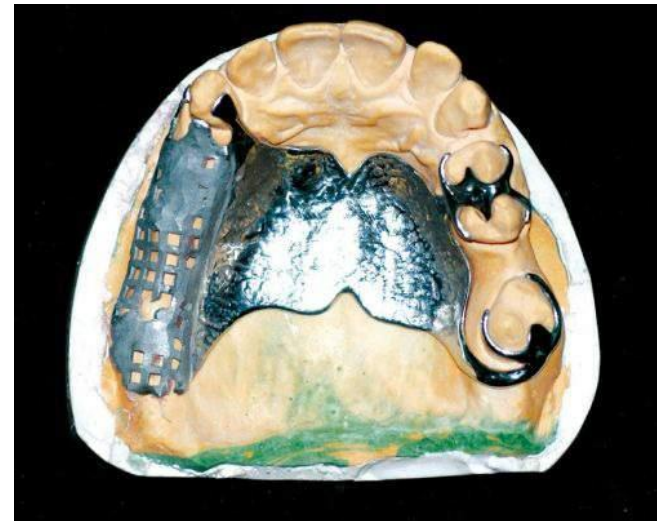
7. There should be **no voids or porosities** present in **high - stress areas** such as where clasps and rest seats are connected to minor connectors.

8. **Internal and external finish lines** should be sharp, well delineated, and **less than 90 °** to provide adequate **mechanical retention** of the resin denture base to the metal framework.

9. When returned from the laboratory, **all external** metal components should be **highly polished**.

10. The **internal components** of the metal framework that contact tissue should have a **smooth, matte – finished** surface that maintains intimate soft tissue contact

- The RPD framework should also be **examined while seated on the master cast**.
A metal frame that does **not fit the master cast well will not likely fit the patient's mouth**.
If **discrepancies** are observed, the framework should be **refined as needed**



- **Methods and procedures for fitting the framework**

- A. Laboratory inspection**

- 1- The **initial fitting** of the framework should first occur in the **dental laboratory** well before the patient arrives for the clinical appointment.

- 2- the **internal surface** of the Framework should be **examined** for obvious casting nodules, polishing paste, or other debris, which should subsequently be removed with a straight - shank round bur.

- 3- The metal framework should be inspected next while **seating the framework on the master cast**. Close observation should be given to the **full seating and adaptation** of the major connector, clasps, rest seats, and indirect retainers

4. The framework should **sit passively** on the master cast **without wedging or impinging on the abutment teeth**.

If **not fully seated**, the **internal surface of the framework** should be **painted with a disclosing medium** such as chloroform and rouge paste, or disclosing wax. The framework should then be seated on the master cast using firm pressure. After removing the framework from the cast, it should be inspected under magnification for indication of **internal high spots or frictional discrepancies as detailed by the disclosing medium**.



B. Clinical procedures

Once the framework is fitted to the master cast, the casting is ready for clinical try - in.

- 1- The framework should be inspected using both visual and tactile sense during seating onto the abutment teeth.
- 2- **Direct seating pressure** should be applied to the **rest seats and major connector only** (Excessive force to seat the framework should not be required) **framework** should be inspected for **complete stability**.

The casting should **fit passively without rocking**.

3- All **major and minor connectors** should be checked with magnification for close **adaptation to the teeth and tissues**.

4- **disclosing wax** can be used to ensure there are no **interferences** causing binding or incomplete seating of the casting

5- **Common areas to inspect** are along guide planes, under rest seats, in the shoulder areas of clasps, and on minor connectors.



6- **Adjustment** should continue to be made with high - speed diamond burs, carbide burs, or abrasive stones **until the casting is fully seated.**

If the casting still will **not go into place** after several attempts at fitting the framework, a decision should be made to **remake** the framework.

7- A framework that **fits the master cast but not the mouth** indicates that the **master cast is inaccurate** and a new impression should be made to initiate the remake of the framework

- **Occlusal evaluation**

The framework should then be evaluated for **clearance** during patient articulation.

Initially, **remove the framework** from the patient's mouth and ask him or her to **occlude**.

Analyze the **bite closely**, and observe whether opposing cusps fit into wear facets or if opposing canines fully articulate together.

If **open spaces** are observed, the framework is elevated in **occlusion and must be adjusted**.

Common areas of **occlusal interferences** are on rest seats, clasp shoulders, and minor connectors.

Thin articulating marking paper, or disclosing wax can be used to discern high spots on the metal frame



- Metal calipers should be used routinely after adjustments to ensure at least **1.5 mm thickness** of metal remains along rest seats, clasps, and minor connectors.

Metal **less than 1.5 mm in thickness** will likely **fracture or deform under function and necessitate remake.**

The framework should be adjusted as needed until there is no contact of the metal against opposing teeth, prostheses, soft tissues, or metal frameworks.

The adjusted areas should be **repolished as needed.**

The patient should report **occlusal stability and comfort**

- **Clinical procedures after fitting the framework**

1. **Corrected or altered cast**
2. **Maxillomandibular records**
3. **Facebow transfer**
4. **Interocclusal records**
5. **Wax try - in**

Support for the Distal Extension Denture Base

By: Lec. Marwa M. Shehab
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- **Support**: resistance to vertical components of masticatory force in a direction toward the basal seat.
- **Support can be classified according to Craddock:**
 1. Dental support (TEETH).
 2. Mucosal support (TISSUE).
 3. Mixed: dental and mucosal/ mucosal and dental support.

- **Designing Support**

- a- Tooth support:**

When abutment teeth available at both ends of the denture base (bounded saddle). It most common obtain by occlusal rest

b- Mucosa support: (mucoperiosteum covering residual alveolar bone). It allows varying degree of displacement.

The amount of displacement (tissue ward movement) will depend on:

- 1.The amount of pressure applied.
- 2- The nature of the mucosa (thickness).
- 3- Area covered by the denture (the wider the area the less the displacement).
- 4- Fit of the denture base.
- 5- Type of impression (anatomical, functional, or selective pressure)

C-Tooth-mucosa support: (Bilateral free end saddle). Posterior tissue support, and anterior tooth support

CLASS I & CLASS II - Tooth & tissue supported prosthesis
CLASS III & CLASS IV - Tooth supported prosthesis

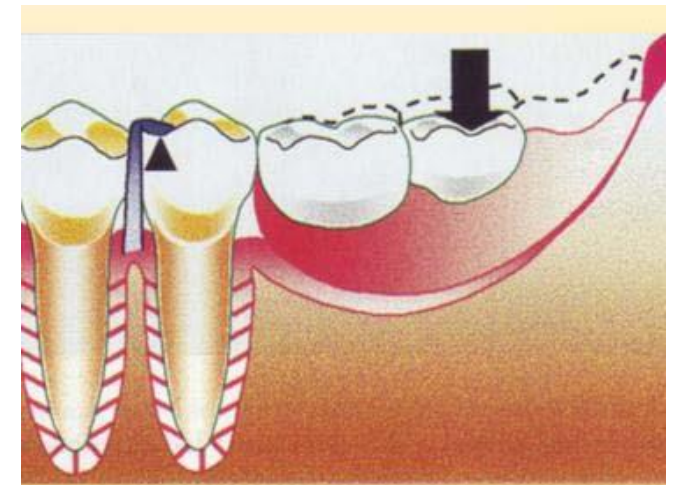
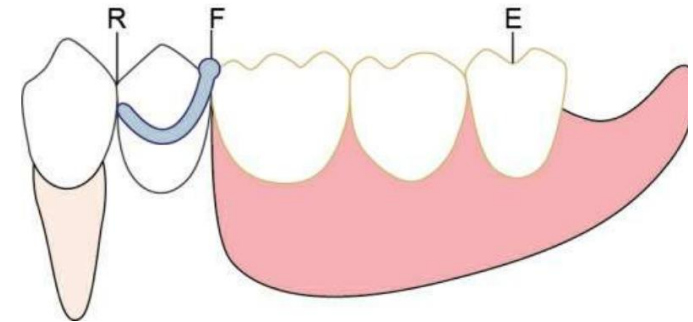
In the class III PD three components are necessary;

- 1. Support provided by rests,**
- 2.The connectors (stabilizing components).**
- 3.The retainers.**
- 4. An anatomical impression is the only needed to record the anatomic form of the teeth and residual ridge in tooth born RPD**

- The distal extensions PD does not have the advantage of total tooth supported because:
 1. one or more bases are extensions covering the residual ridge distal to the last abutment, but in this situation, the support comes from both the teeth and the underlying ridge tissues rather than from teeth alone.
 2. This is a composite support, and the prostheses must be fabricated so that the resilient support provided by the edentulous ridge is coordinated with the more stable support offered by the abutment teeth.
 3. NEEDS FOR INDIRECT RETAINER.

- The main problems which might occur in tooth-tissue support are:

- Mucosa is resilient and displaceable and can lead to unstable prostheses.
- Difficult to record mucosa at resting and at displaced condition simultaneously.
- In distal ERPD under function compresses the mucosa and act as class I lever thus it cause damaging to the abutment teeth, the solution is to record tissue in the functional form so the denture not exert additional stress to the abutment teeth



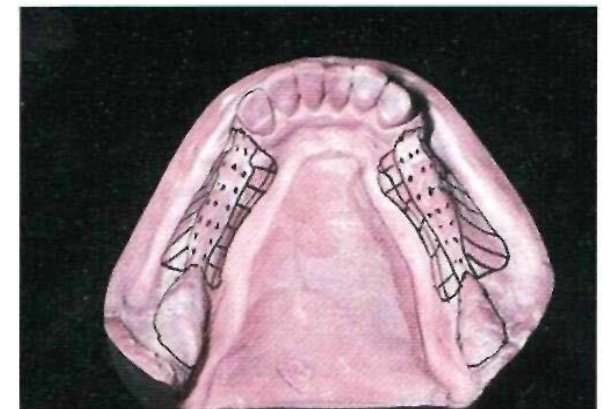
Factors influencing the support of a distal extension denture base

- 1- Quality of the residual ridge.
- 2- Extent of residual ridge coverage by the denture base.
- 3- Type and accuracy of impression registration.
- 4- Accuracy of denture base.
- 5- Design of the partial frame work.
- 6- Total occlusal load applied.

- **1-Quality of the residual ridge for good support.**

The ideal residual ridge to support a denture base would consist of **cortical bone** that covers relatively **dense cancellous** bone with **abroad rounded crest** and **high vertical slopes**, and covered by **firm, dense fibrous connective tissue**.

- Buccal self-area in the **lower ridge** is consider as primary stress bearing area,
- While in **maxillary** ridge the crest is primary stress bearing area.
- Slopes of the ridge can resist horizontal force



- **2- Extent of residual ridge coverage by the denture base.**

- The broader the residual ridge coverage the greater the distribution of the load, which results in less load per unit area.

- The longer the edentulous area covered by the denture base, the greater the potential lever action on the abutment teeth.

2. Quality of support of ridge

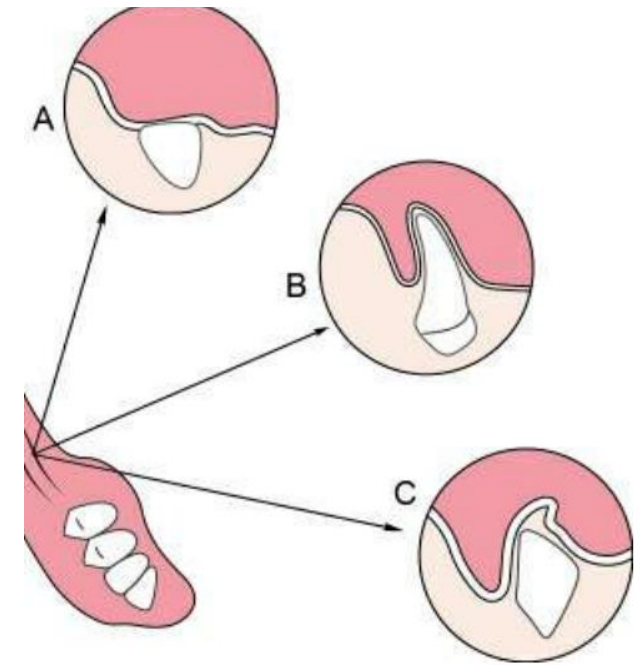
Quality of support of ridge

Large **well-formed** ridges are capable of **absorbing greater amounts of stress** and also provide **good stability**.

Flat ridges give **good support** but **poor stability** .

Sharp spiny ridge provides **poor support** and **poor to fair stability** .

Soft, flabby displaceable ridges provide **poor support** and **poor stability**



(A) Flat ridge

(B) sharp spiny ridge

(C) displaceable tissue

Type and accuracy of impression registration.

residual ridge may be said to have two forms:

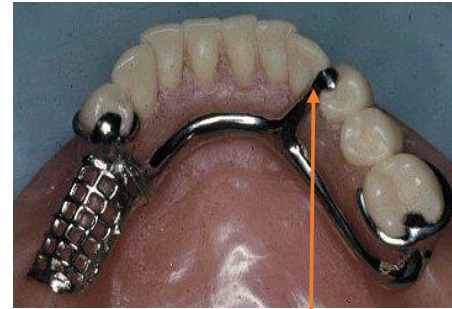
The anatomic form: is the surface contour of the ridge when it is not supporting an occlusal load.

The functional form of the residual ridge is the surface contour of the ridge when it is supporting a functional load.

- McLean and others recognized the need to record the tissue that supports a **distal extension** removable partial denture base in its **functional form**, or supporting state, and then relate them to the remainder of the arch by means of a **secondary impression**. This was called *a functional impression* because it recorded the ridge relation under simulated function

- The requirements for the registration of functional form of ridge

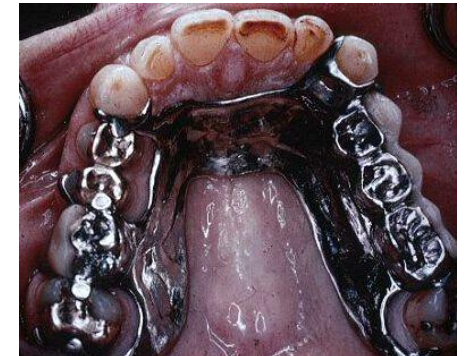
- 1) Positive occlusal rests??
- (2) all-rigid, nonflexible framework.
- (3) indirect retainers to aid stability.
- (4) well-adapted, broad coverage bases.



Indirect retainer rest seat



Deepest portion of rest seat; deeper than reduced marginal ridge area Less than 90 degree angle to make rest seat "positive"



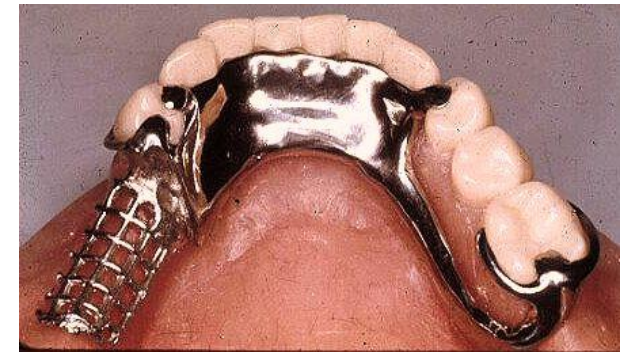
- **4.accuracy of denture base.**

- Distal extension base is enhanced by **intimacy of contact** of the tissue surface of the base and the tissue that covers the residual ridge.
- the **denture base** must be **related** to the removable partial denture framework in the **same manner** as the basal seat tissue was related to the abutment teeth when the impression was made

5- Design of the partial frame work.

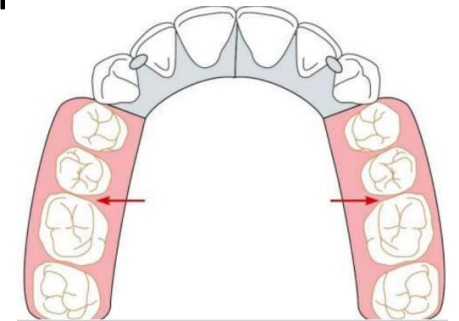
- Some rotation movement of a distal extension base at the distal abutment is inevitable under functional loading.
- The greatest movement takes place
 1. at the most posterior extent of the denture base,
 2. the retromolar pad region of the mandibular residual ridge
 3. the tuberosity region of the maxillary residual ridgetherefore are subjected to the greatest movement of the denture base

- **The solution for these problem by:**
 - use of mesial rest.
 - Incorporation of indirect retainer.
 - Incorporation of RPI system in free end saddle which make stress release



6.Total occlusal load applied

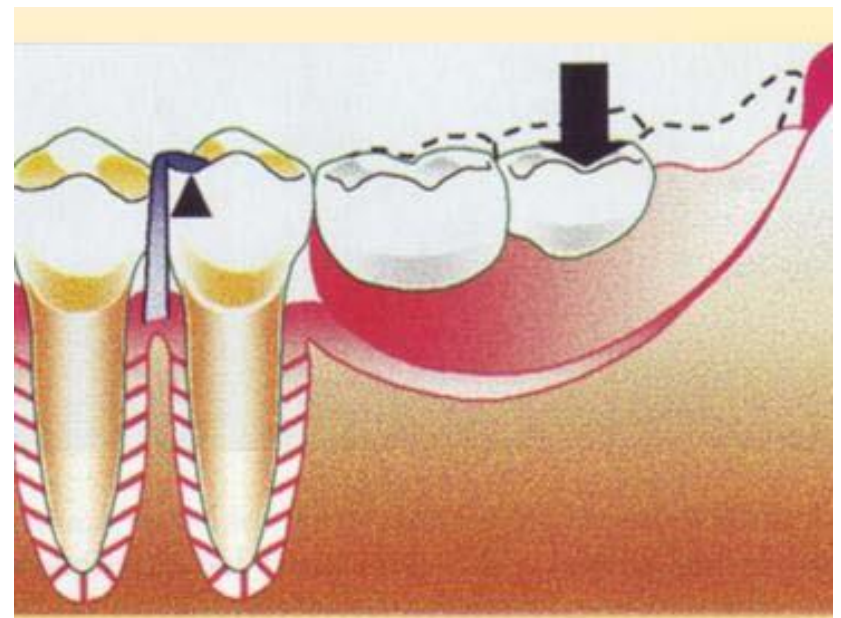
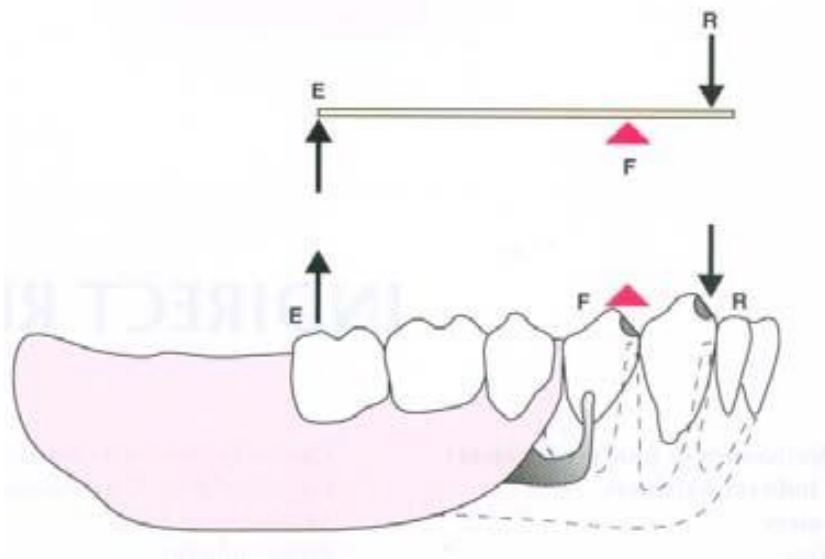
- the occlusal load to the removable partial denture, its preferable the load transferred to the abutments.
- The **support** from the residual ridge should be **optimized**.
- The **number of artificial teeth**, the **width of their occlusal surfaces**, and their **occlusal efficiency** influence the total occlusal load applied to the removable partial denture.
- The reduction of the **size of the occlusal table reduces** the vertical and horizontal forces
- Ideally masticatory load should be applied in the centre of the denture-bearing area, both anteroposteriorly and buccolingually, i.e. in the second premolar–first molar region



- **ANATOMIC FORM IMPRESSION**

- The anatomic form impression is a **one-stage** impression method.
- using an **elastic** impression material.
- produce a cast that does **not represent a functional** relationship between the various supporting structures of the partially edentulous mouth.
- only represented **hard and soft tissue at rest**

- the occlusal rest(s) will fit the rest seat(s) of the abutment teeth, whereas the denture base(s) will fit the surface of the mucosa at rest.
- When a masticatory load is applied to the extension base(s) with a food bolus, the rest(s) will act as a definite stop, which will limit the part of the base near the abutment tooth from transmitting the load to the underlying anatomic structures.
- The distal end of the base(s) that is able to move more freely, however, will transmit more of the masticatory load to the underlying extension base tissue and will transmit more torque to the abutment teeth through the rigid removable partial denture framework.



- **Functional form impression**

- the maintenance of occlusal contact between both natural and artificial dentition.
- Minimum movement of the base, which would create leverage on the abutment teeth.
- Some tissue ward movement can be minimized by providing the best possible support for the denture base.
- No single impression material can record both the anatomic form of the teeth and tissue in the dental arch and, at the same time

Difference between two types of RPDs

1. Support



Tooth & tissue Supported

class I & II

Combination of Abutment teeth
and soft tissues.



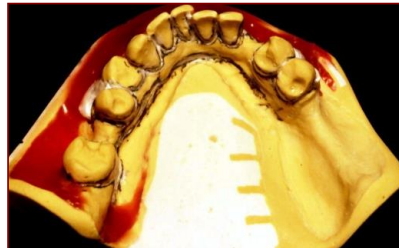
Tooth Supported

class III & IV

abutment teeth support

Difference between two types of RPDs

2. Impression



Tooth & tissue Supported

class I & II

functional forms and selective
(altered cast technique).

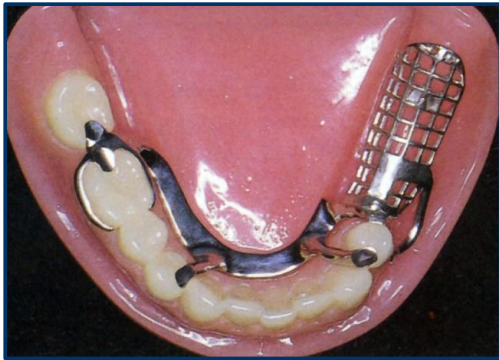
Tooth Supported

class III & IV

Anatomic form impression

Difference between two types of RPDs

3. Indirect retainer



Tooth & tissue Supported

denture rotation

Indirect retainer

class I & II



Tooth Supported

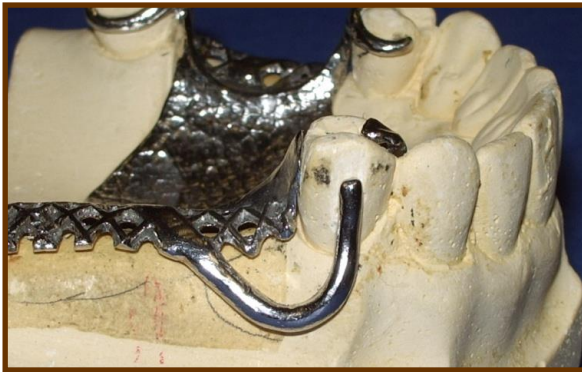
No denture rotation

No Indirect retainer

class III & IV

Difference between two types of RPDs

4. Clasp design



Tooth & tissue Supported

class I & II

Stress release design – RPI /
- wrought wire clasp.

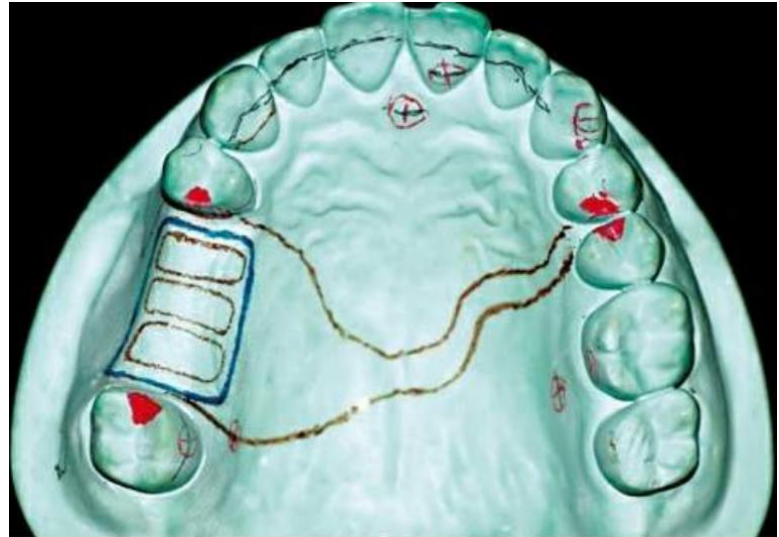
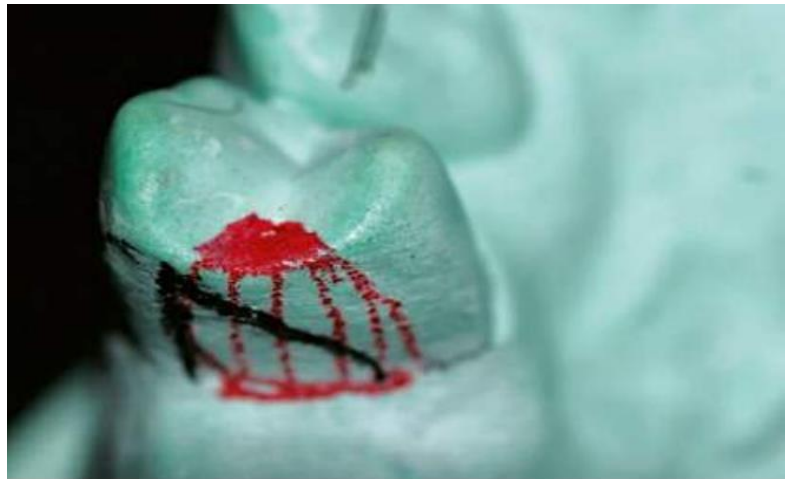
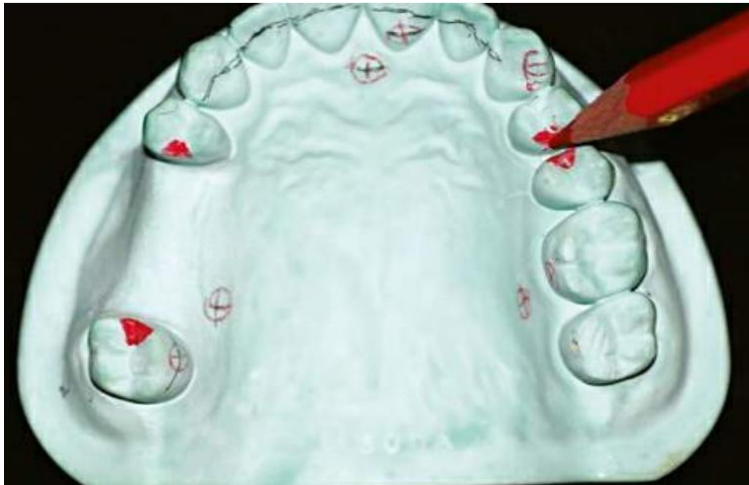


Tooth Supported

class III & IV

No stress release clasps

Circlet/Embrasure/Ring



QUESTIONS

??????????

Mouth preparation For Removable Partial Denture Design

By: Lec. Marwa M. Shehab
م. مروة مروان شهاب



Mouth preparations

Mouth preparations are procedures that **change or modify** existing oral structures or conditions, to **facilitate placement and removal of prosthesis for its efficient physiologic function and long-term success**

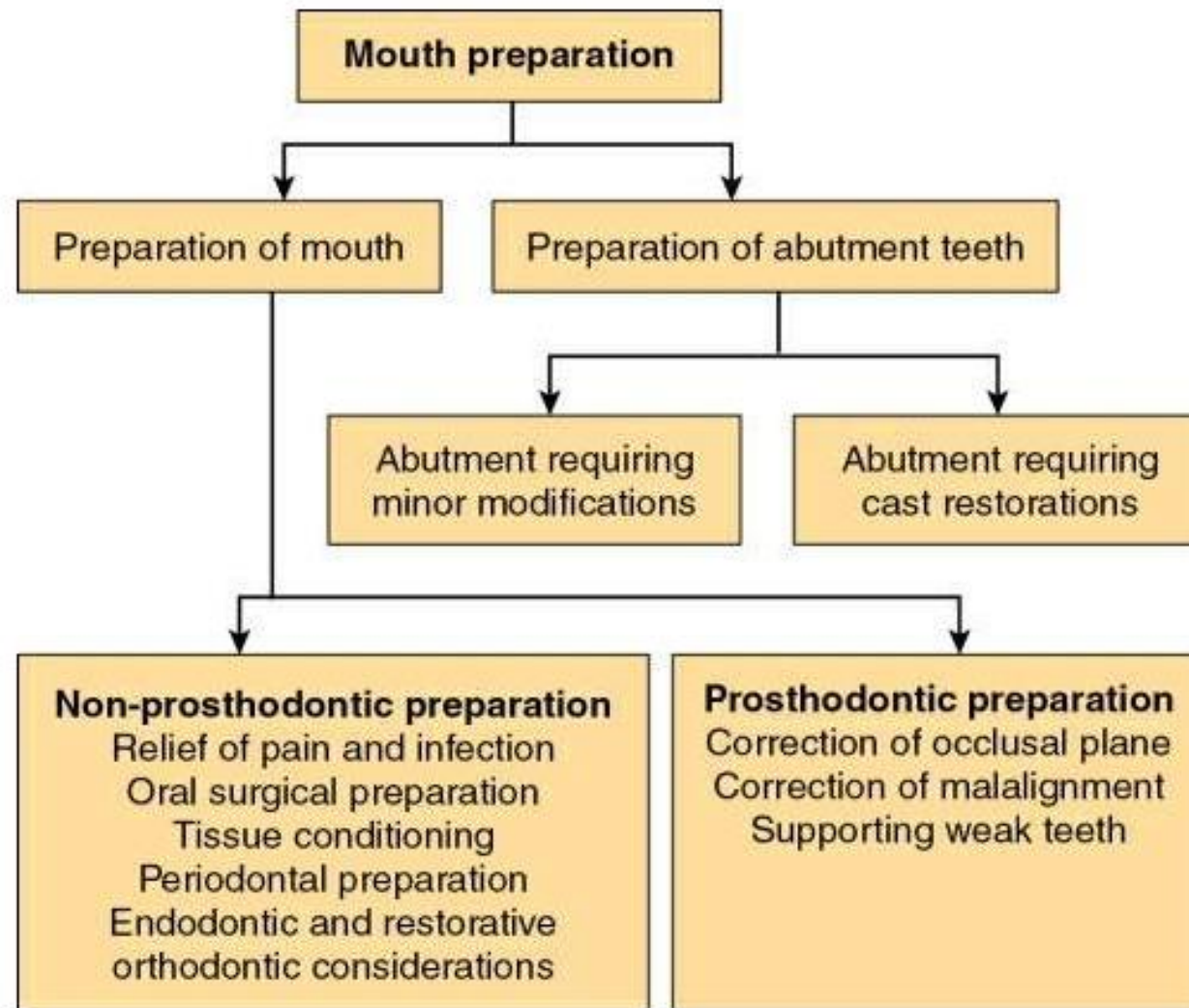
Mouth preparation should be completed before impression procedures for master cast on which denture is to be constructed (the second phase of treatment).

Classification

Mouth preparation may be classified basically into two parts:

1- General preparation of the mouth which involves **nonprosthodontic** preparation (where no prosthetic procedure is performed) and **prosthodontic** preparation (which may involve some prosthetic procedures like crowns).

2- Specific preparation of abutment teeth to create guiding planes, retentive undercuts and occlusal rests.



PREPROSTHETIC PROCEDURES

- **Relief of pain & infection.**
- **Oral surgical procedures.**
- **Conditioning of abused & irritated tissue**
- **Periodontal therapy.**
- **Correction of occlusal plane.**
- **Orthodontic correction.**
- **Splinting weakened teeth.**
- **Reshaping teeth.**
- **Preparation of rest and guiding plane.**

Nonprosthodontic preparation

1- Relief of pain and infection

- Teeth that are causing pain or discomfort due to **Large carious lesion** or defective restoration and infection should be treated to eliminate pain
- The **gingival tissue** should also be treated early to decrease the possibility of **periodontal abscesses** and other inflammatory responses
- **Calculus accumulation** should be derided , plaque should be controlled and a preventive **dental hygiene program** should be started and vigorously monitored .

2- Oral surgical procedures

- i. Extraction
- ii. Removal of residual roots
- iii. Impacted teeth
- iv. Malposed teeth

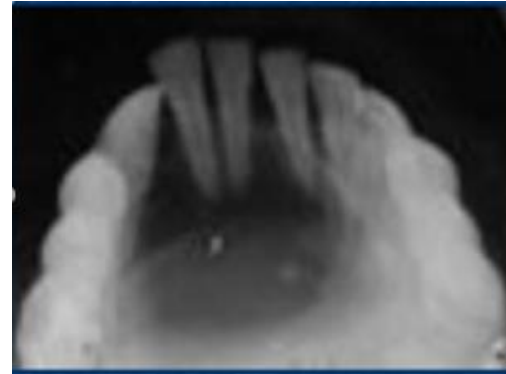


v. Cysts and odontogenic tumours
(clinical, radio graphical
examination and biopsy)

vi. Exostoses and tori

vii. Hyperplastic tissue(fold of redundant
tissue in the vestibule or floor of the
mouth and palatal papillomatosis,
fibrous tuberosity)

viii. Muscle attachments and
freni(mentalis and genioglossus , labial
and lingual freni).



ix. Bony spines and knife-edge ridges

-Sharp **bony spicules** should be **removed**.

-**knife like crest** gently **rounded**.

- All **abnormal soft tissue** lesions should be **excised** and submitted for pathologic examination before the fabrication of RPD

x. Abnormal lesions

Hyperkeratosis, erythroplasia and ulceration (**white, red, or ulcerative** lesions should be **investigated** regardless of their relationship to denture base)

xi. Dentofacial deformities

Replacement of missing teeth and development of a harmonious occlusion are very difficult in treating those patient

xii. Alveolar bone augmentation: Hydroxyl appetite crystal, lack of toxicity and demonstrates no inflammatory or foreign body response

Osseo integrated device Titanium implant was designed to provide a direct titanium-to bone interface(Osseo integration)

3- Conditioning of abused and irritated tissues

Symptoms:

- i. Denture-bearing mucosa is irritated or inflamed.
- ii. Anatomical structures like rugae, incisive papilla and retromolar pad are distorted.
- iii. Burning sensation in tongue, ridge area, cheeks and lips

Causes

ill-fitting dentures, prosthesis with poor occlusion, bruxism, diabetes, nutritional deficiencies, endocrine imbalances and blood dyscrasias..



The treatment procedure includes good home care by:

- **Rinsing the mouth three times daily with prescribed saline solutions**
- **Massaging the residual ridge area, palate and tongue with a soft tooth brush**
- **Removing the prosthesis at night**
- **Using a prescribed therapeutic multiple vitamins along with a prescribed high protein low carbohydrate diet**

MAXIMUM BENEFIT FROM USING TISSUE CONDITIONING MATERIAL By

- Eliminating deflective or interfering occlusal contact of old dentures
- Extending denture base to proper form to enhance support, retention and stability.
- Relieving the tissue side of denture base sufficiently (2mm) to provide space for even thickness and distribution of the material.
- Applying the material in amount sufficient to provide support and a cushioning effect.
- Following manufacturer instruction

4- Periodontal preparation

The **success** of prosthesis depends on the **health** and **integrity of the periodontal tissues** of the remaining teeth and especially the abutments must be evaluated and corrective measures taken before RPD construction

5- Endodontic and restorative treatment

6. Orthodontic treatment



prosthodontic preparation

Correction of occlusal plane

Uneven occlusal plane is common in partially edentulous situations due to:

- Supraeruption and infraeruption
- Mesial migration
- Tipping of teeth
- Malrelationship of jaws

To correct the plane of occlusion, one of the following procedures which range from **simple to complex** may be employed:

- 1- Enameloplasty: **The intial alteration of the surfaces of teeth to change their form**
- 2- Onlay
- 3- Crowns
- 4- Endodontics with crown or coping
- 5- Extraction
- 6- Surgery (orthognathic surgery)

Preparation of abutment teeth

The abutment teeth may be prepared to provide support, stabilization, reciprocation and retention for RPD

Abutment may be grouped as follows .

1. Those requiring only minor modifications to their coronal portions .
2. Those requiring to have restorations other than complete coverage crowns (inlay, onlay) .
3. Those requiring to have crowns (complete coverage) .

Preparation of abutment teeth

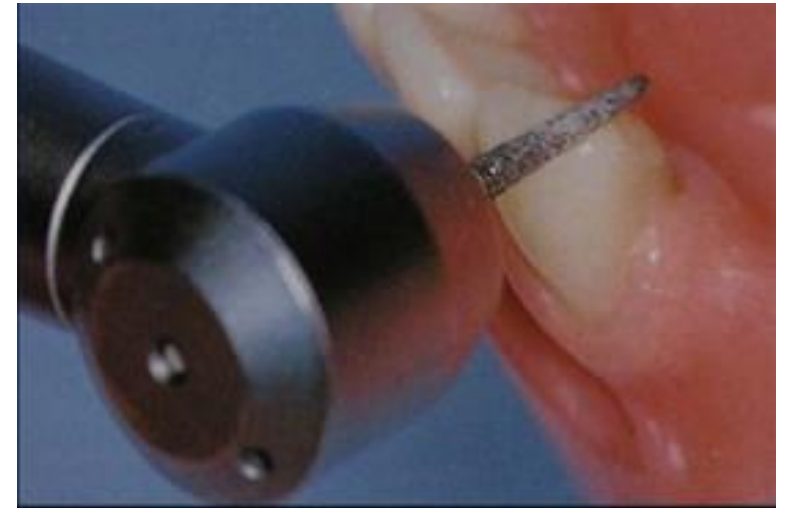
Objectives

- Direct stress along the axis of the tooth.
- Eliminate interferences by recontouring of teeth.
- Create retention by simple alteration procedures.
- Allow placement and removal of prosthesis without transmitting wedging types of stress against teeth with which it comes in contact.

Sequence of abutment preparation on sound enamel or existing restorations

The following sequence of mouth preparation is followed:

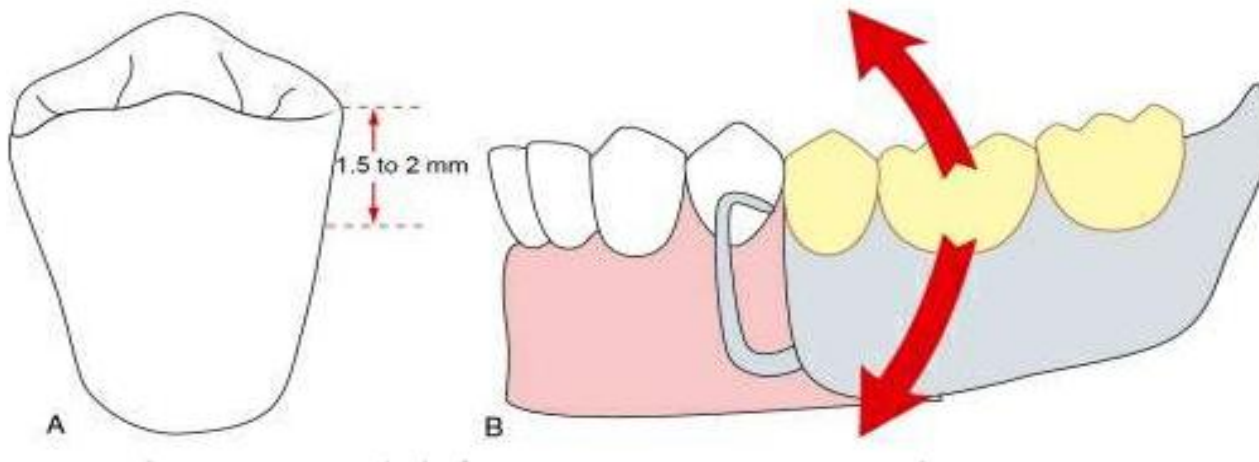
- 1 .Preparation of guiding planes
- 2 .Modification of height of contour
- 3 .Preparation of retentive undercuts
- 4 .Rest seat preparation



1. Preparation of guiding planes

Proximal surface parallel to the path of placement should be prepared to provide guiding planes

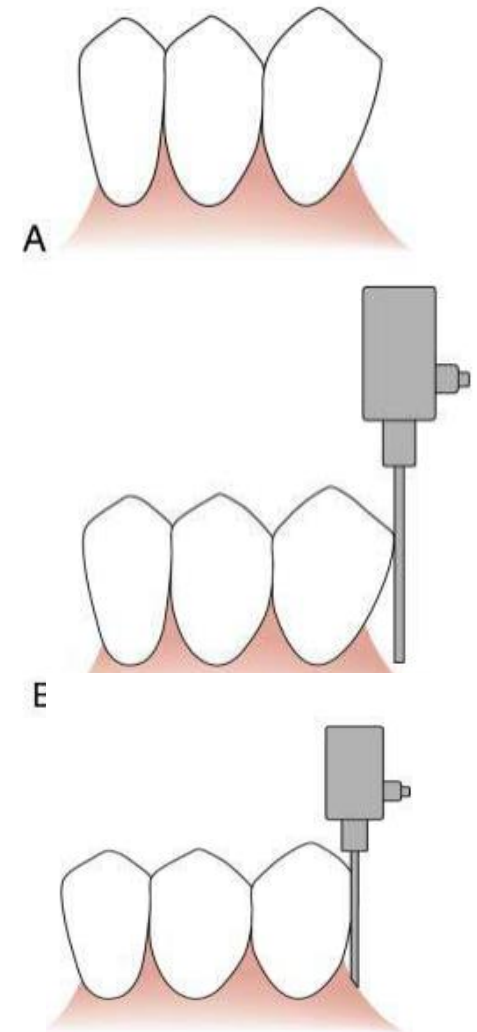
posterior abutment teeth



Anterior abutment teeth

Preparation is similar for any guiding plane and achieves the following:

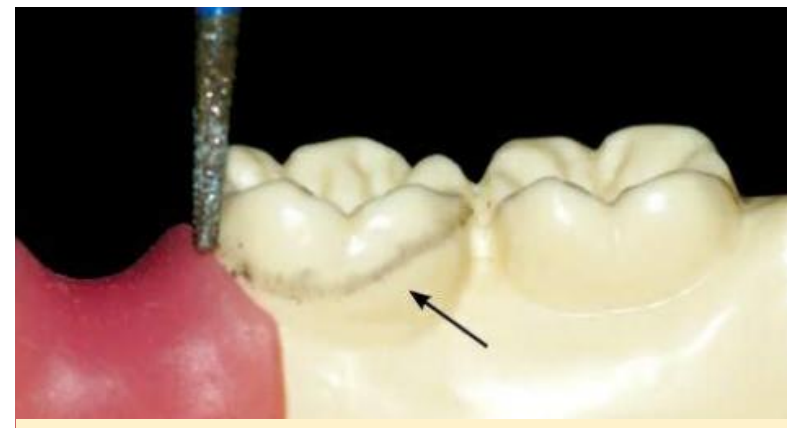
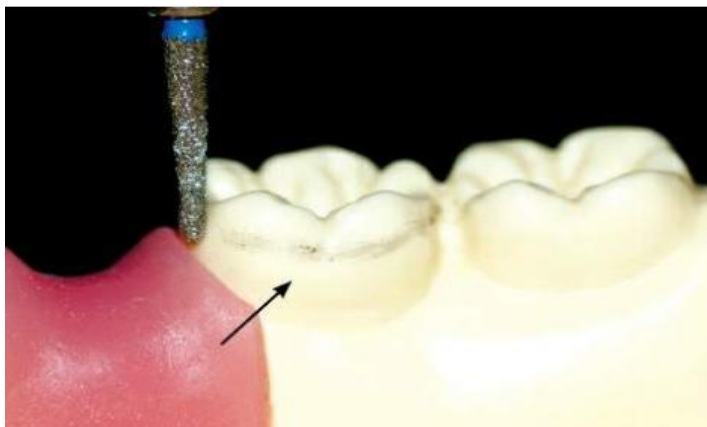
- Provides parallelism ensuring stabilization.
- Minimizes wedging action.
- Reduces undesirable space between denture and abutment teeth and enhances aesthetics.
- Increases retention through frictional resistance.



2 .Modification of height of contour

- Enameloplasty to change height of contour is performed to provide ideal placement of clasp arms and remove interferences for placement of major connectors.
- **Maxillary** posterior teeth tend to **tip buccally** making placement of retentive terminal unaesthetic.

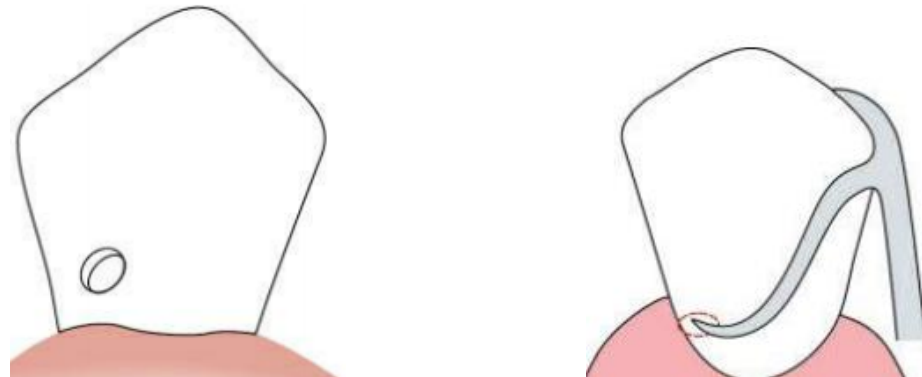
Mandibular posteriors **tip lingually** making it difficult to place reciprocal arm and lingual major connectors. In both these situations, height of contour will be near occlusal surface, lowering height of contour.



Level of height of contour decreased after preparation with tapered diamond

3 .Preparation of retentive undercut (dimpling)

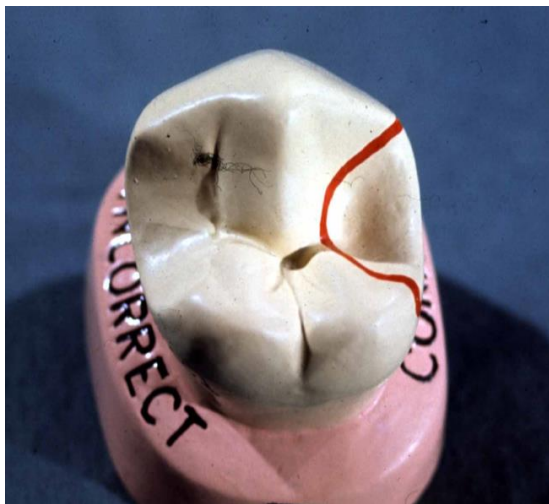
Enameloplasty to modify retentive undercuts is termed 'dimpling.'



4 .Preparation of rest seats: Occlusal rest areas should be prepared that will direct the occlusal force along the long axis of the abatement

Rest Seats

- 1 .Occlusal rests: Placed on occlusal surface of posterior teeth.
- 2.Lingual or cingulum rests: Placed on lingual surface of tooth in cingulum area, usually canine.
- 3 .Incisal rests: Placed on incisal edge of anterior teeth.



4 .Preparation of rest seats

Rest seats must always be prepared after preparation of guiding planes.

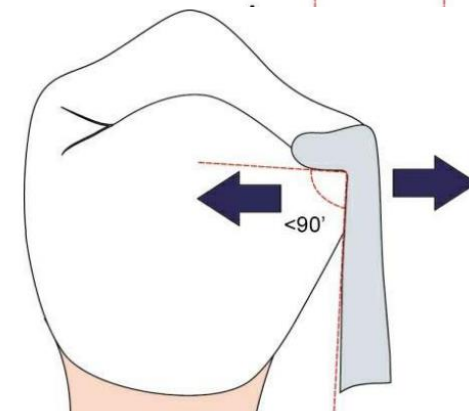
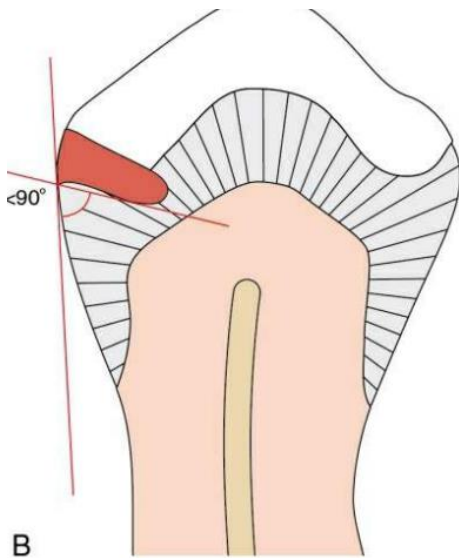
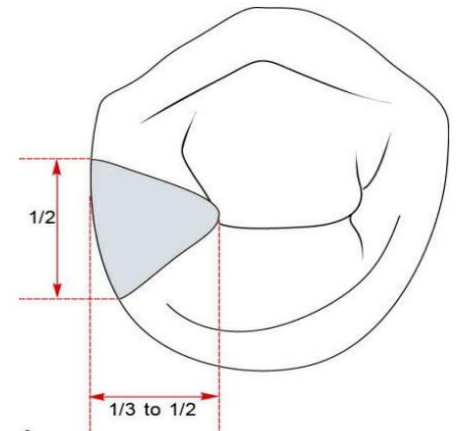
Occlusal rest seat

a. Occlusal rest seat in enamel

Outline form of occlusal rest is triangular with base of triangle at marginal ridge and apex towards the centre of the tooth

Mesiodistal: One-third to one-half the mesiodistal diameter.

Buccolingual: One-half the buccolingual width between the cusp tips



if angle is greater than or equal 90 will cause tooth movement

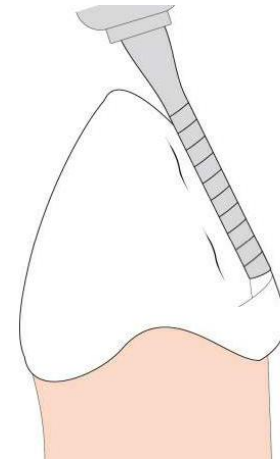
The procedure of rest seat preparation on sounds enamel surface

- Round bur No.8 used to lower the marginal ridge.
- Round bur No.6 used to slightly deepen the floor of the rest seat of the rest seat inside this lowered marginal ridge.
- The floor of the rest seat should incline towered the center of the tooth so that the occlusal forces are centered over the root apex.
- The marginal ridge must be lowered so that the angle formed by the occlusal rest with the minor connector will be less than 90 degree

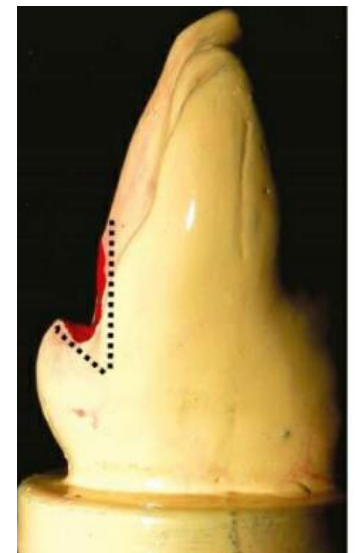
Lingual or cingulum rest

Rest seat must be gingival to contact level of opposing tooth??

The rest seat is V-shaped and has two inclines. The labial incline is parallel to the labial surface of tooth, while lingual incline begins at the top of cingulum and converges labiogingivally towards the centre of the tooth, to meet the labial incline at the apex of rest seat



correct position of bur



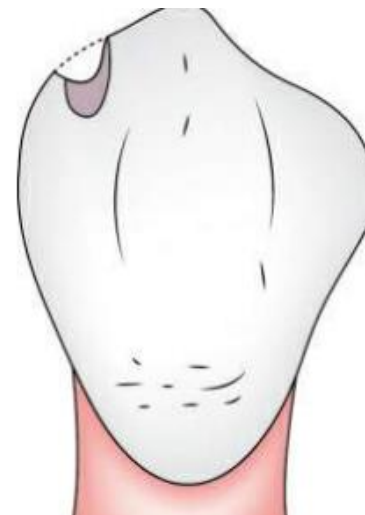
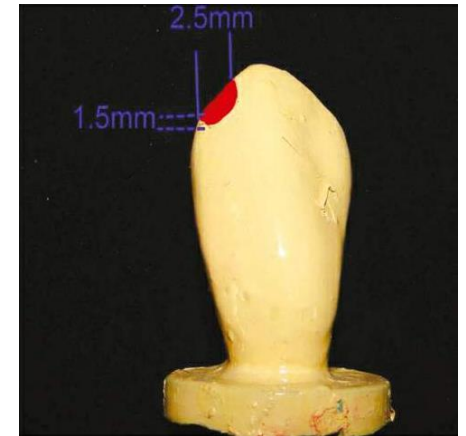
Incisal rest seat preparation

It is prepared only on enamel surfaces. If a cast restoration is planned, cingulum rest is preferred.

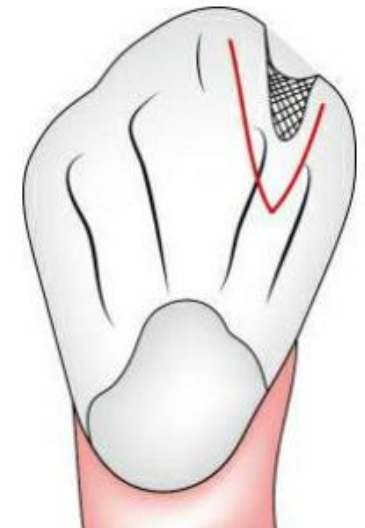
Preparation is made parallel to the path of insertion

It is a small 'V-shaped' notch located 1.5-2 mm from proximo-incisal angle of the tooth. It should **extend onto the facial surface to provide a positive seat for the rest**. It should be bevelled labially and lingually and lingual enamel should be shaped to accommodate the minor connector.

It should be 2.5 mm wide and 1.5 mm deep. The deepest part should be towards the centre of tooth mesiodistally and it should be smooth.



Labial view.



Lingual view.

THANKS



Diagnosis and Treatment Planning for Removable Partial Denture (Co-Cr)

By: Lec. Marwa M. Shehab

م. مروة مروان شهاب





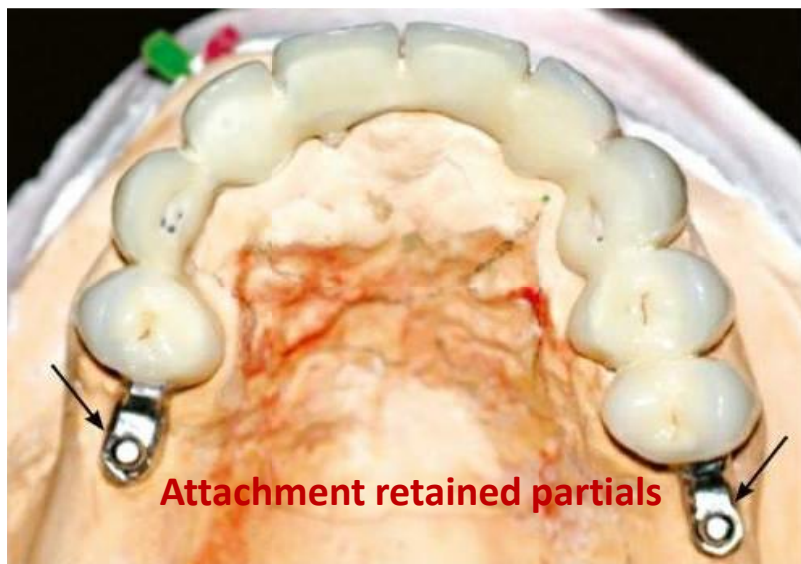
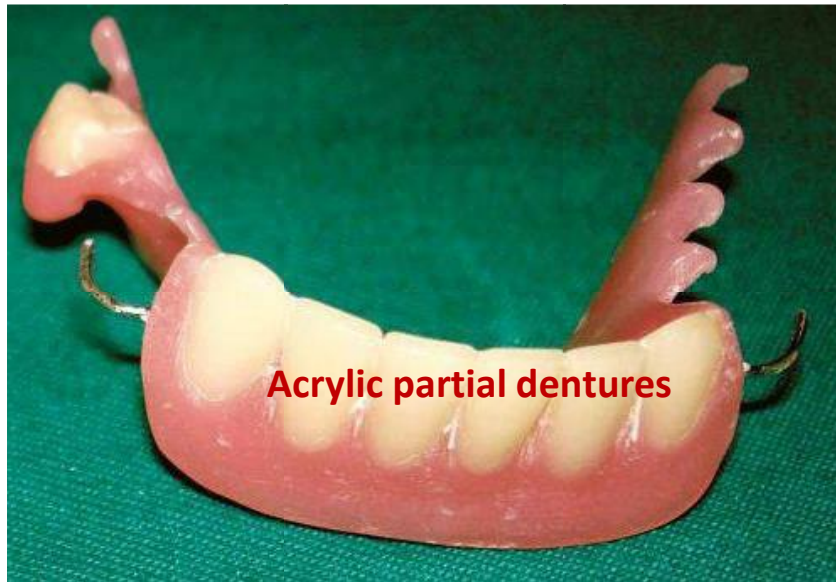
Removable partial denture (RPD): It is defined as any prosthesis that replaces some teeth in a partially dentate arch. It can be removed from the mouth and replaced at will

Basically there are two types of RPDs:

1. Acrylic partial dentures: temporary dentures

2. Cast partial dentures

- Clasp retained  a) Tooth borne
  b) Tooth/Tissue borne
- Attachment retained partials



Treatment planning The treatment of partially edentulous patient can be divided into six phases.

Phase I

- Emergency treatment to control pain or infection.
- Collection and evaluation of the diagnostic data – diagnostic casts and radiographs.
- Developing a design and formulating a treatment plan.

Phase II

- Preparation of mouth.

Phase III

- Preparation of abutment teeth.
- Final impressions and fabrication of master cast

Phase IV

- Fabrication of removable partial denture.

Phase V

- Denture insertion.
- Post-insertion instructions.

Phase VI

- Maintenance and recall.

The purpose of dental treatment: is to respond to a patient's needs, both the needs

- perceived by the patient
- those demonstrated through a clinical examination and patient interview

The achievement of the patient's dental treatment includes 4 distinct processes:

1. A systematic patient **interview to understand** the patient desires and chief complaints and history behind them.
2. A diagnostic **clinical examination** to ascertain the patient dental needs.
3. Developing a **treatment plan** that reflects the best management of desires and needs
4. Executing (accomplishing) **appropriately sequenced treatment plan**.

Patient interview

The fundamental **objective of patient interview** is to listen carefully to what the patient has stated in order to gain a **clear understanding** of why the patient is presenting to this evaluation (**chief complains as described by the patient word**).

The formats of the patient interview should follow a sequence:

1. Chief complaint and its history
2. Medical history review
3. Dental history review, (especially related to previous prosthodontic experience)
4. patient expectations

Shared decision making: The dentist responsibility is to help the patient to participate in a process of identifying the best decision for course of treatment.

The objectives of prosthodontic treatment

The objectives of prosthodontic treatment must be maintain which include -:

1. The best method of **restoring the lost function** within the limits of tissue tolerance of the patient .
2. Maintain or **improve on the appearance** of the mouth. As the **first** objective is satisfied, so the **2nd** requirement is **comfort** in an esthetically pleasing manner. (esthetically pleasing restoration)
3. The preservation and **maintenance of the health** of the remaining teeth and oral tissues (which will enhance the removable partial denture design)

Oral Examination

visual and digital examinations of teeth and surrounding structure with mouth mirror, periodontal probe and tweezers. (to determine the need for management of acute needs).

It should be accomplished in the following sequence:

1. Pain relief and temporary restorations
2. Oral prophylaxis:
3. Radiographic survey.
4. impression for making accurate diagnostic cast
5. Examination of teeth and residual ridge by instrument and visual means

1. Pain relief and temporary restorations:

objectives:

- to relieve discomfort arising from tooth defects
- to determine the extent of caries
- to arrest further caries activity

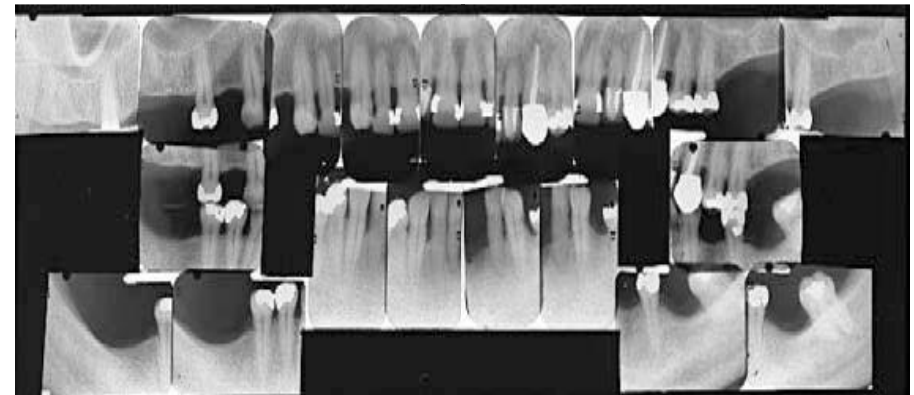
2. Oral prophylaxis: to thoroughly and completely clean the teeth from accumulated calculus and debris.

- Teeth free from accumulation of calculus and debris.
- Accurate diagnostic cast of dental arch can be done

3. Radiographic survey

objectives:

1. To locate areas of infections or pathosis
2. To reveal the presence of tooth fragments, foreign objects, bony spicules irregular ridge forms.
3. To reveal the presence and extent of caries, recurrent caries, marginal leakage and overhanging gingival margins.
4. To reveal the prognosis of present endodontic filling
5. To reveal the periodontal conditions
6. To evaluate the alveolar support of abutment teeth
7. To evaluate the alveolar laminadura
8. Root morphology
9. Presence of third molar



4. Impression for making accurate diagnostic cast to be mounted for occlusal examination, mounting preferably on semiadjustable articulator

5. Visual evaluation of teeth, periodontium and residual ridge (by instrumentation, visual examination and palpation).

The objectives are to reveal:

1. many of the signs of oral and dental diseases like **caries**, restored teeth present signs of **recurrent caries** initial examination.
2. examination of **periodontal disease**
3. The **number** of teeth remaining, the **location** of the edentulous areas, and the **quality** of the residual ridge



4. Tissue contours (a well-formed edentulous residual ridge) small but stable residual ridge is preferable to a larger unstable ridge for providing support for the denture
5. The presence of tori or other bony exostoses must be detected
6. occlusal relationship with the opposing arch must be considered separately

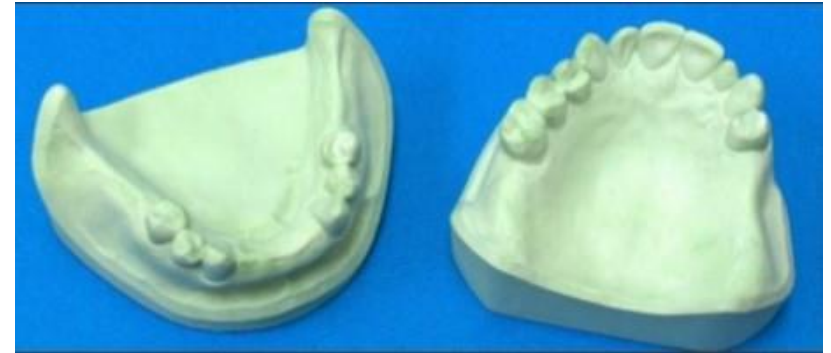


7. Determination of the depth of floor of the mouth by (Direct method - periodontal probe - & Indirect method - diagnostic cast-) (why?)

Diagnostic casts:

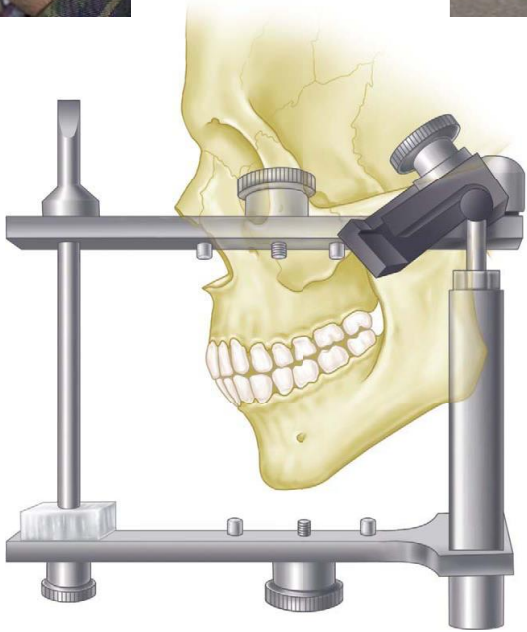
objectives:

1. Analyzing of existing **occlusion**
2. Permit a topographic **surveying**
3. Permit a logical and comprehensive **presentation to the patient**
4. Fabrication of **special (custom) trays**
5. Used as a **constant references** as the work progresses
6. Considered as a **permanent** record of the patient.

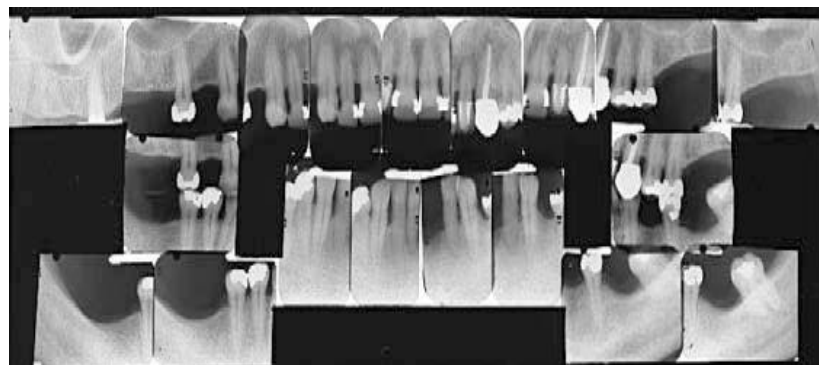


Objectives of mounting the diagnostic casts:

1. To **reveal** malpositioned teeth, low-hanging tuberosities, compromised interarch space, and defective restorations.
2. To permit evaluation of **occlusal relationships** from facial and lingual aspects.
3. Helpful in **patient education**.
4. Provide a **record of the patient's condition before treatment**.



Evaluation and interpretation of diagnostic data **All diagnostic data must be collected** before an effective evaluation can be made. The practitioner must correlate intraoral findings with those of the radiographic survey, the mounted casts, the survey and analysis of the diagnostic casts, and other relevant information. **Results should be used in the development of a sound treatment plan.**



Interpretation of Examination Data

1) Roentgenographic interpretation:

The quality of the alveolar support of an abutment tooth

2) Value of interpreting bone density

evaluating the quality and quantity of the alveolar bone are the height and the quality of the remaining bone structure

3) Root morphology

Teeth with multiple and divergent roots will resist stresses better than teeth with fused and conical roots,

4) Periodontal considerations

looking for adequate zones of attached gingiva and the presence or absence of pockets. The condition of the supporting bone must be evaluated and mobility patterns recorded

Need for extraction

Need for extraction of teeth for the following reasons

1. If the tooth **cannot restore** to a state of health, extraction may be unavoidable.
2. A tooth may be removed if its absence will permit **amore serviceable** and **less complicated partial denture design**.
3. A tooth may be extracted if it is so anesthetically located as to justify its removal to **improve appearance**.

Indications for RPD Treatment:

- 1) Long edentulous span
- 2) Reduced periodontal support of the remaining teeth
- 3) Need for cross arch (bilateral) stabilization
- 4) Excessive bone loss of the residual ridge
- 5) Distal Extension Situations (no abutment tooth posterior to the edentulous area) Class I and Class II
- 6) Patient desires
- 7) Childhood
- 8) Economic Considerations
- 9) Immediate replacement of teeth
- 10) obturation of intraoral defect

Differential diagnosis for fixed or removable partial denture

Although replacement of missing teeth by means of partial denture either tooth or implant supported is generally the method of choice, there are many reasons why a removable partial denture may be a better method of treatment for specific patient. The choice of treatment must meet the economic limitations and personal desires of the patient. although uncommon, unilateral RPD in place of fixed partial denture. This type of prosthesis places excessive stresses on abutment teeth .possibly more important, the risk for aspiration is significant if such prosthesis dislodge during use. For these reasons, the use of unilateral RPD is strongly discouraged

The Recommended Infection Control Practices for Dental Treatment

1. **Gloves** should be worn in treating all patients.
2. **Masks** should be worn to protect oral and nasal mucosa from splatter of blood and saliva.
3. **Eyes should be protected** with some type of covering to protect from splatter of blood and saliva
4. **Sterilization methods** known to kill all life forms should be used on dental instruments. Sterilization equipment includes steam autoclave, dry heat oven, chemical vapor sterilizers, and chemical sterilants.
5. Attention should be given to **cleanup of instruments and surfaces** in the operator. This includes scrubbing with detergent solutions and wiping down surfaces with iodine or chlorine (diluted household bleach solutions).
6. **Contaminated disposable materials should be handled carefully and discarded in plastic bags** to minimize human contact. Sharp items, such as needles and scalpel blades, should be contained in puncture-resistant containers before disposal in the plastic bags

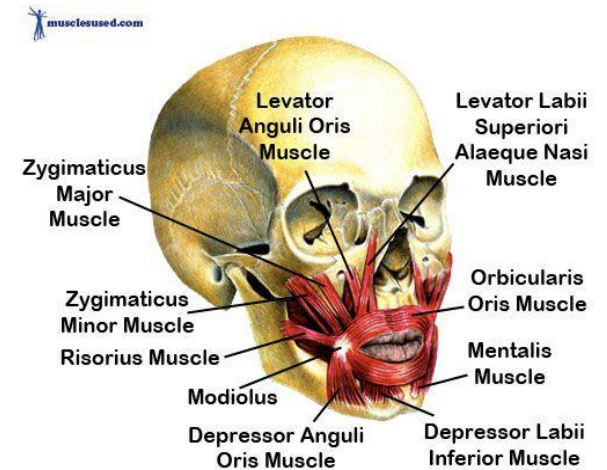


Thanks

Myology related to complete denture



By: Lec. Marwa M. Shehab
م. مروة مروان الشهواني



Myology related to complete denture

The musculature is involved directly in several important phases of complete denture treatment,

- 1- The action of muscles as **prime movers** of the **mandible** and hence as the **power for repeated occlusion** of the teeth.
- 2- They are active during **mastication, deglutition, and speech**.
- 3- They exert a **direct and indirect** influence upon the peripheral **extensions**, shape, and **thickness** of denture bases, the **positions of teeth** both horizontally and vertically, and **facial appearance**.

The muscles that are intimately involved in complete denture service are defined as **skeletal muscles**

In the **majority of skeletal muscles**, the origins and insertions are in bone.

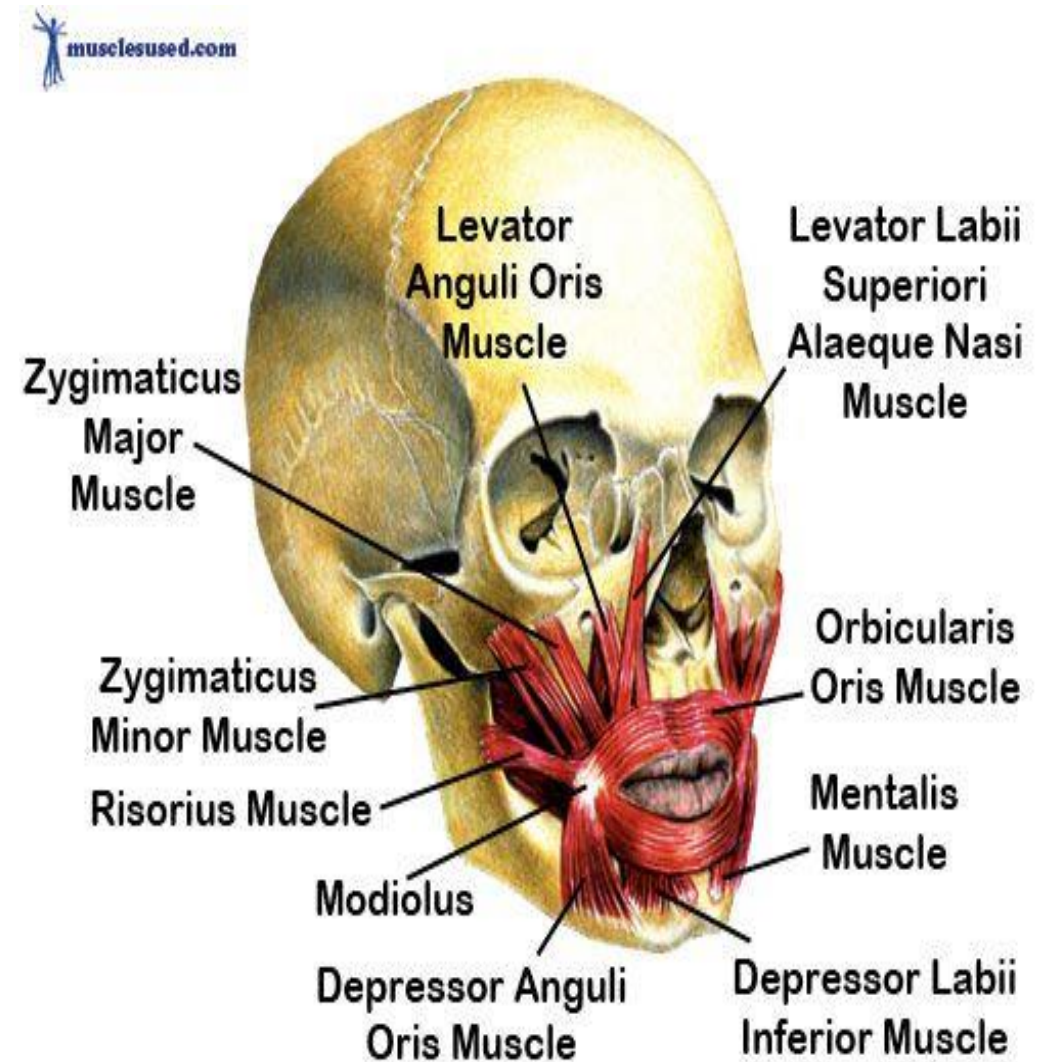
However, **many of the skeletal muscles involved in complete denture construction** have a bony origin but insert into an aponeurosis, a raphe, or another muscle.

Prolonged and strong contraction of a muscle leads to **fatigue**. If a muscle becomes fatigued to an extreme extent, it is likely to become continually contracted, remaining contracted for many minutes even without an action potential as a stimulus. When the fatigue is over, the muscle gradually relaxes.

If an **individual's mandible is protruded and allowed to remain until fatigue occurs, the antagonist action to the retractor and elevator muscles will be weakened. It would be possible to retrude and elevate the mandible to the centric position against very little or no opposing action from the external pterygoid.**

Muscles of facial expression

The zygomaticus, quadratus labii superioris, levator anguli oris, quadratus labii inferioris, depressor anguli oris, risorius, platysma, upper incisor, lower incisor, mentalis, orbicularis oris and the buccinator are responsible for the various expressions seen in the lower half of the face. The actions of these muscles often reflect the mental state, the personality, and the well-being of an individual (laughing, frowning).



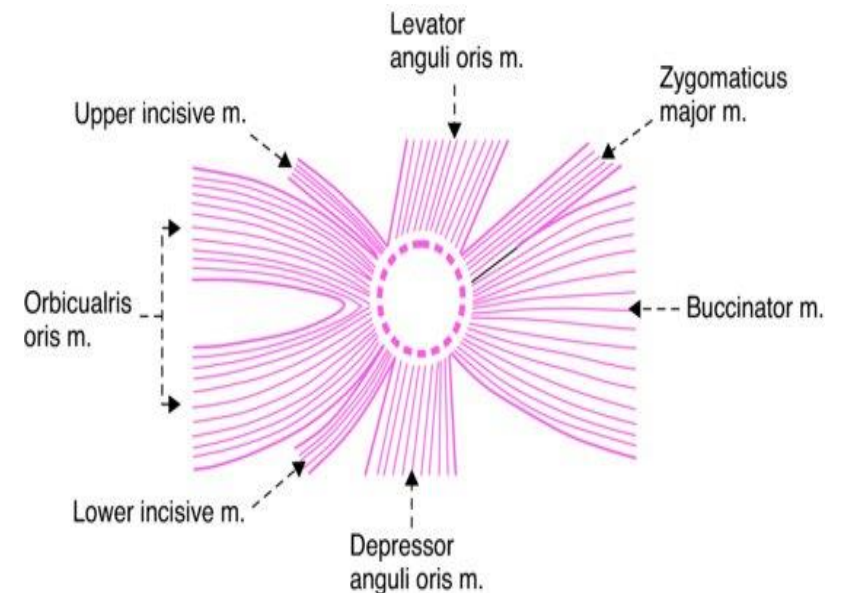
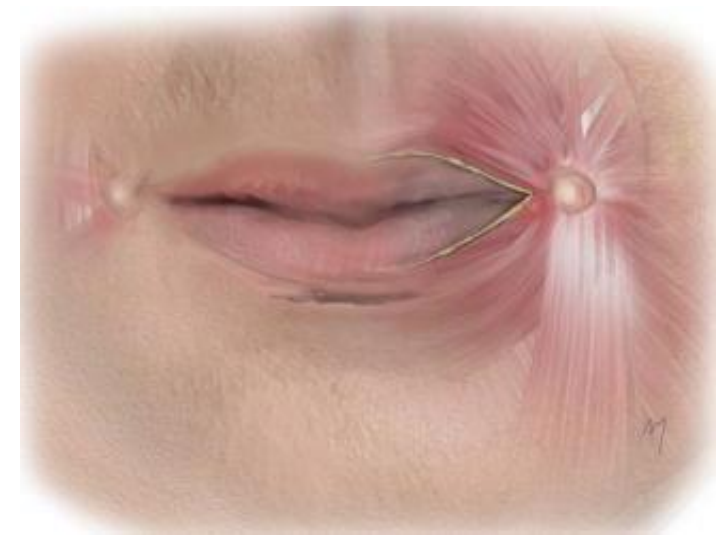
The muscles of facial expression(perioral muscle) **don't insert into bone and need support from the teeth for proper function.** Insertion into connective tissue of the skin and partly into the mucous membrane of the lips.

If the muscles of facial expression are not properly supported, either by the natural teeth or by the artificial substitutes, none of the facial expressions appears normal.

- **Incorrect positioning of the teeth or incorrect contour of denture base** can affect the normal **tonicity** of theses muscle and can **affect adversely the facial expression.**
- **Lack of support** allows **sagging** of the soft tissues of the face, while **stretching inhibits** the normal **contraction** of the facial muscles and results in **changes in muscle tone**

- These muscles depend on a **proper vertical dimension** of the face as determined by the occlusion of the teeth in order that they may be neither **stretched** beyond their ideal length nor permitted to **sag**.
- The **origins** of several muscles of facial expression are **near enough to the denture-bearing** areas that their actions must be considered as definitely influencing the **denture borders**.
- Another problem is the **tendency to cheek biting** when the denture teeth are placed in the improper positions occupied by the natural posterior teeth.

modiolus(muscular node): The area laterally and slightly above the corner of the mouth which is a concentration of many fibers of this group of muscles. It represents an area where extrinsic perioral muscles decussate to join the intrinsic fibers of the orbicularis oris muscle. **The labial flanges of the maxillary denture frequently need to be reduced in thickness in the area of the modiolus in order not to affect the stability of the maxillary denture. At times, the mandibular first premolar should be arranged properly on the crest of residual ridge to avoid any interference with this modiolus.**



The orbicularis oris muscle

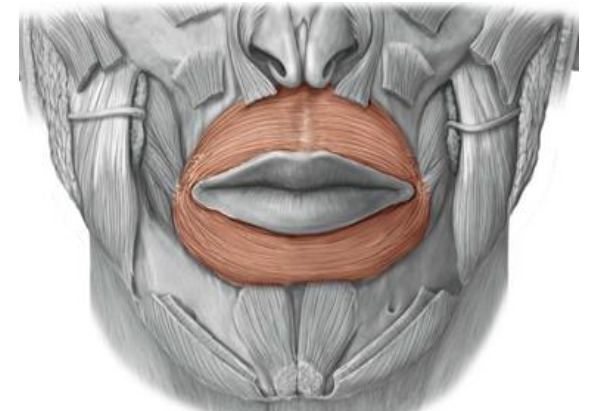
is the sphincter muscle of the mouth has no skeletal origin or insertion. It is attached to the maxilla by maxillary labial frenum and to the mandible by the mandibular labial frenum.

Function :

The action of this muscle can close the lips, narrow and adapt the lips to the alveolar process or protrude the lips.

The position and action of the orbicularis oris muscle is dependent on proper:

- I. anteroposterior position of the anterior teeth.
2. Thickness of the labial flanges of both dentures.
3. vertical dimension of occlusion



orbicularis oris muscle

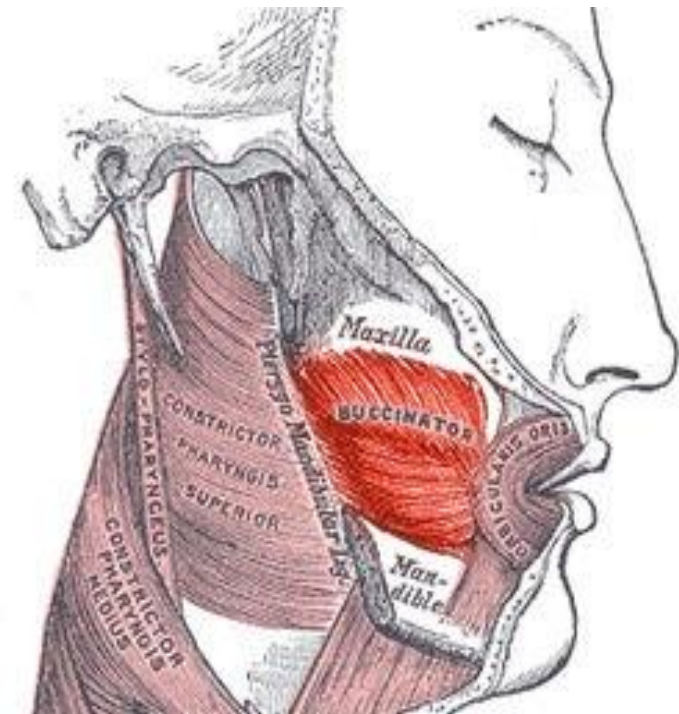
- **The insertion of the muscles of facial expression distal to the corners of the mouth at the modiolus and the position and action of the orbicularis oris have a definite influence in impression making.** When the muscles of the lips are relaxed, the lips become flaccid. This can happen with jaw open therefore, it is important for dentist to make sure that the action of this muscle are recorded when making impression for dentures
- If this muscle is stretched, the angles of the mouth are easily irritated when an impression tray is inserted.
- In normal occlusion the superior border of lower lip is supported by incisal third of the maxillary anterior teeth, if not so, the lower lip would be caught by the anterior teeth during occlusal contact.

Buccinator muscle: forms the mobile and adaptive substance of the cheeks.

Origin: It arises from the outer surface of the maxilla and the mandible opposite the sockets of the first molar teeth.

Insertion: most of the fibers insert into the mucous membrane of the cheek in and around the tendinous node and tendinous line. The other fibers terminate in the skin of the upper and lower lips near the commissure.

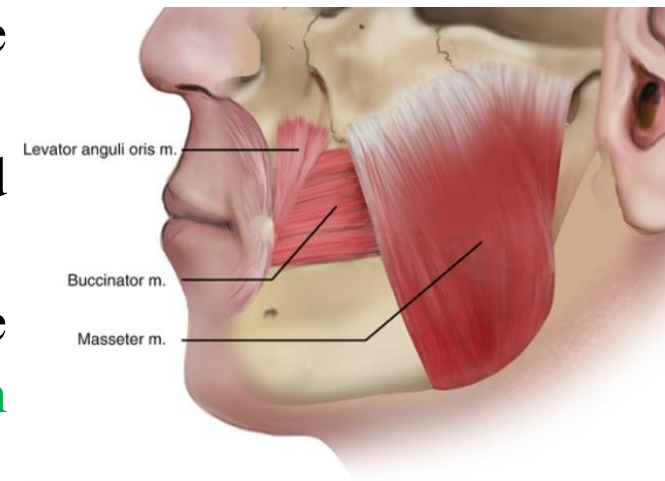
It is in the lower jaw that the muscle becomes a part of the denture-bearing area.



Buccinator muscle: The action is parallel to the plane of occlusion. The fibers parallel to the occlusal plane are at right angles to the fibers of the masseter muscle. When the masseter is activated, it pushes the buccinator medially against the denture border in the area of retromolar pad. This is a dislodging force and the denture base should be contoured to accommodate this action; this contour in the denture base is termed the **masseter groove(massetric notch)**. The action of the buccinator muscles pulls the corners of the mouth laterally and posteriorly

Effect on denture borders

- ❑ The superior **origin** of the muscle influences the height of the **distobuccal flange of the maxillary denture**.
- ❑ **Contraction** of the buccinator pulls the maxillary and mandibular buccal **frenae backward**.
- ❑ **In the buccal shelf area**, the mandibular **denture rests** on the fibers of the buccinator. However, **because the fibers run anteroposteriorly**, contraction does not unseat the denture.

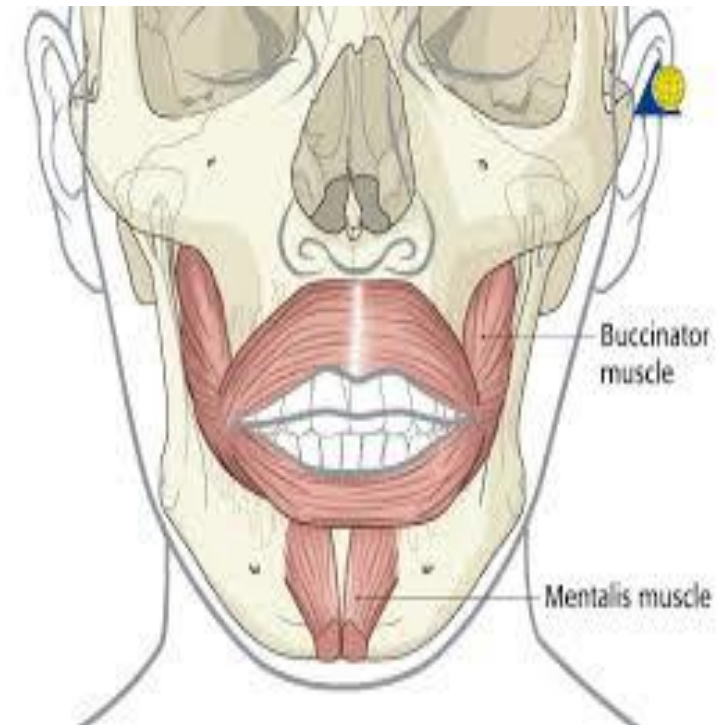


Mentalis muscle:

Origin Arise above the mental protuberance and inserted in the skin of the chin and lower lip

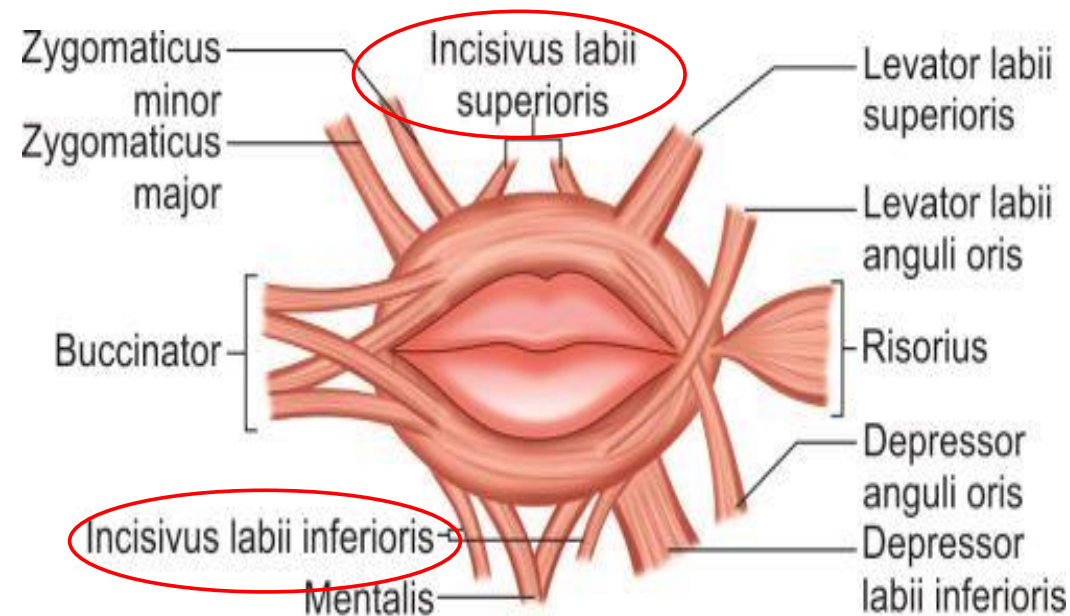
Functions related to prosthodontic

1. Contraction of this muscle is capable of dislodging mandibular denture.
2. It can dictate the level of extension of the labial flange of mandibular below the crest of the ridge.
3. Render the lower vestibule shallower when it contract.
4. Surgical repositioning of the mentalis muscle is sometimes advisable



The incisivus labii superioris and inferioris muscles

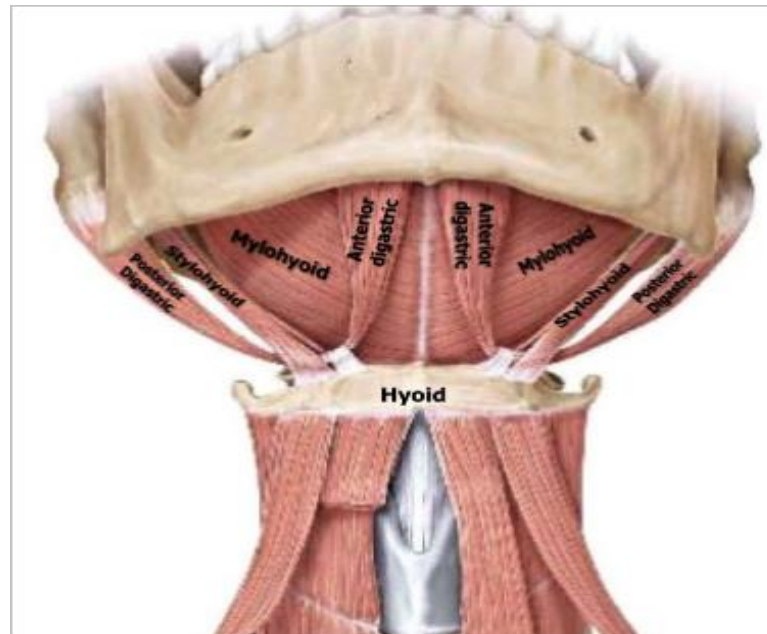
their presence beneath the mucous membrane might present problems associated with flange extension and denture retention.



Suprahyoid muscles (*digastric, stylohyoid, geniohyoid, Mylohyoid*)

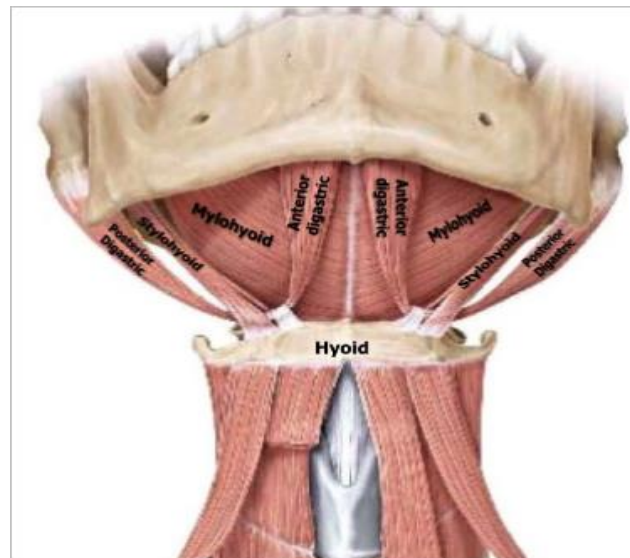
Geniohyoid and Mylohyoid may influence the border of the mandibular denture

If the denture extend below and under the mylohyoid **line(over extension)**, it will **impinge on mylohyoid muscle**, and can affect it action



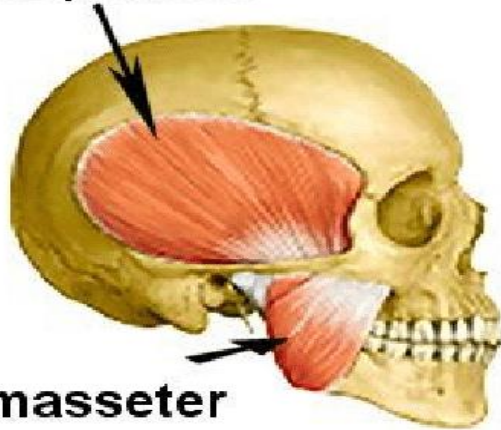
Infra hyoid muscle (*sternohyoid, omohyoid, Sternothyroid and thyrohyoid*)

They are important for they are a part of the kinetic chain of mandibular movement. Their action is to fix the hyoid bone so that the suprahyoid muscles can act on the mandible.



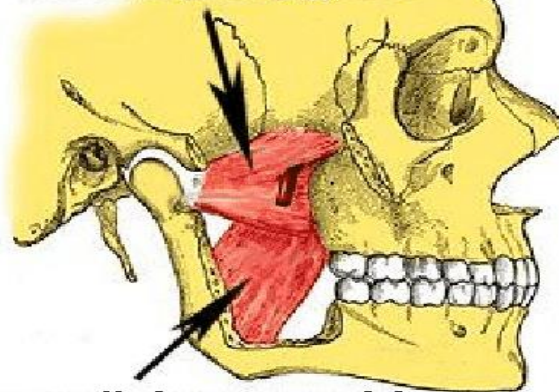
The Muscles of Mastication:

temporalis

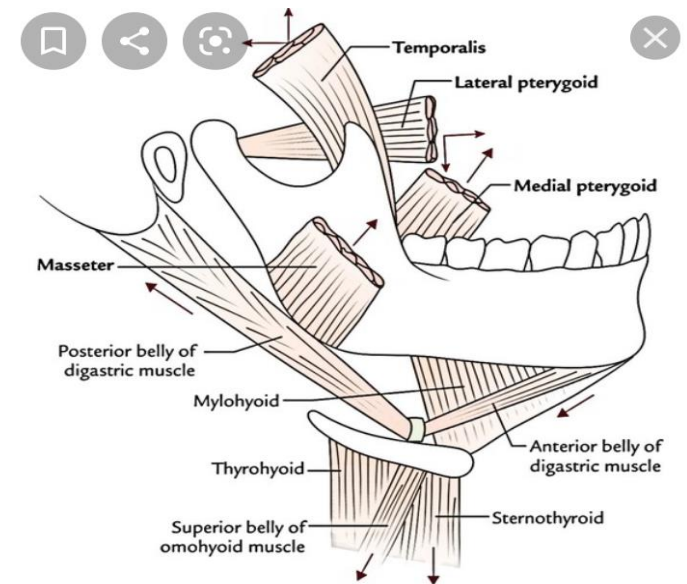


masseter

lateral pterygoid



medial pterygoid

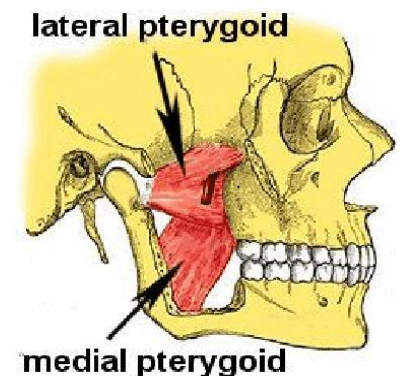
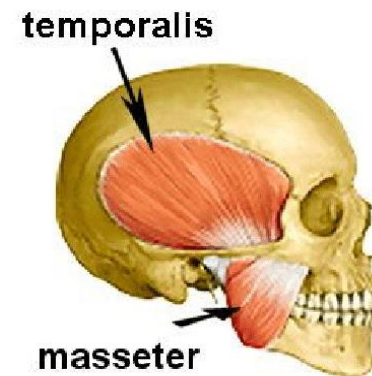


The Muscles of Mastication:

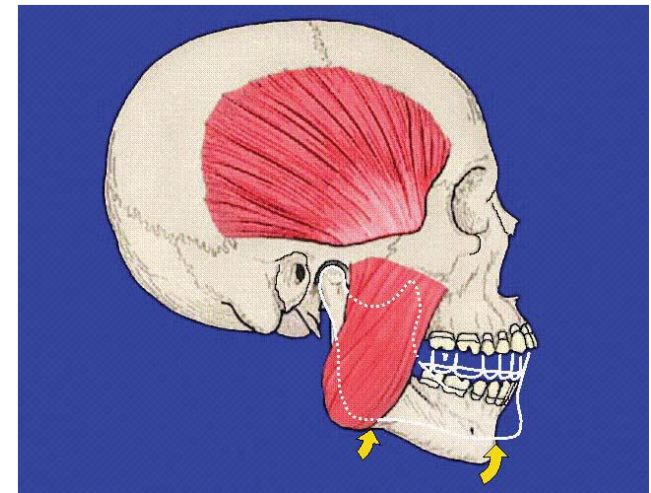
This knowledge is utilized in making jaw relation records, particularly centric relation or centric position

There are four large muscles attached to the ascending ramus and condyle of the mandible, these move the mandible during chewing, speaking and swallowing. They are called collectively the muscle of mastication

1. The masseter muscle.
2. The temporalis muscle.
3. The medial pterygoid muscle.
4. The lateral (external) pterygoid muscle



1- Masseter Muscle: The masseter is a rectangular muscle that originate from zygomatic arch and extends downward to the lateral aspect of the lower border of the ramus. It's insertion on the mandible extends from second molar region posteriorly to the angle of mandible. It's a powerful muscle which provides the force necessary to chew efficiently, and it **raises the mandible**.

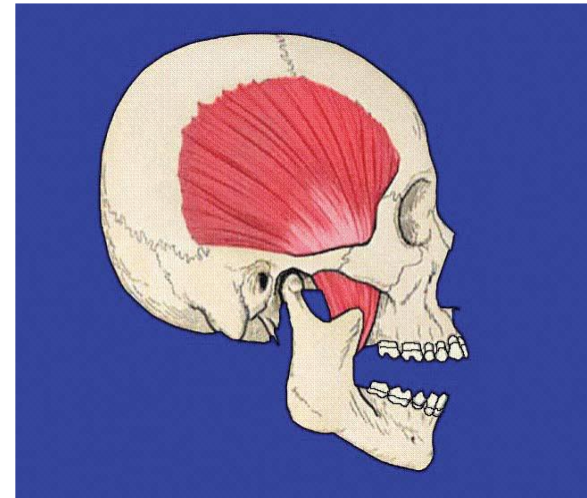


Effect on denture borders

A/ Forceful contraction of the masseter muscle forces the buccinator muscle in a medial direction in the area of the retromolar pad. This action can be recorded in the final impression, and the distobuccal border of the lower denture can be contoured to accommodate the muscle action. If this is not done, the action will displace the mandibular denture and muscle force it in an anterior direction.(mandibular denture)

2- Temporalis Muscle:

The large fan-shaped on the side of the skull, it arises on portion of frontal, parietal and temporal bones and inserted on superior border and medial surface of the coronoid process some fiber extends down the anterior portion of the ramus and insert in to retromolar pad, it is action **synergistically** with masseter muscle to **raise the mandible**, and also **retraction** of the mandible when only **posterior fibers** of the muscle are activated



Effect on denture borders

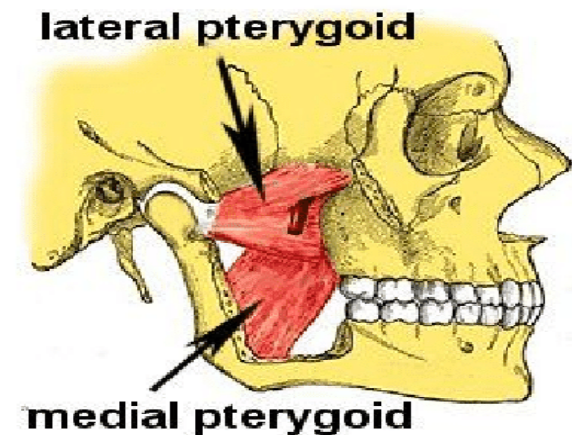
A/ The extension of the temporal tendon into the retromolar pad may affect the posterior border of the mandibular denture (extension of lower denture).

B/ The attachment of the muscle on the coronoid process of the mandible affects the buccal aspect of the denture border of the maxillary denture by racing the buccinator muscle to encroach on the buccal vestibule during lateral and latero-protrusive movement of the mandible.

3-Internal (medial) Pterygoid Muscle:

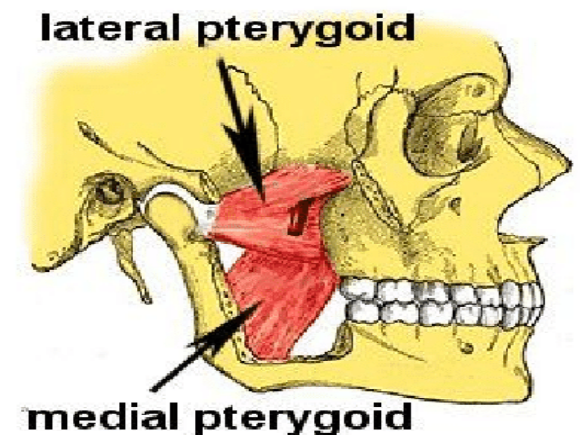
It's originates in the pterygoid fossa some fibers originate from the posterior aspect of the maxillary tuberosity and the adjacent surface of the palatine bone, and extends downward, backward and outward to insert along the medial surface of the mandibular angle. It works **synergistically** with masseter and temporalis muscle to **raise** the mandible. **Unilateral** contraction will bring about a **mediotrusive (protrusion and lateral movements)** movement of mandible.

Effect on denture borders: the attachment to the maxillary tuberosity may affect the denture border in the hamular notch area.



4-External (lateral) Pterygoid Muscle:

It's the **origin** of the muscle is that the **upper head** arises from the infra-temporal surface and crest of the greater wing of sphenoid bone, **lower head** arise from lateral part of the lateral pterygoid plate, the **insertion** of the upper head, few superomedial fibers inserted into the medial aspect of the capsule and meniscus, and the reminder fiber of upper head together with fibers of the lower head inserted into pterygoid fovea of the condyle of the mandible. **The upper head plays an important role in stabilizing and controlling the movement of the meniscus** . Also the muscle pulls the neck of the mandible and articular disk **forward and downward(protrusion and depression)**.



Tongue

The tongue is a muscular organ, attached with its base and the central part of its body to the floor of the mouth. **The denture flanges must be contoured to allow the tongue its normal range of functional movements.**

The muscular activity of the tongue is controlled by two groups of muscles, the **Intrinsic muscles**: being wholly inside the tongue, can only produce changes of shape in the tongue.

Extrinsic group (genioglossus, styloglossus, hyoglossus and palatoglossus) take origin from parts outside the tongue and can move the tongue as well as alter its shape.



Muscles of the soft palate

The tensor veli palatini, levator veli palatini, muscular uvulae, and palatoglossus are the muscles of the soft palate.

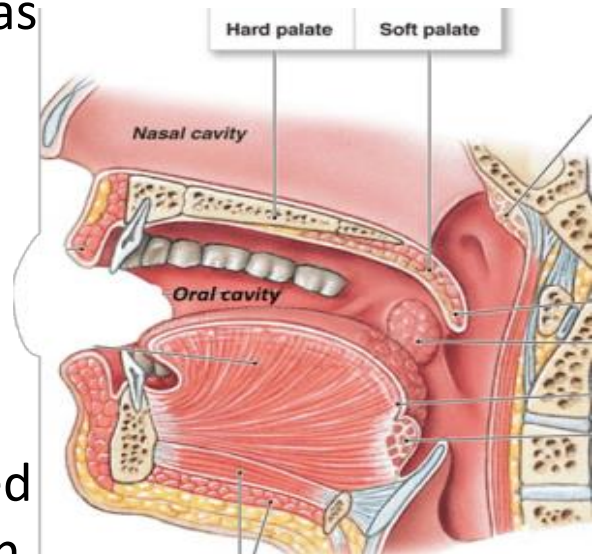
Tensor veli palatini: This slender muscle when taut, can influence the denture **contour in the hamular notch area.**

Levator veli palatini: It **elevates** the soft tissues during swallowing as well as helps in **determining the position of the vibrating line** when developing a posterior palatal seal for a maxillary denture.

Palatoglossus: When the two palatoglossi contract, they draw the tongue and soft palate toward each other. This action also exerts lateral pressure on the **lingual extension of a mandibular denture.**

Clinical significant

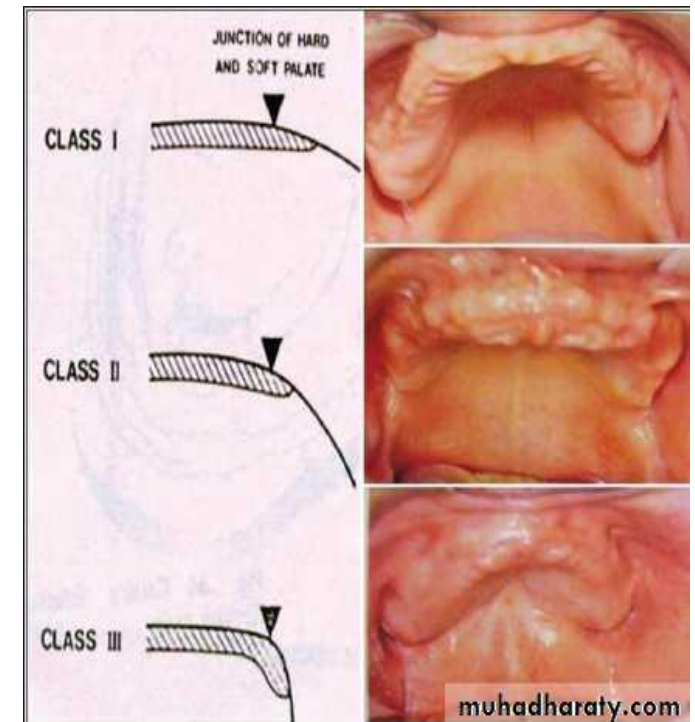
Since there is a need to determine the vibrating line which is located on soft palate not over the palatine bone. The patient says Ah when the patient closes both nostrils and blow gently. The air will force the soft palate to flux inferiorly at the junction of movable and non-movable soft palate.



Classification of the soft palate

Soft palate can be classified into:

- **Class I**: horizontal with little muscular movement. In this case more tissue coverage is possible for posterior palatal seal.
- **Class II**: soft palate makes 45 degree angle to the hard palate. Tissue coverage for posterior palatal seal is less than that of class I condition.
- **Class III**: soft palate makes 70 degree angle to the hard palate. Tissue coverage for posterior palatal seal is minimum.



Muscle physiology:

The muscles that are intimately involved with complete denture function are skeletal muscles which are controlled by the central nervous system (CNS) **Afferent and efferent**. The oral cavity has many **sensory receptors (periodontium)**. When the teeth are **extracted**, **these receptors are lost**.

There **are proprioceptors** in periodontal ligaments, lips, tongue, cheeks, mucosa, skin, muscles, and temporomandibular joints (monitor the position of the mandible).

Muscle contraction (**isometric**, contraction not shorten) and (**isotonic** contraction shorten).

In the **mandible both occurred isotonic move and isometric contraction to brace the mandible when teeth contact importance during recording of jaw relation**.

When load applied on muscle Elongate with limit, the greater the load the greater the stretch, this is of importance during recording of jaw relation.

Oral mucosa

Depending on its location, it could be classified into:

1. The masticatory mucosa.
2. The lining Mucosa.
3. The specialized mucosa. .

The masticatory mucosa: keratinized stratified Squamous epithelium

In edentulous patients it covers:

1. The **crest of the residual ridge**, here it is firmly attached to the underlying supporting bone.
2. The **hard palate**, this masticatory mucosa is characterized by a **well-defined keratinized** layer on its outermost surface.

As long as tissues should be recorded when or during their resting condition, for tissues tend to return to their normal form after a period of time after being displaced, thus, creating an unstable denture, so that proper relief is sometimes needed for proper recording of these tissues in their undistorted form.

The region of the **median palatal suture exhibits a very thin submucosa** firmly attached to the underlying bone, that's why the covering tissues of this suture is **non resilient**. Here a very little or no stress can be subjected to this area during the impression making procedure or rocking of this denture above the center of the palate will occur.

The lining mucosa: Stratified Squamous epithelium non keratinized

Found in the lips, cheeks, and vestibule spaces, this type of mucosa is not firmly attached or in other words, it is **loosely** attached to the underlying bone. In other areas as the alveololingual sulcus, the soft palate and the ventral surface of the tongue this lining mucosa is non keratinized mucosa.

The specialized mucosa: Covers the dorsum of the tongue, here this mucosa is **keratinized** including the papillae on the upper surface of the tongue.

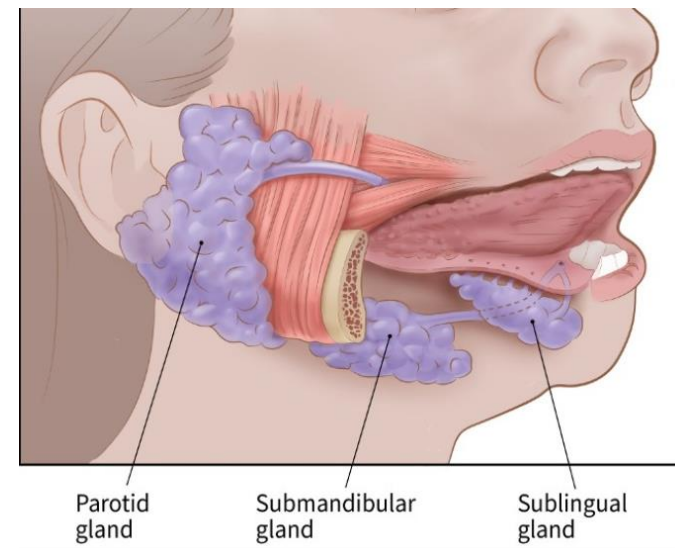
Oral mucosa of **soft palate is stratified squamous epithelium none keratinized**. The Sub mucosa here have numerous gland supporting membrane, it is a transition between loosely and fixed type of mucosa

Salivary gland and saliva

Saliva is secreted by three different major exocrine glands:

1. A serous secretions by the parotid gland.
2. A mixed but mostly serous secretion by the submandibular glands.
3. A mixed but mostly mucous secretions by the sublingual glands.

Some other smaller glands are located in the mucosa of the tongue, lips and palate.



The viscosity of saliva is important

A thick ropy saliva can cause some problems:

1. Very thick saliva can force the dentures out of their correct position.
2. Complicates impression making by forming voids in the impression surface while the impression material sets.
3. Causing the patients to gag while impression are made and after the new denture are installed

lack of saliva (xerostomia) cause some problem:

1. Reduced retention of denture.
2. Sticking of cheeks and lips to the denture base in an uncomfortable manner.
3. Formation of sore spot under the denture which is very annoying to the patient.
4. Lack of oral hygiene.

Physiologic factors affect salivation

1. Agreeable taste stimuli result in profuse salivation.
2. A smooth surface inserted into the mouth (Ex: polish surface of denture) will result in an increase in salivation.
3. When a patient is dehydrated salivation decreases.
4. Emotional and other psychological stimuli excite the autonomic nervous system, and in turn the function of the body organs are altered.
5. As one ages, the saliva becomes more ropy in consistency.

Functions of Saliva Complete Denture Prosthodontics

1. Contain enzyme digestive ptyalin for **digestion** of starchy foods.
2. **Lubricant** for the mucosa and surface of the denture.
3. **Protective agent** (antifungal and antibiotics activities).
4. Aids in **retention** of removable prostheses.
5. **Mechanical cleansing**.

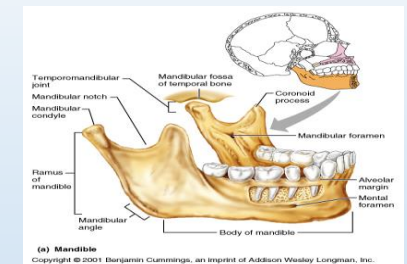
THANKS FOR ATTENTION



Anatomy and physiology as related to dental prosthesis (osteology)



By: *Lec. Marwa M. Shehab*
م. مروة مروان الشهبواني



- Objectives:

- 1- To give knowledge about the introral anatomical landmarks (denture bearing areas and denture boundaries)
- 2- fabricate a complete denture (retention, support, stability with preservation of these underlying and surrounding structure)
- 3- deliver a denture which is compatible with the oral environment, able to function in harmony during mastication, speech and swallowing

- The osseous structures not only support the denture but have a direct relation on the **impression making** procedure, **position of teeth** and the **contours of the finished** denture
- There are certain tissue areas or regions in the maxillary and mandibular edentulous foundations, which are **better suited to bear the stresses due to mastication, and are called as *stress bearing areas***. While there are other tissue areas which are not quite suited to take up these stresses, either due to their anatomy or due to the structures that lie beneath them and are called *stress relief areas*. The structures which limit the extension of the maxillary and mandibular complete dentures are called *border-limiting areas*.

The anatomic landmarks of significance in relation to maxillary and mandibular complete denture can be discussed as:

1- Mucous membrane

2- Supporting areas: these are the structures that support the denture

3- Limiting areas: these are the structures that limit the border extent of the denture.

4- Stress-bearing areas

5- Relief areas

- **Mucous membrane**

- Covers or lines the oral cavity including the residual alveolar ridges and acts as an intervening **cushioning** material between the residual ridges and denture

It consists of:

1. Mucosa: mucosa is firmly or loosely attached to the under lining structure
2. Submucosa: connective tissue, attaches the mucosa to the underlying structures.

Factors that influence the form and size of the supporting bone include the following:

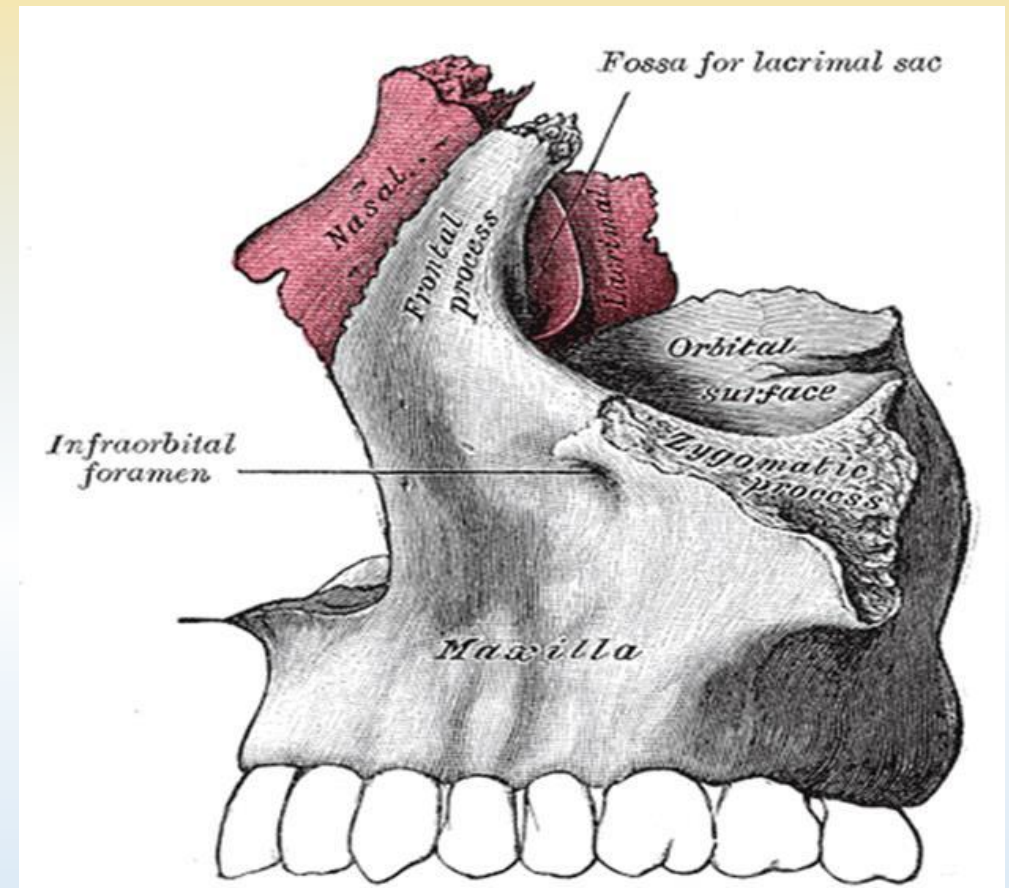
1. The original size and arch form before extractions.
2. The severity of periodontal disease.
3. Amount of alveoloplasty at the time of tooth extraction.
4. Forces developed by the surrounding musculature.
5. Forces accruing from the wearing of dental prostheses.
6. The relative length of time different parts of the jaws have been edentulous.
7. Unknown genetic predisposition to bone resorption.

- Osteology of the oral cavity:

The maxilla:

The maxillary denture is supported by **two pairs** of bone the **maxillae** and the **palatine bones** whereas the mandibular denture is supported by **one bone** the **mandible**.

There are two maxillae each consisting of a central body and four processes: alveolar, frontal, zygomatic and palatine. Some area of the body and two of the processes are involved in the support of the maxillary denture.



Maxillary anatomical land marks



Supporting and limiting structures in maxilla: (a) palate, (b) rugae, (c) residual ridge, (d) maxillary tuberosity, (e) labial frenum, (f) labial vestibule, (g) buccal frenum, (h) buccal vestibule and (i) fovea palatine, (j) median palatine raphe, (k) hamular notch, (l) posterior palatal seal area and (m) incisive papilla.

Maxillary anatomical land marks

- Supporting structures

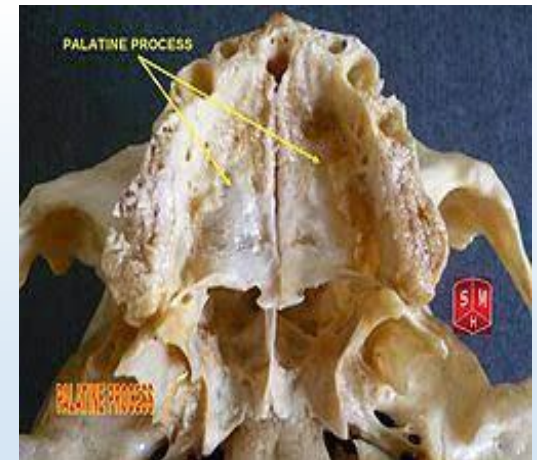
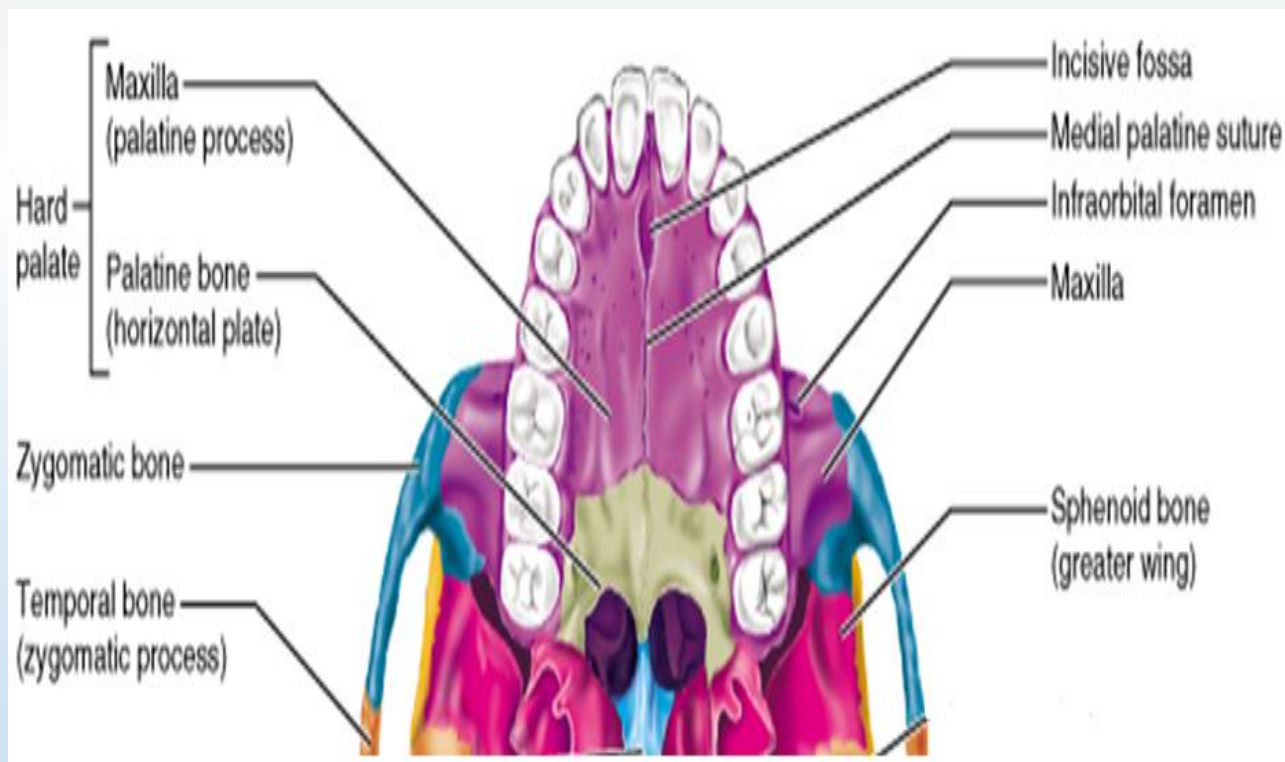
1. Zygomatico-alveolar crest (malar process).
2. Alveolar ridge
3. The palatine bone
4. Palatine process of the maxilla
5. The incisive fossa
6. The pterygoid hamulus
7. Maxillary tuberosity
8. The greater palatine foramen
9. Cuspid eminence.

- Limiting and peripheral structures

1. Labial frenum
2. Labial vestibule
3. Buccal frenum
4. Buccal vestibule
5. Hamular notch
6. Vibrating line(Posterior palatal seal area)
7. Fovea palatine

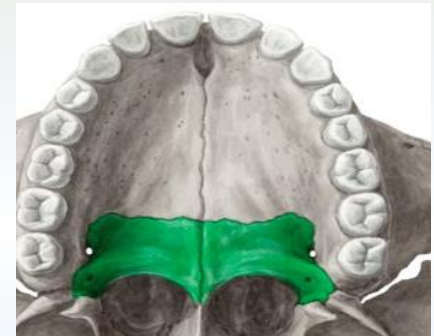
The palatine processes of maxillary bone:

- They arise as horizontal plates from the body of the maxilla
 - The palatine process of the maxillae join together at the midline forming the **median suture (mid palatine suture)**, **Relief** (in order to create equilibrium between the resilient and non resilient tissue supports)
- The hard palate resists resorption (primary stress bearing area)



- **The palatine bone:**

The horizontal plate of palatine bone unite with the posterior rough border of the horizontal palatal process of maxillae. The posterior border of palatine bone unite at midline forming the posterior nasal spine. The soft palate is attached to this posterior border. The PPS is placed at the junction between immovable and movable parts of the soft palate.

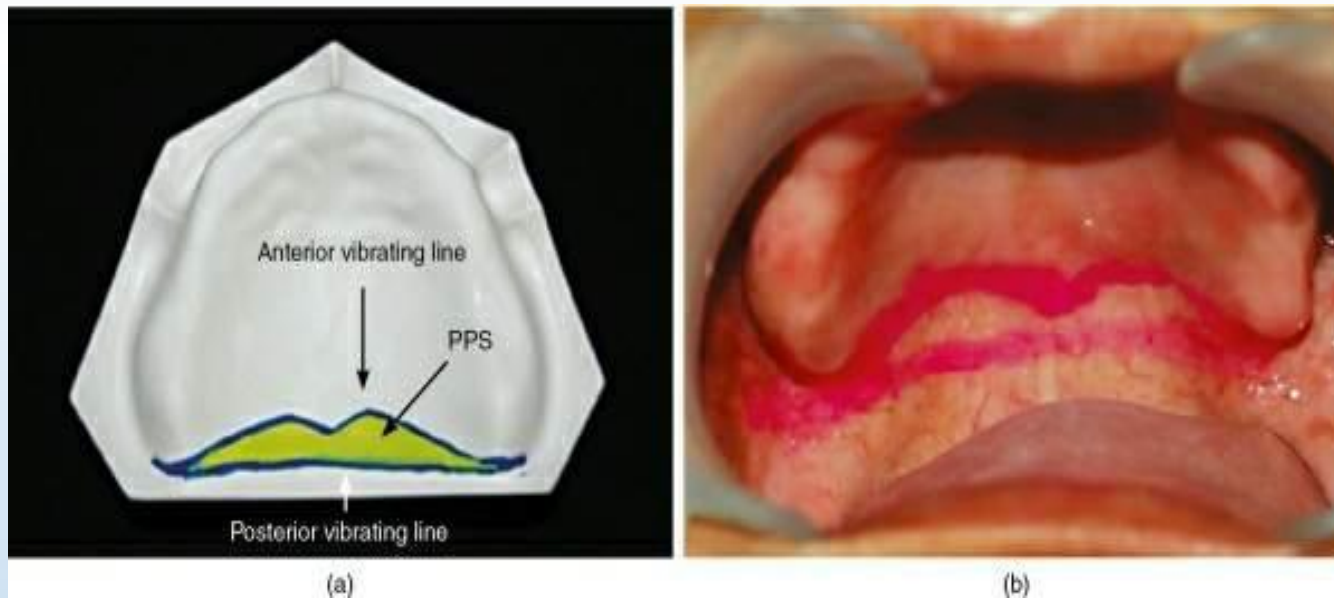


- **Posterior palatal seal (PPS) area:** The soft tissue area limited posteriorly by the distal demarcation of the movable and nonmovable tissues of the soft palate and anteriorly by the junction of the hard and soft palates on which pressure, within physiologic limits, can be placed; this seal can be applied by a removable complete denture to aid in its retention

Posterior palatal seal

- The posterior palatal seal is identified as the area between the anterior and posterior vibrating lines

The soft tissue along the junction of hard and soft palates on which pressure within physiologic limits can be applied by the complete removable dental prosthesis to aid in retention of denture



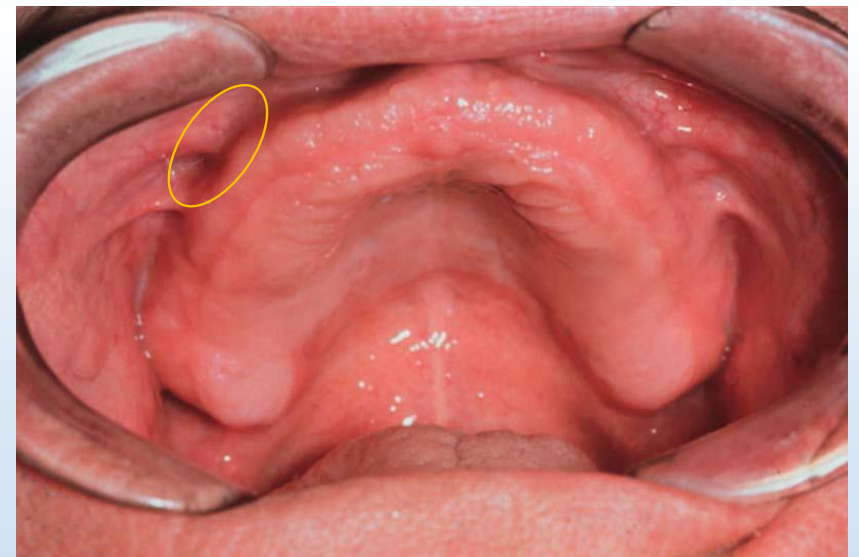
Zygomatico-alveolar crest (malar process):

- it starts at the tip of the zygomatic process of the first molar to disappear at the base of the alveolar process.
- The crest is prominent and mucosa is thin (relieved) .
- good bony support considered to be the primary stress bearing area.



Canine eminence (Cuspid eminence)

- Corner of the mouth
- Used as a guide for selection and arrangement of maxillary anterior teeth
- Relief



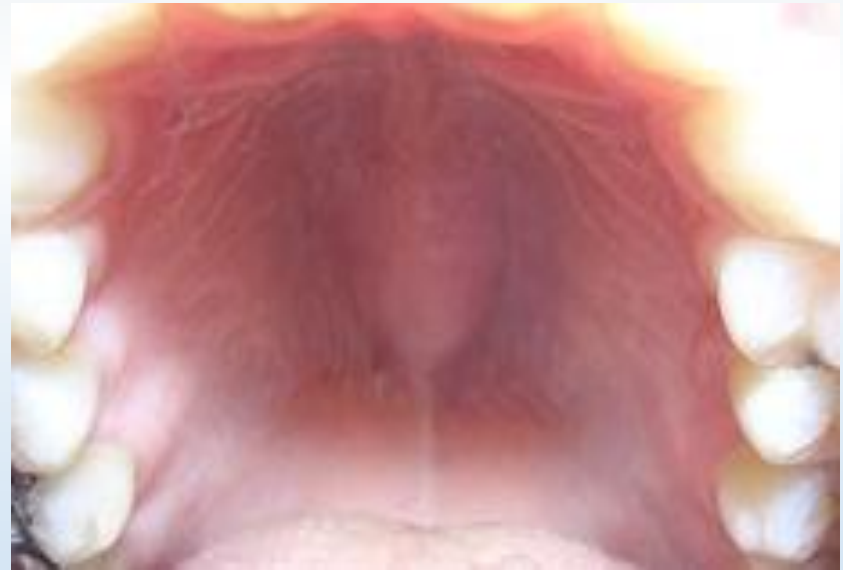
• Alveolar Ridge (Residual Ridge):

- ✓ The residual ridge (after extraction of teeth)
- ✓ The alveolar process (contained sockets for natural teeth).
- ✓ the alveolar ridge can be expected to get smaller (resorb).
- ✓ The rate of resorption varies considerably from person to person.
- ✓ The crest of the maxillary residual alveolar ridge provides good support, but as it is subject to **resorption**, it can be a **secondary stress-bearing area**



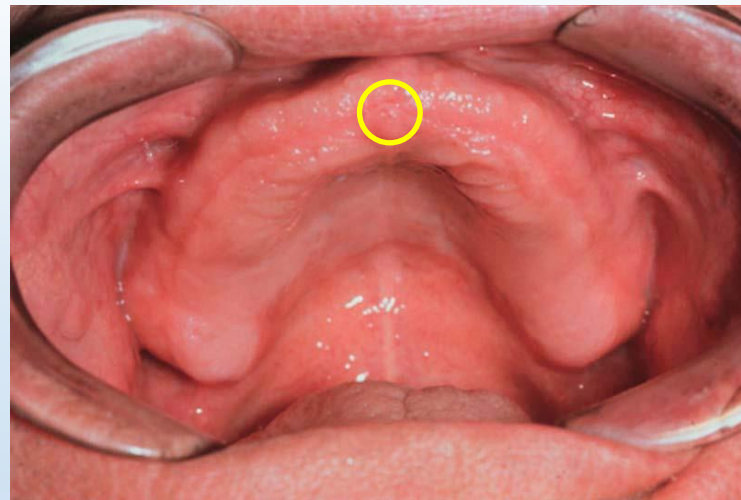
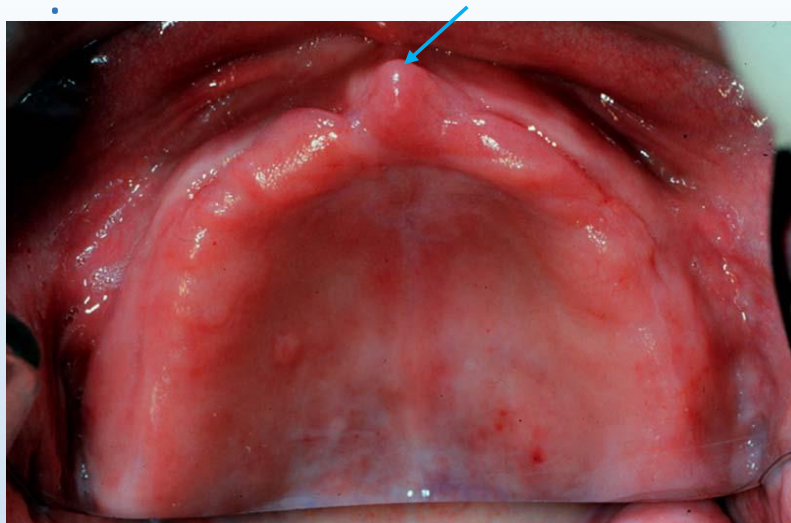
Torus palatinus

- anatomical protuberance.
- It is a hard bony enlargement that occurs in the midline of hard palate and is found in 20% of the population.
- Require relief (less large , irregular shape and undercut area).



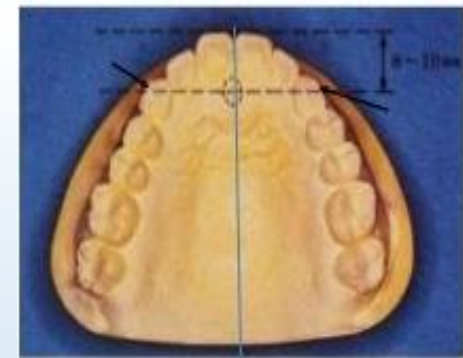
Incisive Papilla

- The soft tissue elevation immediately over the incisive foramen.
- behind the central incisor teeth.
- The foramen is an exit hole for blood vessels and nerves.
- **reliable guide for determining the midline relationships of upper anterior denture teeth.**
- **Relief** to avoid any interference with blood supply and nerve pathway which causes **burning sensation and pain at the anterior part of the palate.**



• Significance

- A stable landmark is related to the incisive foramen through which the **neurovascular bundle** emerge and lies on the surface of the bone.
- It is a biometric guide giving information about **location of maxillary canines** (a perpendicular line drawn posterior to the center of the incisive papilla to sagittal plane passes through the canines).
- It is a biometric guide giving information on **positional relation of central incisors**, which are about 8-10 mm anterior to the incisive papilla.

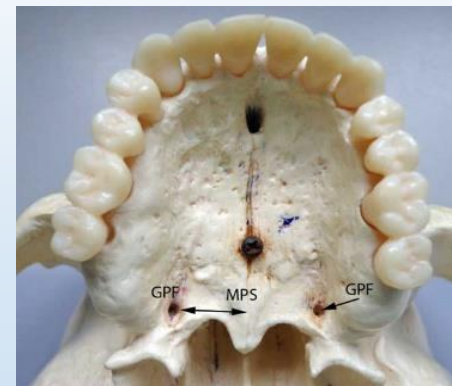


Clinical consideration:

During the impression procedure, care should be taken not to compress the papilla. This is one of the **relief areas** of the maxillary edentulous foundation. Hence the incisive papilla should be relieved.

- **Anterior (greater) palatine foramen:**

This is located **medial to the third molar** at the junction of the ridge and horizontal plates of palatine bone. **Rarely** would a **relief** be required in the denture base over this area since the nerve and blood vessels are housed in a groove and covered by **thick soft tissue**.

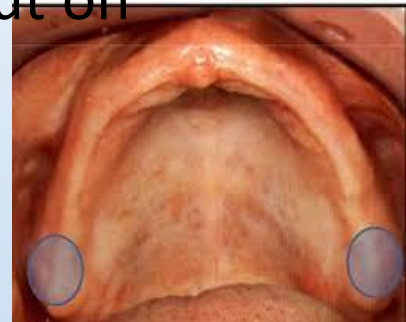


- **Maxillary tuberosity:**

It is that part of the residual ridge that extend distally from the area of the 2nd molar to the hamular notch. The *tuberosities* often are **dense fibrous** connective tissues with minimal compressibility. In this situation, considerable **support** is offered to the denture.

- Sometimes cause problem in maxillary denture construction such as:

1. **Enlargement** of the tuberosity with the presence of **bilateral** undercuts effect the **insertion and removal of denture**.
2. The presence of **pendulous tuberosities** cause a **reduction in the interarch distance** in the posterior region against the retro molar pad.
3. To **prevent oro-antral fistula**, it is important to have an occlusal radiograph before surgical resection of the tuberosity.
4. In case of **severe undercuts** at the tuberosity region, the undercut on the preferential chewing side should be **reduced**.
5. The **last posterior** tooth should **not** be placed on the tuberosity



Hamular Notch:

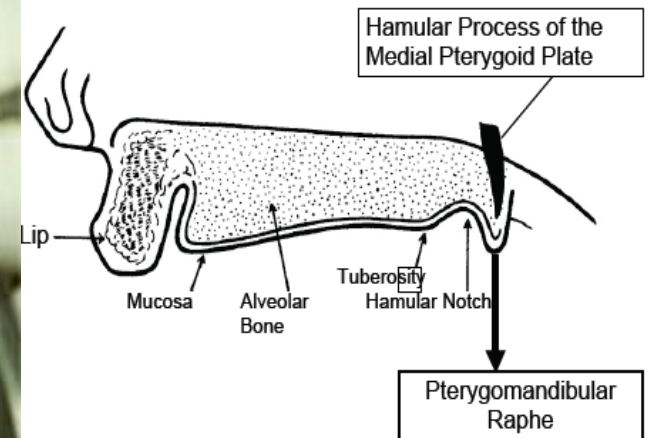
- a deep depression located posterior to the maxillary tuberosity (between the tuberosity and hamulus of medial pterygoid bone). The depths of this depression is part of a series of **guides used to determine the posterior border of a maxillary denture.**
- overextension of the denture base beyond the pterygo-maxillary notch may cause soreness
- underextension may cause poor retention,
- must be captured in impression



(a)



(b)



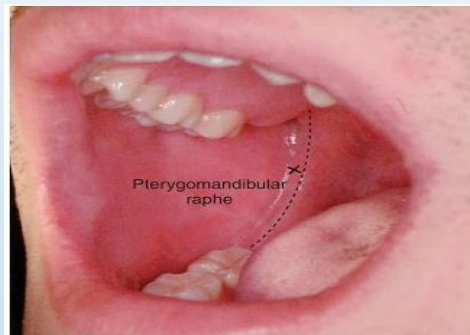
- **Significance**

1. Constitutes the **lateral boundary** of the posterior palatal seal area in the maxillary foundation.
2. The pterygomandibular raphe attaches to the hamulus.

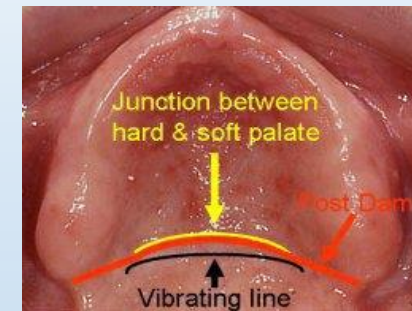
- **Clinical considerations:**

The denture should not extend beyond the hamular notch, failure of which will result in:

1. Restricted pterygomandibular raphe movement.
2. When mouth is wide open, the denture dislodges.
3. Pterygomandibular raphe may be sandwiched below the denture.



- **The limiting structures of the upper denture can be divided into three areas:**
 - (1) the labial vestibule, which runs from one buccal frenum to the other on the labial side of the ridge;
 - (2) the right and left buccal vestibules, which extend from the buccal frenum to the hamular notch; (**The size and shape of distal end of buccal flange must be adjusted to accommodate the movement of coronoid process of mandible and the masseter muscle**).
 - (3) the vibrating line, which extends from one hamular notch to the other across the palate.



Labial Frenum:

- a narrow fold of oral mucosa, which is found in the approximate midline, single or multiple; narrow or broad.
- The labial frenum is **not a reliable guide** for determining the **midline** of the face when natural teeth are absent.
- **Notch in the labial flange** of the denture to **avoid pain and dislodgement** of the denture.



Buccal Frenum:

- There are two buccal frena, first bicuspid region.
- **Notch in the labial flange** of the denture to **avoid pain and dislodgement** of the denture.





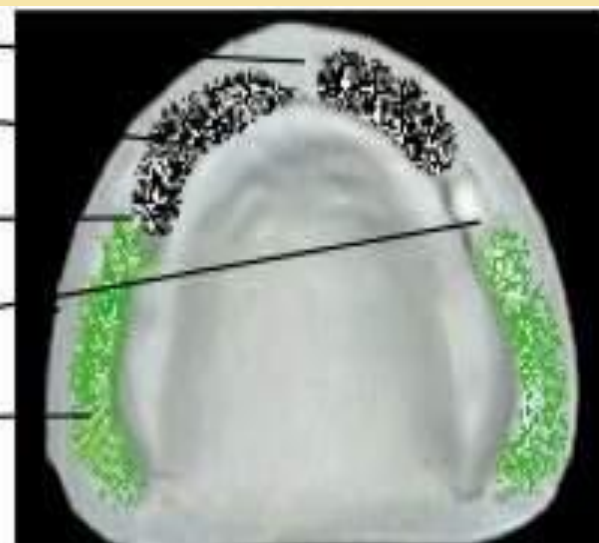
labial frenum

labial vestibule

buccal frenum

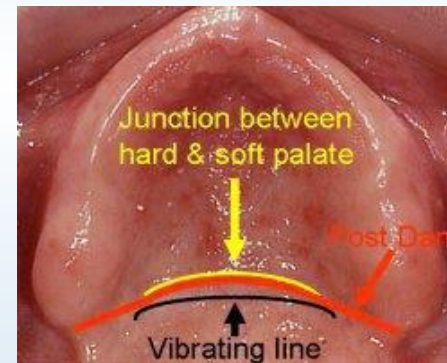
buccal frenum

buccal vestibule



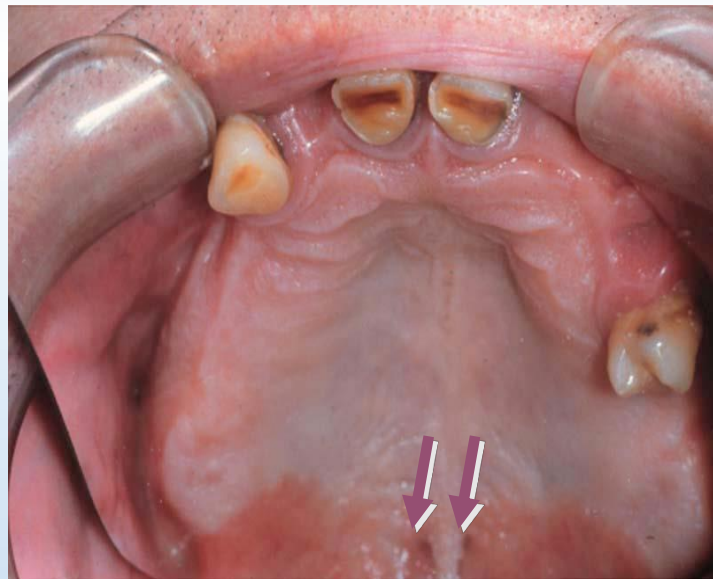
Vibrating line:

- An imaginary line across the posterior part of the soft palate marking the division between the movable and immovable tissues; this line can be identified when the movable tissues are functioning.



Fovea palatine:

- Two small pits in the posterior aspect of the palate on each side of mid line it formed by coalescence of several mucous gland ducts
- Denture extends 1-2mm beyond it. (an ideal guide for the location of the posterior extent of the denture)
- The secretion of the mucous gland spread as a thin film and aids in denture retention



Mandible anatomical land marks



Supporting and limiting structures of the mandible:

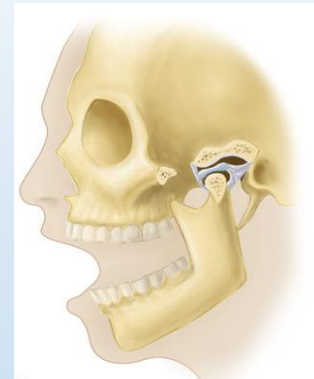
(a) buccal shelf area, (b) residual alveolar ridge, (c) labial frenum, (d) labial vestibule, (e) buccal frenum, (f) buccal vestibule, (g) retromolar pad, (h) lingual frenum, (i) alveololingual sulcus and (j) retromylohyoid space

Mandibular anatomical land marks

Osseous structures associated with the mandibular denture:

1. Coronoid process.
2. Residual alveolar ridge.
3. Buccal shelf area.
4. Mental foramen.
5. Mylohyoid ridge.
6. Lingual tuberosity.
7. Genial tubercles.
8. Torus mandibularis.
9. External oblique ridge

- **The mandible is the movable member of the stomatognathic system. It is consist of:**
 - A. The body of the mandible.
 - B. The rami: Each ramus terminate at its upper extremity into two processes, posteriorly the condyloid and anteriorly the coronoid process.
- **Coronoid process:** It is the anterior process and continuous with the anterior border of the ramus. If the **distobuccal flange of maxillary denture is too thick** it will cause **discomfort and dislodgment** of upper denture when the mandible is protruded and move from side to side. Trimming of the flange will solve the problem.



Residual alveolar ridge

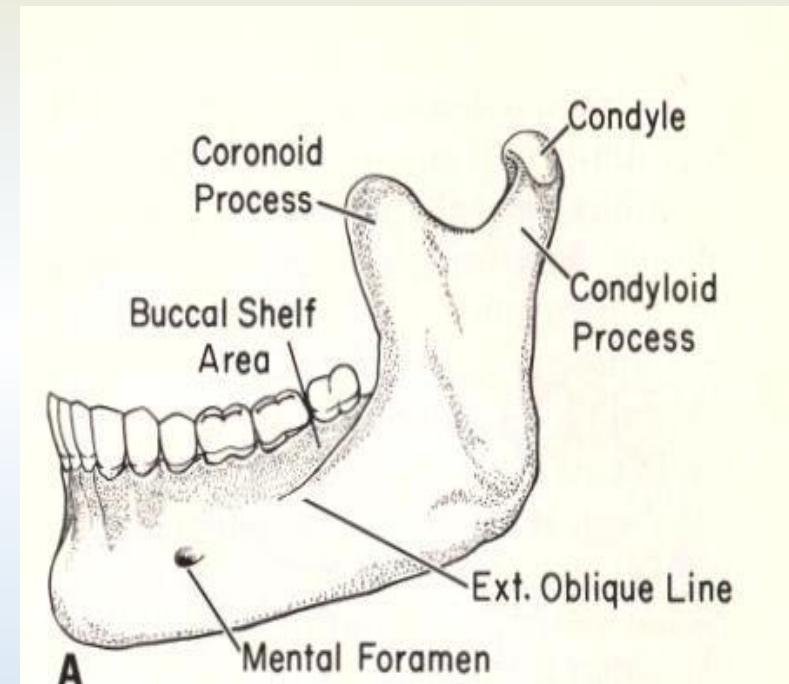
It is that part which remain after loss of teeth. The bone underlying the crest of RR is **cancellous** which makes it **unfavorable for resisting applied forces** from a denture.

Secondary stress-bearing area



External oblique line or ridge

- a ridge of dense bone extending from just above the mental foramen backward to become continuous with the anterior border of the ramus.
- Mostly this landmark is the anatomic guide for the lateral termination of the buccal flange of the mandibular denture



Buccal shelf

- It is bounded by:
 - Medially—crest of the ridge
 - Laterally—external oblique ridge
 - distally— retromolar pad
- bicuspid and molar regions, between the mandibular buccal frenum and the anterior edge of the masseter muscle.
The buccinator muscle fibers attach horizontally along the bony oblique ridge
- As resorption of the ridge occurs, the buccal shelf does not resorb because of its muscle attachments on the posterior and lateral borders.
- The buccal shelf lies at right angles to the vertical occlusal forces and is good mucosal coverage with good smooth cortical bone (**dense closely placed trabeculae are arranged parallel**) (**primary stress bearing**)



Mental Foramen

location

The lateral surface of the body of the mandible

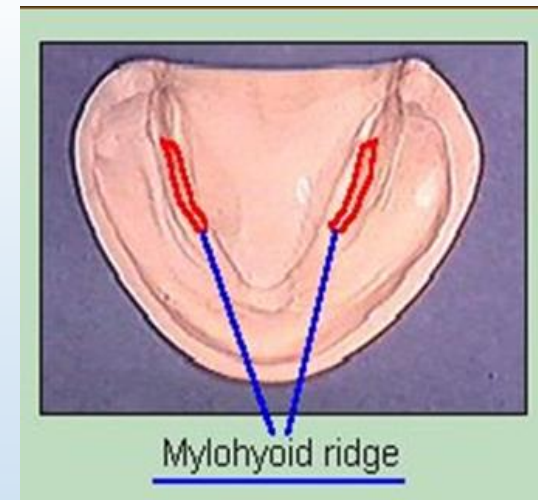
Between the first and second bicuspids (premolars).

When there is **extensive bone resorption**, the foramen becomes **more superior** and the denture base must be **relieved** to avoid irritating the mental neurovascular bundle.



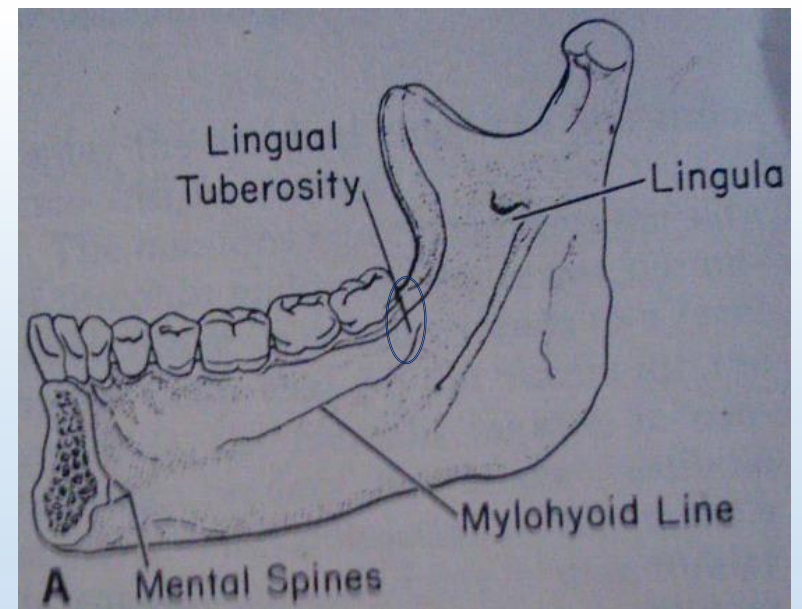
Mylohyoid line or ridge

- It is irregular, rough bony crest extending from the third molar region to the lower border of the mandible in the region of the chin (internal surface).
- The lingual flange of denture should extend below this line.
- mylohyoid ridge become more prominent (relief)
- If the bony crest is so prominent and sharp that it becomes a fulcrum point, surgical intervention, or relief



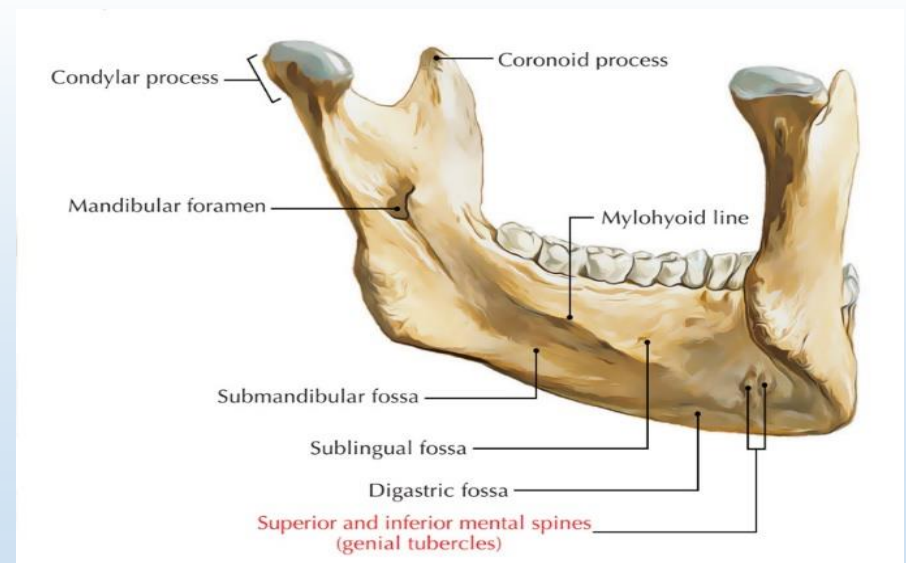
- **Lingual tuberosity:**

It is an irregular bony prominence distal to mylohyoid ridge when it became prominent should be relieved, rounded or surgically removed



Mental spines (Genial tubercles)

- location: **lingual aspect** of mandibular body in the **midline** slightly **above the inferior border (2-4)** . they represents the muscle attachment of the genioglossus and geniohyoid muscle .it is usually seen below the crest of the ridge.
- Mucosa: **thin and tightly adherent to the bone (relief)** failure of which leads to ulceration
- **bone loss (resorbed)** , these spines will become more **superior** in position and in these cases **surgical correction** is required.



Torus mandibularis:

- Bony prominences (cortical) ,unilateral or bilaterally, lingually near the 1st and 2nd bone in the premolar area
- Needed either (Small) relief or (large) surgical removal

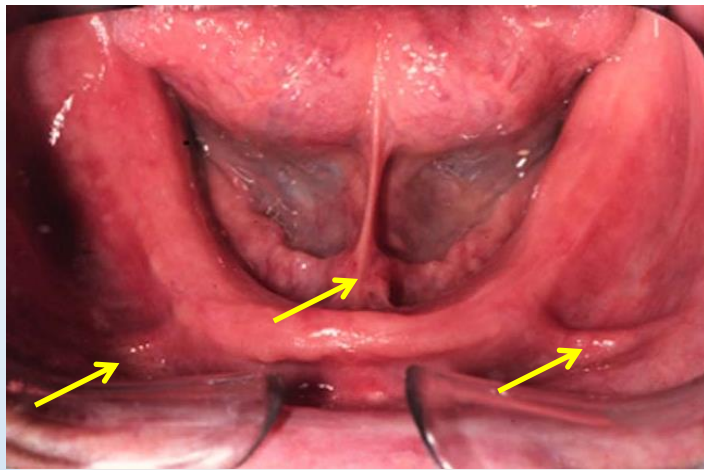
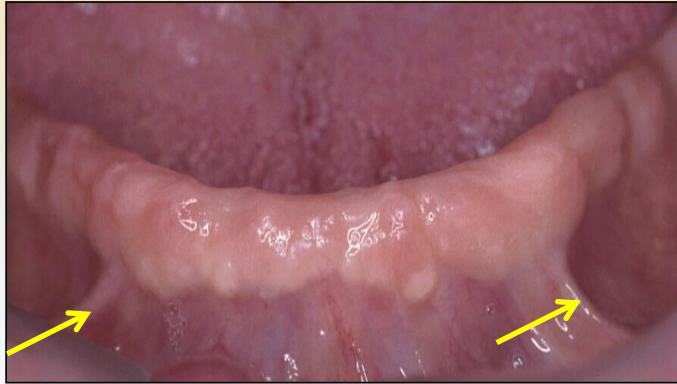


Retromolar pad

The retromolar pad is a triangular pad of tissue at the distal end of the residual ridge. The **anterior portion** of the triangle is **keratinized** tissue of the **remnant gingiva of the third molar called the pear-shaped pad**. The **posterior** aspect of the triangle is composed of thin, **nonkeratinized** epithelium; loose connective tissue; glandular tissue; fibers of the temporalis tendon and of the buccinators and superior constrictor muscles; and the pterygomandibular raphe. The underlying bone is **dense cortical** bone because of the **muscle attachments** and is **resistant to resorption**. The denture should **cover the retromolar pad** because of the support and lack of long-term cortical bone resorption



Limiting Structure



• Frena

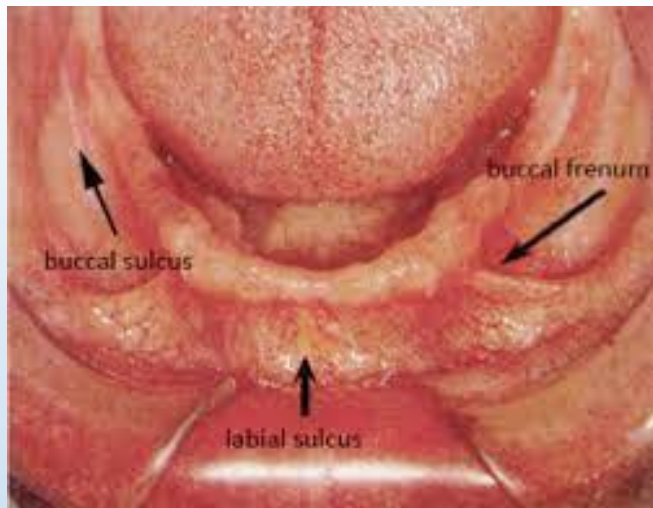
- The labial and buccal frena of the mandible are in corresponding positions to their counterparts in the upper jaw. Also, a lingual frenum can be seen in the floor of the mouth when the tongue is raised. The lingual frenum is present in the approximate midline and extends from the floor of the mouth to the lingual surface of the alveolar ridge.
- Clearance must be provided in the denture, to avoid dislodgement

Sulci

Labial Sulcus. The labial sulcus of the lower jaw lies at the base of the alveolar ridge **between labial and buccal frena.**

Buccal Sulcus. The buccal sulcus extends posteriorly from the **buccal frenum to the buccal aspect of the retromolar pad.**

The distobuccal area of the buccal flange must converge rapidly to accommodate the anterior fibres of the masseter muscle which pass outside the buccinator in this region. When properly accommodated and recorded, this results in a notch in the denture called masseteric notch. **Overextension** in this region causes **soreness and movement of denture.**



Alveolo lingual sulcus

It is the space between residual ridge and tongue. It extends from lingual frenum to retro mylohyoid curtain posteriorly. The borders are as follows:

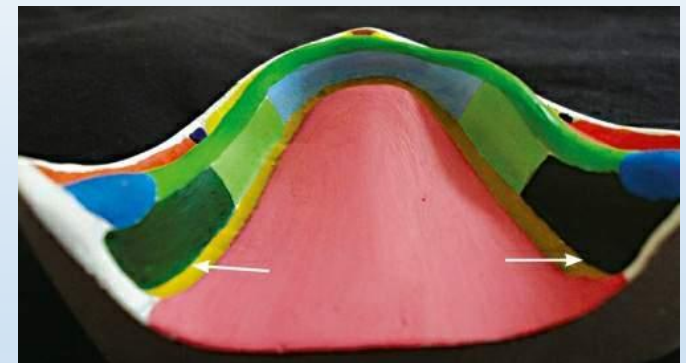
Anterior region: curves **down** below the level of the sulcus.

Middle region: curving **medially** from body of the mandible.(WHY)

Posterior region: The flange passes into the retromylohyoid fossa **turns** laterally (WHY) .

The lingual flange of the lower denture will be **short anteriorly than posteriorly**.

The **over extension of the distolingual** flange can cause **soreness and dislodgement** of the denture during swallowing.



The **retromylohyoid fossa** is the pouch forming the posterior terminus of the alveolingual sulcus on each side. the posterior wall of the fossa is formed by the retromylohyoid curtain, which contains the superior constrictor muscle of the pharynx.

The over extension of the lingual flange in the retromylohyoid fossa area can cause soreness and dislodgement of the denture during swallowing.



Maxillary and Mandibular Stress-Bearing Areas

Maxillary

- 1° firm tuberosities
- 1° hard palate on either side of palatal raphe
- 2° alveolar ridge
- 2° rugae

Mandibular

- 1° buccal shelves
- 1° retromolar pads
- 2° alveolar ridge



The mean denture bearing area for edentulous maxillae are 23cm² while for mandible 12cm² in contrast with 45cm² area of PDL in each dental arch.

The masticatory loads recorded for the natural teeth are about 20 Kg while maximum forces of 6 Kg during chewing have been recorded with complete denture. In fact , maximal bite forces appear to be five to six times less for complete denture wearer than person with natural teeth.

Relief areas

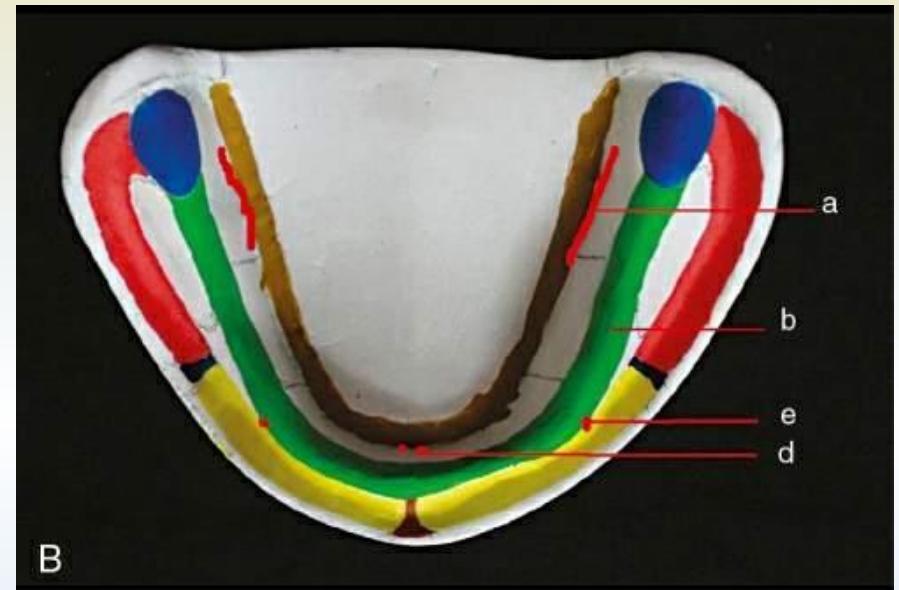
portion of the denture that reduced to eliminate excessive pressure on specific part of supporting structures (submucosa thin, mucosa non resilient, sharp bony, vessels, nerve)

Relief areas in maxilla:

- Midpalatine suture
- Incisive papilla
- Torus palatinus
- Rugae
- Zygomatico-alveolar crest (malar process)(sharp prominent)
- Canine eminence



- **. Relief areas:**
 - Crest of the residual alveolar ridge
 - Mylohyoid ridge
 - Mental foramen
 - Genial tubercles
 - Torus mandibularis



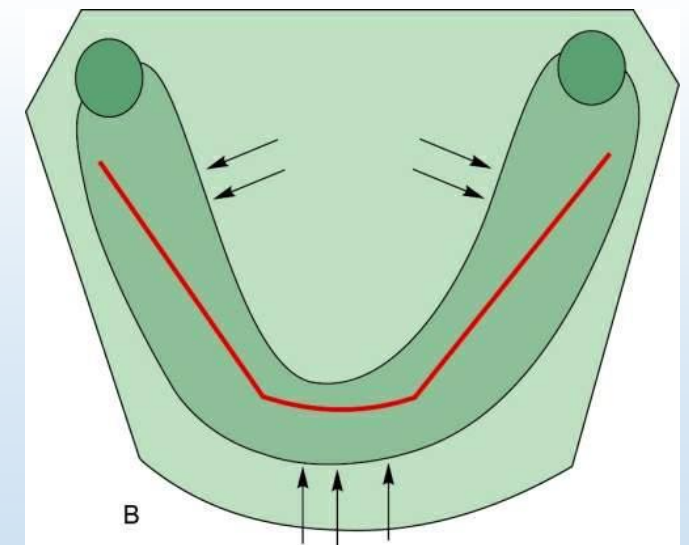
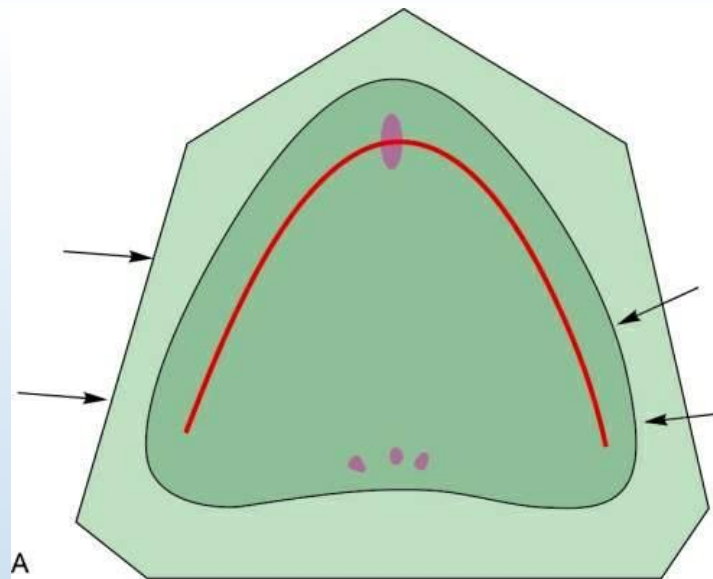
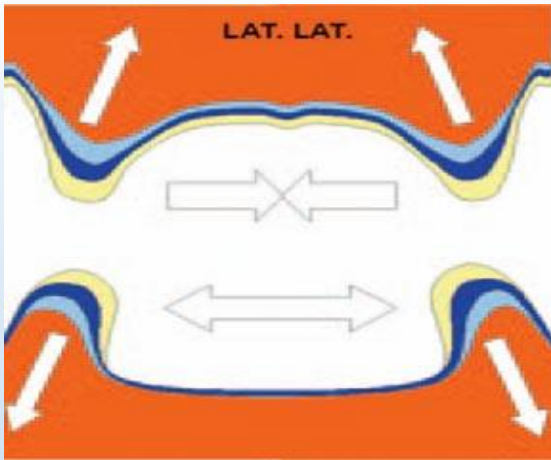
(a) Mylohyoid ridge, (b) crest of residual alveolar ridge, (c) torus mandibularis (d) genial tubercles and (e) mental foramen

- **Pattern of bone resorption:**

The **maxilla resorb upward and inward** to become progressively **smaller (centripetal)**.

- While the **mandible resorb downward and incline outward** to become gradually **wider (centrifugal)**.

- This progressive change of the mandible and maxillae makes many edentulous patients **appear to be prognathic**.



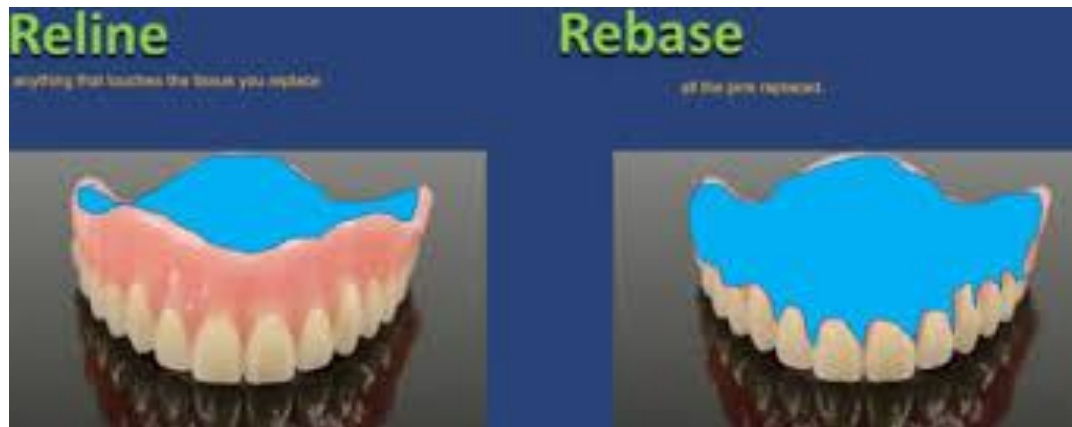


**Thanks for nice
attention**

Relining Complete Dentures



Relining is a procedure to resurface the tissue (intaglio) surface of an existing denture with new denture base material.



Patients often present with

1- Existing complete dentures that, still structurally sound, are not retentive or stable because they no longer properly fit the soft tissues and residual ridges.



Patients often present with

2- These patients often present with obvious occlusal and/or facial changes. They may exhibit poor esthetics because excessive bone loss under the prostheses has resulted in a loss of face height or repositioning of the anterior teeth.



Patients often present with

3- Their occluding vertical dimension (OVD) and their occlusion may also be compromised because the dramatic tissue changes have caused the dentures to lose their proper ridge orientation.



Patients often present with

4- The tissue underlying the dentures is frequently abused and irritated. Most of these changes are the result of poorly fitting dentures. If these changes are not too great, and the dentures are still in reasonably good condition, these problems may be corrected by relining the dentures.



The decision to reline an existing denture is based on a number of factors:

1. The occluding vertical dimension must be correct or it must be able to be corrected during the impression procedure for the reline.
2. The patient's centric relation occlusal position must be stable or correctable through occlusal adjustment.
3. The general appearance of the teeth must be satisfactory to the patient, and there should not be severe occlusal wear.
4. Speech patterns should also be satisfactory. As stated previously, the soft tissue must be healthy or correctable.

Making the **impression for a reline** is much like the **conventional final impression** technique. However, there are some differences

The most obvious difference is that

1- An existing denture is used in place of the custom impression tray.



2- The relining final impression must be completed while maintaining the correct occlusal vertical dimension and making sure that the patient remains in the centric relation position through the border molding procedures and the final set of the impression material.



Maintaining the occluding vertical dimension and the centric relation position is not a consideration when making a conventional final impression.

When both the maxillary and mandibular dentures for some patients may require relining, which of the two is relined first?

When both dentures must be relined, one denture at a time is relined rather than attempting to complete opposing relines simultaneously.

- When deciding which denture to reline first, usually the less stable of the two is relined first.
- If there is no significant difference between the stability- or retention of the opposing dentures, then the maxillary denture is often selected.

Dentures may be relined using either a "closed-" or "open-" mouth technique.

Because one of the primary objectives of a denture reline is maintaining the proper occlusion, many clinicians select the **closed-mouth** technique.

The primary difference is that with the closed-mouth technique, the patient is required to close and maintain the dentures in proper occlusion at the correct OVD while the impression material sets.

**close the dentures in
proper occlusion**



With the **open-mouth technique**, the patient is not allowed to maintain occlusal contact. The open mouth technique usually requires extensive occlusal equilibration at insertion and can even allow the denture to be misaligned in its proper relationship to the residual ridges



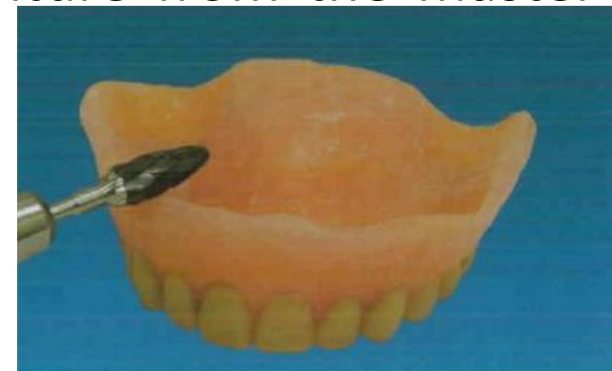
Not maintain occlusal contact.

Impression Technique

1- The denture **flanges are reduced so that 2-3 mm of space** exists between the flanges and the depth of the vestibules to provide space for the border molding material.



2- Enough resin is removed from the tissue side of the denture to **eliminate all resin undercuts** on the denture base. To allow the laboratory technicians to remove the denture from the master cast during processing,



3- To create **space for the impression material**, reduce at least one **millimeter** of the remaining unreduced **denture base material over the entire tissue surface**.

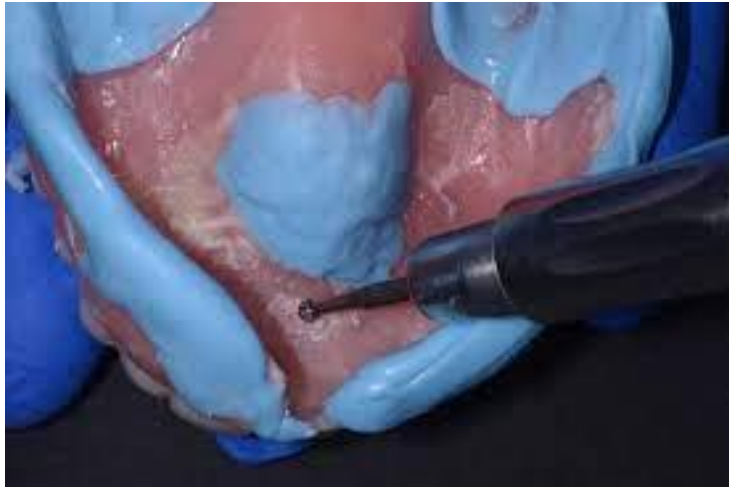
4- At this point, space for the impression material has been created but, the plane of occlusion has been changed and the **vertical dimension of occlusion has been overly reduced by approximately 1—1.5 mm**. This loss can be regained by adding 3-4 "**stops**." Small tissue stops are created with spots of heavy-bodied vinyl polysiloxane material about 3 mm in diameter.



The stops are placed in the canine and second molar areas, the denture is gently seated, and the patient is closed into the CR position at the proper OVD. **Border molding is now completed, as with a conventional impression**, with the exception that the vertical dimension of occlusion and centric occlusion positions must not be compromised.



5- Four to six holes are placed into the maxillary denture, spaced approximately 12 mm (half inch) apart through the palate of the denture with a round bur (#6). These holes provide escape vents to minimize hydraulic pressure buildup during the wash impression.



6- The impression material is mixed and loaded uniformly inside the denture. For the maxillary denture, the denture is seated onto the ridges by exerting gentle pressure upward and backward. The patient is instructed to close into the centric occlusion position, and the clinician must manipulate the denture until the desired occlusion is achieved at the-correct vertical dimension of occlusion.



7- While maintaining the correct occlusal position the musculature of the mouth is border molded in same manner as a conventional complete denture impression

8- After the impression material has set, the denture is removed from the mouth, and the excess impression material is trimmed from the denture and surfaces of the teeth.



The denture is then ready for the laboratory procedures.

If the clinician or staff pours the final impression in dental stone, it is essential that the denture not be removed from the cast prior to submission to the laboratory. If removed, it may be impossible for the laboratory technician to properly reseal the denture on the cast and the proper cast/occlusion orientation will be lost.



The laboratory technicians will invest the denture in a processing flask prior to removing it from the cast. If any resin undercuts were not removed prior to making the impression, it may be impossible for the technician to remove the denture from the cast without breaking the cast.

That is why it was important to remove all resin undercuts prior to making the impression. If a posterior palatal seal is required it is usually cut into the cast just before processing the denture.



The denture is returned from the laboratory just as if it were any other new denture, Insertion, adjustment, and post-insertion procedures are followed, just as for a conventional denture. Because there was no face bow made, the relined dentures will have remount casts but no index to place the maxillary remount cast/denture on the articulator in the proper relationship to the condyles. A facebow recording and a centric relation record may be necessary for extensive occlusal equilibration.



- **Complete denture complications**

- Fabrication of complete denture is based on **psychological interaction between the patient and the dentist**, where healthy communication acts a significant role in success of treatment of completely edentulous people. Range of post insertion problems may arise with new complete dentures.

Causes of these problems may relate to

- failure of the dentist to prepare and educate the patient about the new experience
- failure of the patient to adapt to the prosthesis
- even to faults in the construction.

• Complete denture complications

- The practitioner should realize that problems such as pain and looseness might have a single underlying cause. Therefore, to understand the problems and making a plan to correctly manage them, this will require:
 - 1- careful discussion with the patient
 - 2- a thorough clinical examination.
- The reason behind need of the patient for a complete denture is **mastication, aesthetics, phonetics and comfort**. Although the complete dentures are compatible with the oral structures, but this requires an enough time for adaptation and tissue conditioning. For example, **6-8 weeks are needed for adaptation to mastication**

Generally, many problems have been reported which can be randomly enumerated as following:

1. Looseness or instability
2. Lower denture rises when mouth is opened
3. Sore spots
4. Gagging
5. Feeling of space in upper denture
6. Phonetic problems
7. Can't eat most foods/ masticatory insufficiency
8. Loss of taste
9. Clicking while eating or talking
10. Tenderness when swallowing
11. Food under dentures
12. Saliva under dentures
13. Dislodgement when drinking
14. Drooling at corners of mouth
15. Excessive bulk
16. Cheek, lip, or tongue biting
17. Halitosis
18. Dry mouth (Xerostomia)
19. Excessive salivation
20. Unusual tastes
21. TMJ problems
22. Burning sensation
23. Pain and discomfort

- The most common complaints reported include:
 - Pain/discomfort.
 - Looseness of one or both dentures.
 - Speech problems.
 - Chewing problems.



- **Pain/discomfort:**

- This is a particularly common finding with new dentures, and can have many causes such as:

- **Overextended periphery:** Probably the most frequent etiological factor is an area of over extension of the periphery. This should be suspected initially if there is an area of **well-circumscribed soreness in the sulcus**. This may appear as an area of **erythema or ulceration of the mucosa**. This procedure is facilitated by using pressure-indicating paste (PIP). A small amount of PIP is applied to the suspected area of overextension and applied with a sponge. The denture is then reinserted, muscle trimmed and then removed. On inspection, the PIP will have rubbed off in the overextended area. This should be adjusted with a fluted acrylic trimming bur in a straight hand piece and the procedure repeated.



- **Freeway space problem**: If there is pain across the **entire lower denture-bearing area**, then the patient may have **too little freeway space**. If the patient complains that this pain increases through the duration of the day, then it is almost certainly due to lack of freeway space. **Speech may be affected**, and further symptoms include **unsatisfactory appearance and pain or tiredness in the jaw muscles**. In some cases, there is too much freeway space and this may cause muscular discomfort.

- **Treatment**

- Freeway space can be increased by:
 - (a) raising the maxillary occlusal plane.
 - (b) lowering the mandibular occlusal plane.
 - (c) a combination of both.



(a)



(b)

The appearance of the dentures will help determine which of these options to choose.

-If, for example, there appears to be too much maxillary tooth showing, then option (a) should be chosen, and the maxillary denture should be remade.

- If, for example, there appears to be too much mandibular tooth showing, then option (b) should be chosen, and the mandibular denture should be remade.

- In the case of the patient in both mandibular and maxillary dentures were at fault. The denture teeth should be removed from the denture base, a wax rim added and trimmed until sufficient freeway space is achieved. The jaw relationship in centric relation should be registered, and then a trial set-up prescribed in the usual manner.



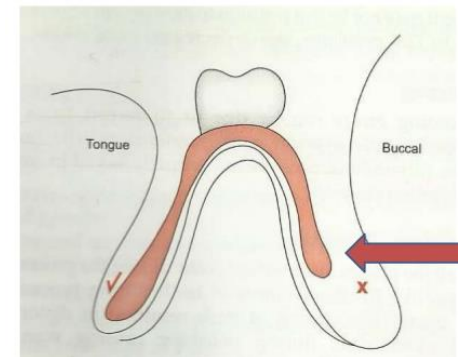
- **Pain on crest of the alveolar ridge:**
- This may be due to the **poor quality of supporting tissues or the unemployed ridge**, Prominent areas of bone have thin mucosa overlying them, and these offer poor support for the denture.
- When the area is sufficiently relieved, the clinician should be able to apply gentle finger pressure to the denture without causing pain. A further possible treatment option is to provide a **permanent resilient lining in the denture.**

- **Looseness of one or both dentures:**

- When the patient complains of looseness, you need to check:
- Peripheral extensions
- Posterior palatal seal
- Adaptation of the bases
- Occlusion
- Shape of the polished surface
- Tooth position.



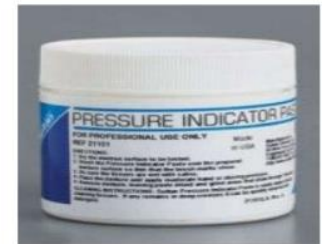
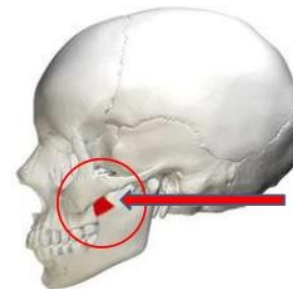
- **Loose dentures:** In the absence of pain and associated overextension of the periphery, looseness of dentures is in all probability a result of a **failure to obtain a peripheral seal**. A further etiological factor may be **poor adaptation of the denture to the underlying tissues**. This should be suspected if the patient complains that **food accumulates beneath the denture**. The extension of the denture should be checked, and areas of **under extension modified with green stick tracing compound**. The **post dam region** of the maxillary denture should also be assessed, and green stick tracing compound added if the post dam is found to be deficient. Common areas for under extension in the mandibular denture are the **distolingual pouch and the retromolar pad region**



Denture drops occasionally: In this situation, the denture is **reasonably retentive**, but **occasionally drops** without apparent reason.

This may be due to a **low frenal attachment occasionally displacing the denture**.
Providing more relief for the frenum may help.

- The other feature to check is the **width of the polished surface around the maxillary tuberosities**. When the mouth is opened wide, the coronoid process of the mandible can encroach upon the neutral zone in this region. If the adjacent polished surface of the denture is bulky, then the denture can be displaced. If this is suspected, then the thickness of the polished surface should be reduced gradually until the patient can open their mouth without displacing of the denture, and the denture polished.



- If the impression and polished surfaces are satisfactory, then the problem may be related to the occlusion. Check the occlusion in centric relation and excursive movements. If there is locking of cusps when undertaking excursive movements, then the dentures can be displaced. These contacts should be identified and adjusted until balanced articulation is achieved.



- Speech problems:

- This is sometimes a minor problem. If the patient is not overly concerned, they should be encouraged to resolve the problem by adapting to the new denture.

If the patient has significant difficulty with speech, the areas to check are:

- The freeway space - If this has been reduced 'too much, then speech is often affected. The patient frequently complains that they have "a mouthful of teeth". This will have to be addressed as previously described.
- The thickness of the palatal acrylic - If this is bulky, then the problem may be resolved with reduction of the bulk.

Chewing problems

This may present as either an **unsatisfactory chewing function** or as biting of cheeks or lips when chewing food. If the patient feels that their chewing function has deteriorated with the new dentures, then the following possible causes should be considered:

The **teeth are too flat - If the cuspal angles are too shallow**, or if the occlusal surfaces have been adjusted excessively, then the patient **may not be able** to comminute food properly. Using **an interocclusal record**, the technician should remount the dentures on an articulator and **replace the posterior teeth with appropriate cuspal anatomy**.

Insufficient freeway space - As described earlier, this causes **pain in the denture-bearing tissues of the mandible, and chewing problems** can be a secondary complaint. There may also be insufficient space to accommodate large amounts of food.

Excessive freeway space - Add wax to the occlusal surface of one or both dentures to reduce freeway space and record a new jaw relationship. Following a new trial denture stage, process and return the dentures.



If the patient is **biting their cheeks or lips** when eating, the problem is likely to be due to **insufficient horizontal overlap**, It may be possible to provide some overlap by adjusting the incisal edges or the buccal aspects of the mandibular teeth. A further option is to add a layer of wax to the teeth of the maxillary denture to increase the horizontal overlap and ask the technician to move the maxillary teeth in a buccal or labial direction as indicated by the wax.



**THANK
YOU!**

... FOR YOUR WARM AND SUNNY WISHES!

Complete Denture insertion



By: Lec. Marwa M. Shehab
م. مروة مروان شهاب



- **Insertion of complete denture**

- The moment new dentures are placed in patient's mouth, all the procedure involved in denture construction are **subject to review and reevaluation**, starting from the choice of materials, the technical and clinical effectiveness of procedures used and the skill in carrying out the procedures are exposed to three evaluations.
- These are by **dentist, patient and the friend and family** of the patients who will be viewing the dentures.

- **Dentists' evaluations**

- Evaluations made by dentists should be the **most critical** because these are the professionals who **know the potentialities and limitations in the treatment** of the patient.

- **Patient evaluation:**

- The patient **reaction** to the denture may range from **intense acceptance to fear and apprehension**. The patient frame of mind will greatly depend on the dentist's tempering the patient's expectations, but it may be affected by previous experiences in denture wearing and by comment of other people.

- **Friend evaluation:**

- The evaluation by friend may **not be accurate**, because the friend cannot know how the patient feel, they cannot judge the efficiency of denture in eating and speaking, they cannot know the difficulties encountered by dentist because poor foundation on which the denture has been built, they cannot understand the lack of the denture. **The friends can add to patient's difficulties because they have not been exposed to the information supplied to the patient by the dentist during construction of the denture.**

- **Complete denture insertion procedure:**

- The first step at the insertion appointment is to **review with the patient the instructions given during the diagnostic phase**. The patient had an opportunity to study these instructions, and this review allows the dentist to discuss any that the patient does not understand.
- There are certain technical procedures that must be carried out to ensure a successful prosthodontics service. Inaccuracies in the material and method used to get a denture to this stage must be recognized and elimination before the patient wears the denture, the inaccuracies may be result of:
 - Technical errors or errors in judgment made by dentist.
 - Technical errors developed in laboratory.
 - Inherent deficiencies of material used in fabrication of denture.

- Ideally the patient should be instructed to keep any **previous denture out of the mouth for 12 to 24 hours immediately before the insertion appointment**, this is essential if the new dentures are to be seated on healthy and undistorted tissues.
- An acceptable alternative is to have the **existing dentures relined with a soft temporary material to minimize tissue distortion problems.**

Examination of the denture:

Before the placing of dentures in the patient's mouth, the dentures should be inspected digitally and by magnifying loupes to be sure that:

- 1- the tissue surface has no imperfections.
- 2- the polished surface is smooth.
- 3- the denture flanges have no sharp angles and are not too thick.
- 4- the denture borders are round and smooth with no obvious overextension.

- **Adjustment of denture base**

- Denture-supporting mucosa varies in its compressibility under load, so that despite accurate impressions and models, some **adjustments over thin areas of mucosa or undercuts will make patients more comfortable.**

The use of pressure-indicating paste (PIP) is essential to evaluate and improve the adaptation of the denture to the tissue.

- PIP helps for the following reasons:
 - **Pressure spots** may have been present in the **final impression**, which was otherwise acceptable and used.
 - **Processing changes** can create a slight **contraction of the maxillary denture base**, and it is common to **relieve the lateral surfaces in the tuberosity** area to compensate for processing changes.
 - **Bilateral undercuts** on the residual ridge can interfere with the initial placement of dentures and **relief** may be needed to allow comfortable insertion and removal.
 - It is common to **provide relief for the thin mucosa** over the **lingual bony prominence of the mylohyoid muscle insertion.**
 - With **advanced resorption**, the mentalis and incisive canal nerves may have so little tissue over them that they require relief to avoid discomfort

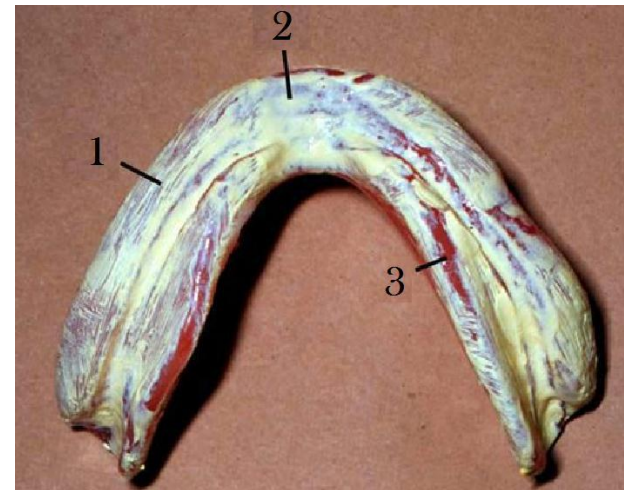
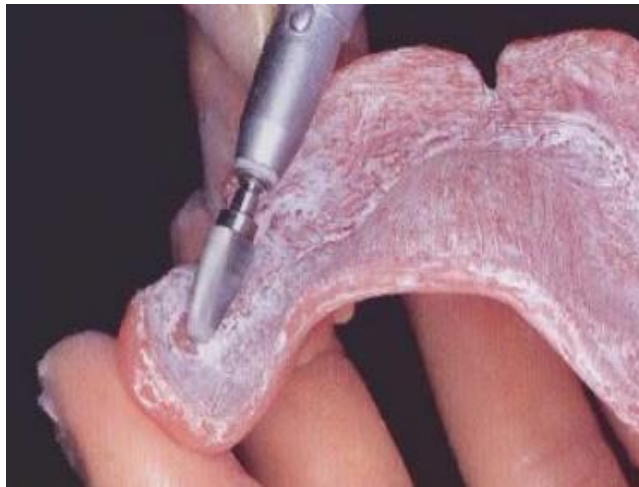
- **Procedure**

- Dry the denture first and then run the brush with the same direction and apply a thin even layer of PIP onto the surface of the denture
- Do not have your patient bite when using PIP at this point because the uncorrected occlusal errors may shift the denture and create an erroneous PIP pattern.
- There are four possible patterns to observe when reading PIP:
- A clean wipe on the periphery results from cheek rubbing during insertion. Do not adjust clean wipe area.
- Disturbed brush lines indicate the desirable tissue contact.
- Undisturbed brush lines indicate no tissue contact yet.
- Pink acrylic show-through spots indicate excessive tissue contact and pressure. These pink marks in the paste indicate where the denture base should be adjusted to relieve the interference.

These areas indicate:

- 1- streaks still present indicate no contact
- 2 – no streaks present indicate normal contact
- 3 – no paste indicates impingement (pressure areas)

C)- These areas of impingement should be relieved by grinding with an acrylic bur and then smoothened.



- **Adjustment of denture border**

The denture borders are evaluated to determine if:

- 1) The border extensions and contour are **compatible** with the available spaces in the vestibules.
- 2) The borders are properly **relieved** to accommodate the **frenum attachments** and the **reflection of the tissues** in the **hamular notch area**.
- 3) The dentures are stable during speech and swallowing



- Apply **disclosing wax** on an incremental **dried denture border** and warm up the wax in **water bath for 5 seconds** seat the denture firmly with even finger pressure, Instruct the patient to go through the necessary **border-molding movement**. Carefully **remove** the denture **without smearing the wax**. adjust any visible pressure area or overextension. Repeat the procedure until no overextended border is indicated

- **Retention and stability**

- **Retention**

- -The upper denture should offer resistance when pulled downwards by finger and thumb gripping the incisors.
- -The **lower denture**, however, will **not** normally offer **significant resistance to attempted displacement because it has a relatively inefficient border seal.**

- **Stability**

Neither denture should rock when finger pressure is applied alternately to either side of the occlusal surfaces in the first molar region



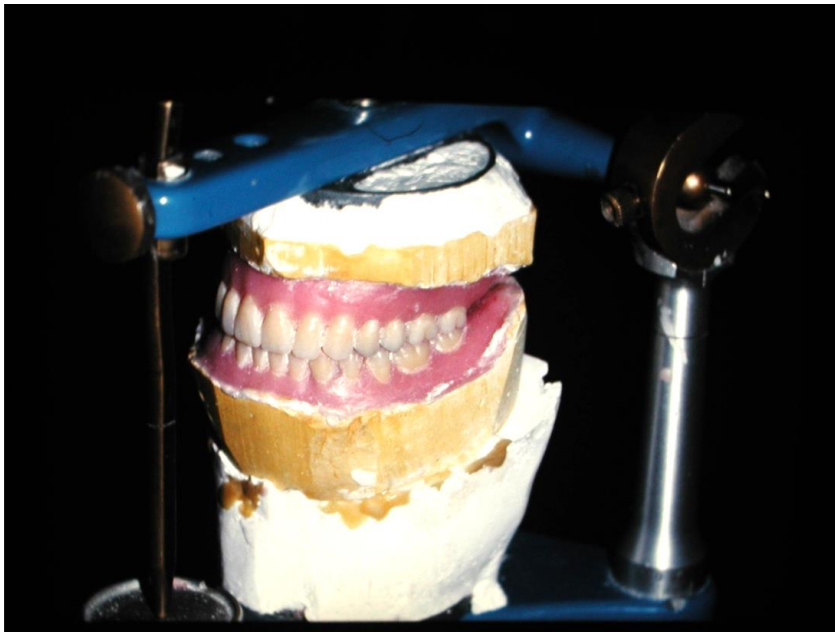
Evaluation of occlusion

- **Errors in occlusion**

- Errors in occlusion can result from a number of factors include:

1. Change in the state of the **temporomandibular joints** (TMJ).
2. **Inaccurate maxillomandibular** relation records by the dentist.
3. **Errors in the transfer** of maxillomandibular relation records.
4. **Ill-fitting** temporary record bases.
5. Change of the **VDO on the articulator**.
6. **Incorrect arrangement** of the posterior teeth.
7. **Failure to close the flasks** completely during processing.
8. Use of **too much pressure** in closing the flasks.
9. Unavoidable **processing changes** during polymerization

- **Occlusal correction (selective grinding):**
- There are 2 types of selective grinding:
- Intra-oral (inside the mouth).
- Extra-oral (on the articulator in the laboratory).



- **Intra oral occlusal correction**

- There are many intraoral methods for correcting occlusal disharmony. **Articulating paper and wax-sheet** may be used to detect the premature contacts, although it is preferable to use wax-sheet because premature contact will cause the cusps to penetrate through the wax indicating heavy contact is present.
- **The articulating paper is not preferred over the wax sheet for the following reasons:**
 - The presence of **saliva** will complicate the use of articulating paper intraorally.
 - It is **difficult** to place the articulating paper on **both sides** of the arch at the **same time**.
 - The articulating paper may **color even the teeth that are not in occlusion**.
 - **Mucosal displacement** and tipping of the dentures can bring non-occluding teeth into contact with the articulating paper.

- **Occlusal indicator wax** is a soft, dark wax with an adhesive surface that is applied to the mandibular posterior occlusal surfaces bilaterally. Areas where the wax penetrated represent premature contacts (heavy occlusal contacts) and should be adjusted



- Checking the occlusion with **articulating paper**:

Two pieces of occlusal marking paper or a single “horseshoe” articulating paper is inserted intraorally, placed over the mandibular teeth and the patient is instructed to gently bite together once and release. The dark contact marks should be recognized as pre-maturities, adjusted and the occlusion checked again. This process continues until the desired pattern is achieved.

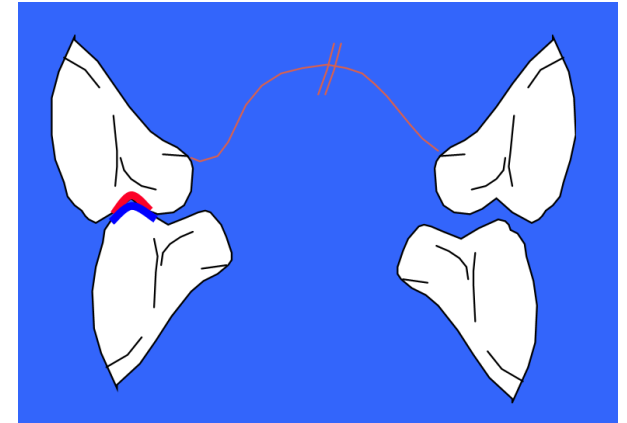


- Extra-oral selective grinding is done in the laboratory either
- after deflasking before polishing of the dentures, where remounting of the casts with dentures is done with plasters on the articulator and then the occlusion is corrected,
- or extra-oral selective grinding is done after polishing and in the insertion stage when there are changes in occlusion which are difficult to be corrected by intra-oral selective grinding, in which a new record of centric jaw relation is taken from the patient, after that the dentures are remounted on the articulator to perform selective grinding in the laboratory

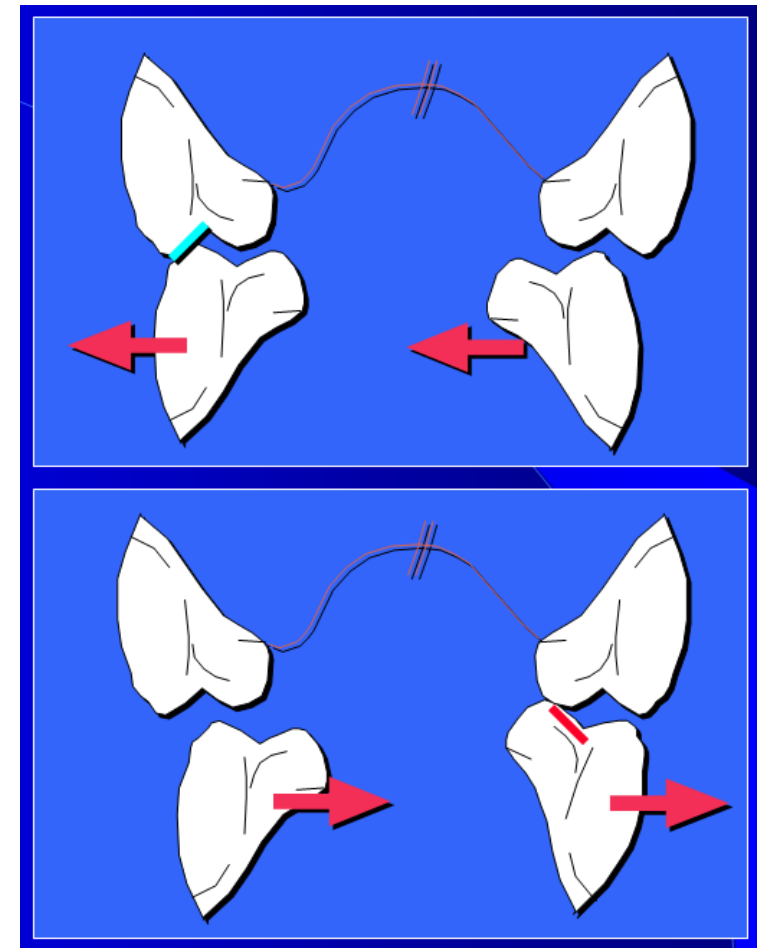
- Extra-oral selective grinding is more preferable than intra-oral selective grinding for the following reasons:
 - It **reduces** patient participation.
 - It permits the dentist to **see the procedures better**.
 - It provides a **stable working foundation**; bases are not shifting on resilient tissues.
 - The **absence of saliva** makes possible more accurate markings with the articulating paper or tape.
 - Corrections can be made **away from the patient**, thus preventing occasional objections when patients see their new dentures being altered

Correction of error in centric occlusion

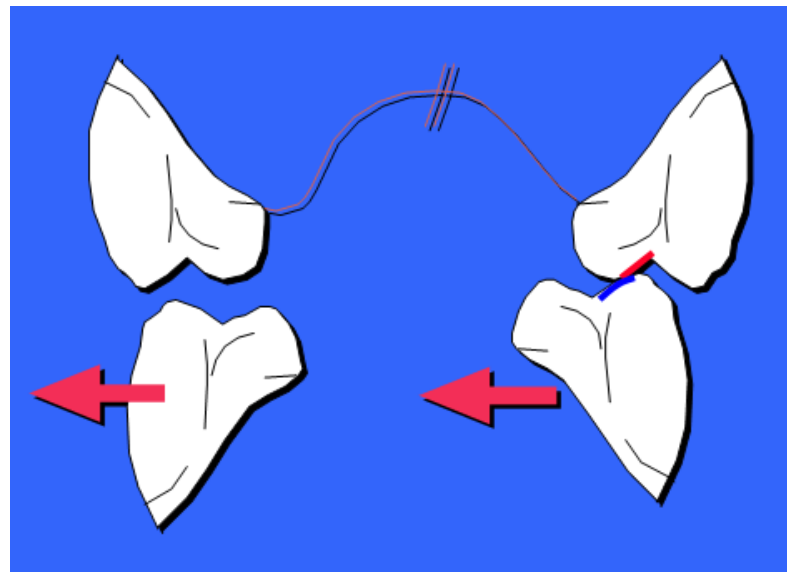
- If the cusp is **high** in the centric and in the **eccentric** position, **reduce** the premature **cusp**.
- If the cusp is **high** in the centric and **not** in the **eccentric** position, **deepen the fossae** or the marginal ridges.



- Correction of working occlusion
- On the working side, reduce the inner inclines of the buccal cusps of the maxillary teeth and the lingual cusps of the mandibular teeth (**BULL rule**).
- In the bull rule reduce the lingual inclines of the upper buccal cusp and the buccal inclines of the lower lingual cusps.



- **Correction of non-working (balancing) occlusion**
- On the nonworking side, reduce the inner inclines of the mandibular buccal cusps. If it is necessary to eliminate a centric cusp to correct balancing prematurities, eliminate the mandibular buccal cusp. This maintains the centric occlusal contact on the maxillary lingual cusp, which will better direct the forces of mastication against the mandibular denture.



- **Correction of protrusive occlusion**
- To achieve balance in protrusive excursion, **reduce the distal inclines of the maxillary cusps and the mesial inclines of the mandibular cusps.**
- After completing the selective grinding procedures to establish and maintain the desired occlusion refines the occlusal anatomy.



- **Special instructions to the patient**

- Educating patients to the limitations of dentures as mechanical substitutes for living tissues must be a continuing process from the initial patient contact until adjustments are completed.

- **Individuality of patients**

- Patients must be reminded that their physical, mental, and oral conditions are **individual in nature**. Thus they cannot compare their progress with new dentures to other persons' experiences. Denture complaints that are annoying and painful to some patients may be of secondary importance to others. Chewing and speech patterns considered successful by some persons may be interpreted as unsuccessful by others.

- **Appearance with new dentures**

- Patients must understand that their **appearance with new dentures** will become **more natural with time**. Initially, the dentures may **feel strange and bulky in the mouth and will cause a feeling of fullness of the lips and cheeks**.
- The **lips** will **not adapt** immediately to the fullness of the denture borders and may initially present a **distorted appearance**.
- **Muscle tension** may cause an **awkward appearance**, which will **improve after the patient becomes relaxed and more confident**.



- **Mastication with new dentures**

- The patient must be constantly reminded that eating with dentures is a developed skill. Learning to **chew satisfactorily with new** dentures usually requires **at least 6 to 8 weeks**. Patients will become discouraged unless they are aware that this learning period is to be expected. New **memory patterns** often must be established for both the facial muscles and the muscles of mastication. Once the habit patterns become automatic, the chewing process can take place without conscious effort. The muscles of the tongue, cheeks, and lips must be trained to maintain the dentures in position on the residual ridges during mastication. **Patients can be told that “these muscles must learn what they should and should not do.”**
- Patients should begin chewing relatively **soft food that has been cut into small pieces**. If the **chewing** can be done on **both sides** of the mouth at the same time. Occasionally, **edentulous patients have gone without dentures for long periods and have learned to crush food between the residual ridges or perhaps between the tongue and the hard palate. These persons usually experience increased difficulty in learning to masticate with new dentures, and the time for adjustment will likely be extended.**
- **Excess flow of saliva for the first few days** after placement of new dentures is expected. However, in a relatively short time the salivary glands accommodate to the presence of the dentures, and normal production of saliva returns

- **Speaking with new dentures**

- Fortunately, the problem of speaking with new dentures is **not as difficult** as might be expected. The adaptability of the tongue to compensate for changes is so great that most **patients master speech with new dentures within a few weeks**.
- If correct speech required exact replacement of tissues and teeth in relation to tongue movement, no patient would ever learn to talk with dentures. If it were **not** for the extreme **adaptability of the tongue**, the necessity of additional **bulk over the palate would cause a lasting speech impediment**. Even a 0.5-mm change at the linguogingival border of the anterior teeth would cause a speech defect, especially in the production of “s” sounds.
- Speaking normally with dentures requires practice. Patients should be advised to **read aloud and repeat words or phrases that are difficult to pronounce**.
- Patients usually are much more conscious of **small irregularities** in their speech sounds than those to whom they are speaking.

- Oral hygiene with dentures

- Patients must be convinced of the importance of maintaining good oral hygiene for the health of the oral cavity.
- -Patients should be instructed to rinse their dentures and their mouths after meals whenever possible.
- -Once a day, it is essential that the dentures be removed and placed in a soaking type of cleanser for a minimum of 30 minutes.
- Before the dentures are placed in the cleanser, they should be brushed gently with a soft brush and a nonabrasive detergent on all surfaces.
- The dentures should be brushed over a basin partially filled with water or covered with a wet washcloth to prevent breakage in case they are dropped.
- Patients should be discouraged from using toothpastes because most contain an abrasive material that will wear away the surface of acrylic resin.
- The mucosal surfaces of the residual ridges and the dorsal surface of the tongue also should be brushed daily with a soft brush

- **Recall and maintenance**

Recall appointments may be scheduled as follows:

First recall : 1–3 days

Second recall : 1 week after first visit

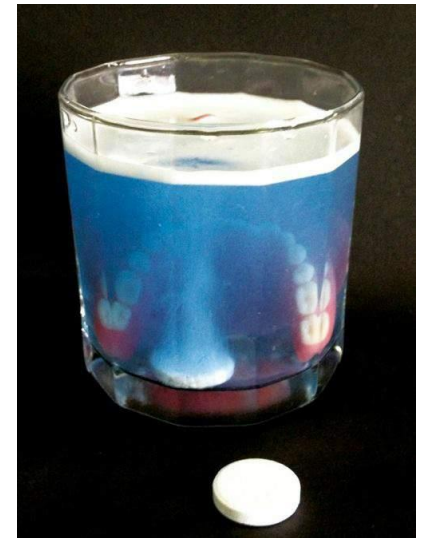
Third recall : 3–4 months after second visit

Maintenance : Every 1 year

This is a general recall programme, which may need to be modified depending on the postinsertion problems, after the first recall appointment



THANKS



- **Trial denture for removable complete denture**

- **Trial denture:** a preliminary arrangement of **artificial teeth** that has been prepared for placement into the patient's mouth to **evaluate esthetics, phonetics, and maxillomandibular relationships**.
- **Trial base:** an interim material or device representing the base of a removable denture or maxillofacial prosthesis; used for making **maxillomandibular relationship records and for the waxing of the trial denture**.
- **Trial placement:** the process of placing a trial denture in the patient's mouth for evaluation.

- **Importance of trial denture**

1. It is the **last opportunity** to evaluate many of the previous steps already accomplished.
2. Permits the **patient to assess** the appearance of the denture.
3. **Identification and correction** of any errors before the dentures are finished

- **Objective of try-in procedure**

- 1.To **verify the maxillomandibular** records which were made without teeth
 - a) To check for acceptance of established vertical dimension.
 - b) Verify that centric occlusion and centric relation coincide.
- 2.To **determine** the **position** of teeth and denture base are **compatible** with surrounding oral tissues.
- 3.To **evaluate** tooth selection and arrangement for **esthetic requirement**.
- 4.To make **additional interocclusal maxillomandibular** records if needed for further adjustment of the articulator e.g. protrusive interocclusal record.

- **Aspects of Try-In stage**

- a.**Extra oral examination** on articulator which include the accuracy of the cast, denture base, teeth and their relation.
- b.**Intra oral examination** which include check the trial denture separately and together inside the patient mouth.

A- Extraoral examination of the trial dentures

• The master Cast

- As the finished denture is processed on the master cast. So the master cast should be:
 - a. good shape.
 - b. Free from air bubbles or scratches.
 - c. Free from wax debris which lead to improper adaptation of the trial denture bases leading to false relationships.
 - d. If there are any undercuts present in the cast, these undercut should be relieved to avoid scratching of the cast by the trial denture bases

- **The trial denture bases**

➤ Check the following:

1. The trial denture bases must be **stable**.
2. **The borders** of the trial denture base should be smooth, round, and have no sharp edges.
3. Also the border should be shaped to conform to the **depth and width of the sulci**.

- **On the articulators**

➤ The mounted cast is checked for:

- a) Maintaining of the vertical dimension of occlusion
 1. Top of the **incisal pin** is flush with the **upper member** of the articulator.
 2. The incisal pin is in contact with the **incisal table**.
- b) The **mounting rings** are firmly screwed in their position.
- c) **Moving** of the articulator smoothly from centric to eccentric position **without cuspal interlocking**.
- d) The trial **denture bases** lie properly on their **casts** and the **teeth meet evenly in centric relation**.



• The teeth

1. It is the **dentist responsibility to select** the proper shade, and shape of the teeth and determine that the teeth are set correctly.
2. Elimination of the **excess wax** is done to avoid the false teeth relationships or overlook the occlusion.
3. The **relation of both upper and lower teeth** to the opposing ridges must be checked: if there is **excessive anterior tooth contact on the articulator**, should be corrected to avoid the excessive forces on the maxillary anterior ridge which causing bone destruction in that area that is already a target for bone loss.

4. Denture **occlusion**:

The occlusion of the teeth in on the articulator should meet the following in the class I jaw relationship:

The upper anterior teeth overlap the lower anterior teeth by about 1-2mm, in both horizontal and vertical planes.

- **B-Trial denture assessment in the mouth**

- The denture should be **assessed individually** for:
 1. Physical retention
 2. Stability
 3. Extension of denture bases
 4. Relationship to the neutral zone
- The denture should then be assessed **together** for:
 1. VD
 2. CR position
 3. Esthetic
 4. Phonetics
- Establishment of the **posterior palatal seal**.

• Physical retention

- If the prognosis for retention in the upper jaw is good, dislodgement should be expected to be difficult. In the case of the lower denture, retention is often poor because of the relatively small denture-bearing area and the difficulty in obtaining an efficient border seal.

- It is noted that the retention of the trial denture is less than that of completed denture, due to:

- a. Absence of a posterior palatal seal.

- b. Poor adaptation of the trial denture base to the tissues.

- The trial denture should stay in position when the mouth is opened. Looseness of the upper trial denture makes it impossible to carry out an accurate assessment of the occlusion {may use denture fixative} especially, in patients with unfavorable anatomical factors.

Loss of retention may include absence of a border seal resulting from:

1. Under-extension.
2. Inadequate width of flange.
3. Ineffective seal at the posterior border.
4. Poor fit of the denture base.

- **Stability**

- It is tested by applying pressure in a tissue ward direction with the ball of the index finger in the premolar and molar regions on each side alternately.
- This pressure must be directed at **right angles to the occlusal surface** where displacement does occur.

- **Causes of instability**

1. Warpage of the denture base.
2. Posterior teeth set buccal to the underlying alveolar ridge
3. Hard unrelieved area in the midline e.g. torus palatinus.

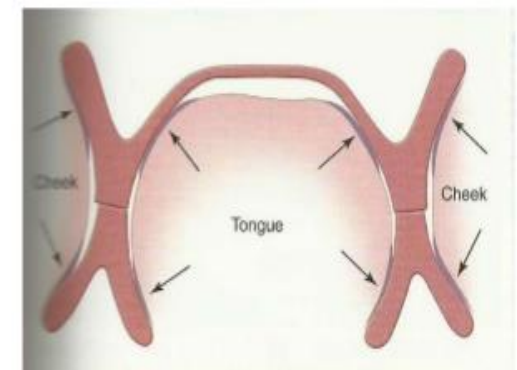
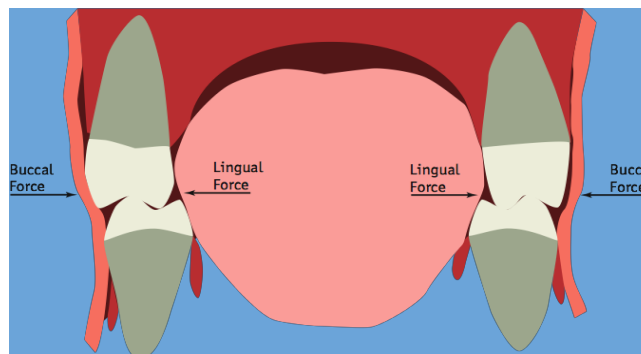


- **Extension of denture bases**

- The accuracy with which the **denture borders conform to the depth and width of the sulci** must be determined.
 - a. The posterior border of the upper trial denture base should extend from the hamular notch of the other along the vibrating line of the soft palate.
 - b. The lower denture should cover the retro molar pad to buttress the denture against the backward pressure of the lower lip.
- If marked **over-extension** of the denture flanges is present, stretching of the sulcus tissues will occur when the denture is inserted into the mouth and their subsequent elastic recoil will cause dislodgement of the denture. Therefore, be suspected.
- The presence of **under-extension** is determined primarily by intra-oral examination, when the depth of the sulcus will be seen to be greater than that of the denture flange. **Correction** of any under-extension will usually entail taking a new impression in the trial denture. Failure to do this will result in reduced physical retention of the finished dentures and inadequate distribution of load to the tissues.

- **Relationship to the neutral zone**

The positioning of teeth in the neutral zone is of particular importance in the case of the lower denture because the physical retention is relatively weak. Identification of the neutral zone will have been attempted while shaping the record block at the earlier visit and now the trial denture must be checked to see if that assessment was correct and has been transferred accurately to the denture. When the lower denture is inserted, it should remain in place when the mouth is half open and the tongue is positioned so that its tip lies just behind the lower anterior teeth.



- **Assessment of denture together intraorally**

- **Vertical dimension of occlusion**

- The vertical dimension of **occlusion and rest** must be evaluated **because the final position of the anterior and posterior teeth will depend on the amount of space available vertically.**

The factors that govern the final determination of vertical relation depends on careful consideration of the following:

- 1.Occlusion: compare to previous VDO at two skin points.
- 2.Upper/lower teeth and gingival visibility.
- 3.Facial profile and proportions mid/lower face.
- 4.Relaxed facial posture.
- 5.Interarch space with breathing, swallowing, speaking.
- 6.Patient perception of jaw position.



- **Correction of the occlusal vertical dimension**
- **Occlusal vertical dimension too small**
- When the freeway space is too large, it is corrected by adding the appropriate thickness of wax to the occlusal surfaces of the posterior teeth on one of the dentures, adjusting the wax to produce an even occlusion at the desired occlusal vertical dimension and then re-recording the jaw relationship in the retruded contact position.



- **Occlusal vertical dimension too large**

- When the freeway space is too small, or absent altogether, teeth will have to be removed from one of the dentures and be replaced with a wax rim before the new recording can be made.

- **Evaluation of centric jaw relation**

- **Intra Oral Observation of Intercuspatation**

- Patient is guided into CR by a thumb placed on the anteroinferior portion of the chin and index finger bilaterally on the buccal flanges of the lower denture.
- Any Error in CR will be apparent when teeth slide over each other.



space exists between the upper and lower posterior teeth when the patient closes in CR.

- **Extra oral articulator method**

- **Process:**

1. Impression material (e.g. Aluwax) is placed over mandibular posterior teeth.
2. wax sealed – denture placed in mouth – just wax portion is immersed in water bath of 130oF for 30 secs – denture placed back in patients mouth - mandible guided into CR so that upper teeth makes contact with the wax – denture removed & chilled in ice water & returned back to patients mouth for re-checking.
3. CR is confirmed – Trial dentures are then locked in articulator – opposing teeth should fit in the indentation in every way (anteriorly, posteriorly, laterally & vertically) if the original CR was correct.
4. If it does not fit, mandibular cast should be separated & remounted with last occlusal record.
5. The new mounting is again checked to prove or disprove its correctness.
6. Do not remount the upper cast because the face-bow transfer will be destroyed.



- **Esthetic evaluation of trial denture:**

1. **Central or midline:** stand in front of the patient some distance away, a wrong center line will be obvious, but if in doubt any aids can be used like dropping an imaginary line from the midpoint on the inter-pupillary line, the contact area between the two central incisors should coincide with this line.



upper and lower midlines do not coincide when the patient closes in CO

- **Esthetic evaluation of trial denture:**

2. **Anterior plane:** this may be observed from some distance away from the patient, and any tendency for this plane to slope markedly up or down should be noted and corrected.



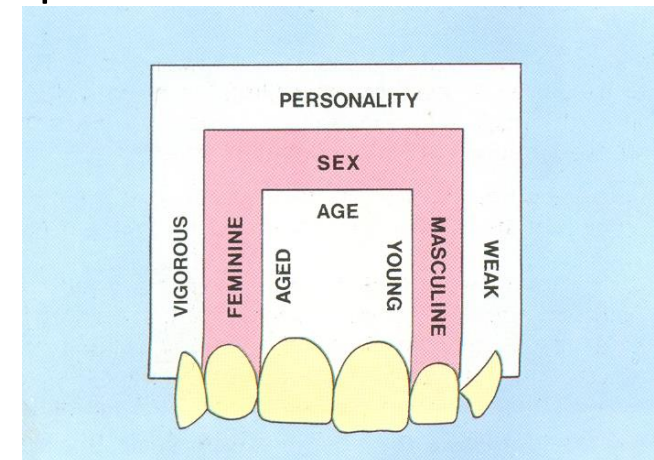
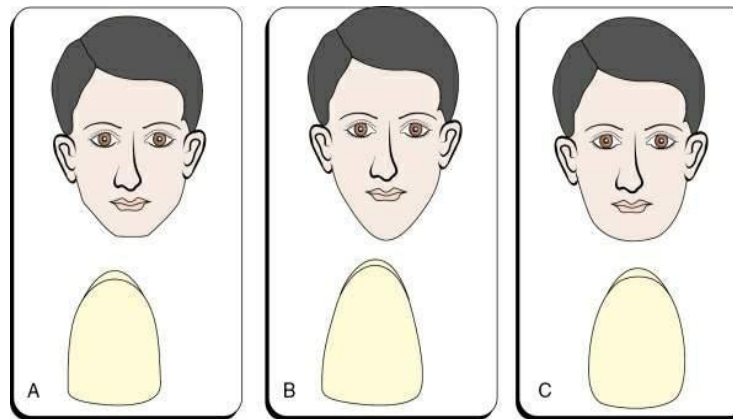
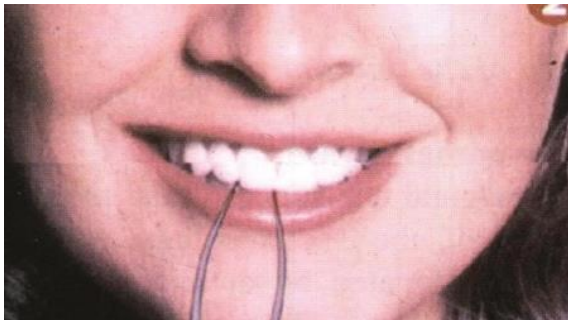
- **Esthetic evaluation of trial denture:**

3.Size, form and shade of teeth: the **size** of six upper anterior teeth should approximately the width between the corners of the mouth.

The **form** should be in harmony with the face form, but not necessarily identical with the outline of the face.

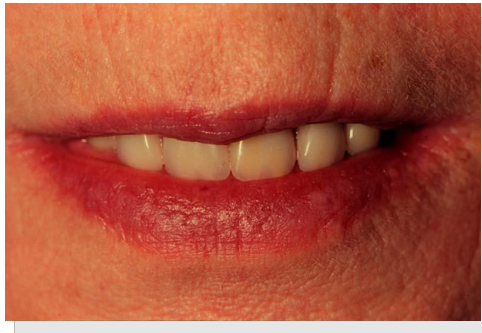
The **color** of the teeth should blend with the face so the teeth do not become the main focal point of the face.

The **concept of the influence of sex, age and personality** must be considered when developing harmony among teeth form, arrangement and the patient.



- **Esthetic evaluation of trial denture:**

4.Lip support and profile: the upper lip should be adequately and properly supported by the upper anterior teeth. The labial surfaces of central incisors will be about 8-10 mm in front of the middle of incisive papilla. The further the papilla is located labially, the greater the maxillary ridge resorption and the further the anterior teeth must be positioned. In many instances the inclination of anterior teeth is similar to that of the profile of the face.



5.Amount of tooth visible: the amount of upper anterior teeth seen during speech and facial expression depend on the length of upper lip. In **long lip** no teeth are visible, the **teeth are shown in smiling only**. While in **short lip**, full crown may be **visible below the upper lip even at rest**. On smiling, large amount of denture base in addition to teeth are visible.

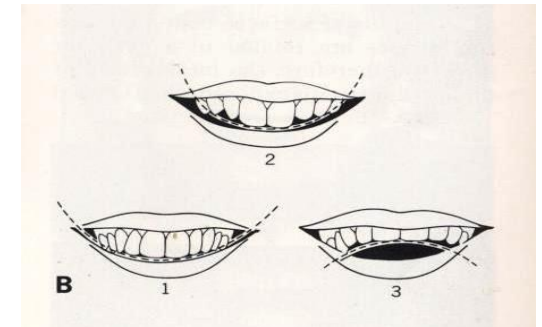
For the **lower teeth** must be **leveled with the corner of the mouth when the patient opens slightly**.



5. **Regularity of teeth:** few natural teeth exhibit **perfection**, and to perfect a set up in the incisor region especially in persons of middle age, try to avoid that the teeth looks artificial. Therefore, a little **irregularity** is usually desirable like **rotating and overlapping** the teeth to give an irregular appearance.

6. **Harmony of the incisal edge of maxillary anterior teeth with smiling line of lower lip:** usually the incisal plane of maxillary anterior teeth follows the contour of the lower lip during smiling.

7. **Buccal corridor:** usually a buccal corridor should be evident between the teeth and cheek. Wide upper arch cause crowding appearance and obliterating of corridor, while narrow upper arch causes an increase in the buccal corridor which looks like a dark space between teeth and cheek.

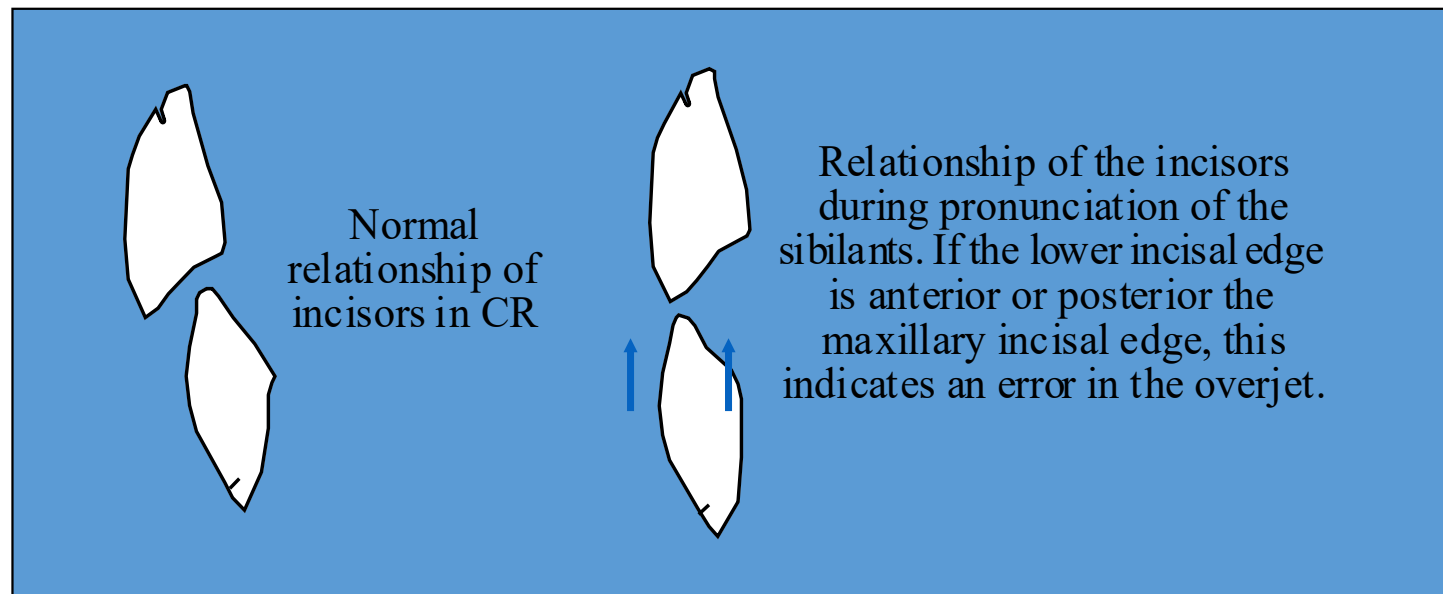


•Evaluation of the phonetics Labiodental sounds (f,v)

- F & v are between the upper incisors and the posterior one third of the lower lip.
- Affected by the anteroposterior position of upper anterior teeth and their length.
- If upper anterior short, v sound will be more like an f.
- If upper anterior long, f sound will be more like v.

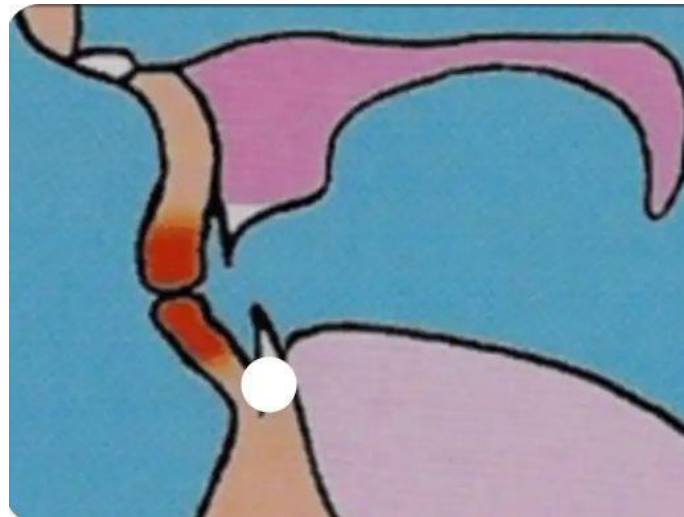


- **Linguoalveolar sound (t, z, s, d, v, l, ch, sh)**
- During pronunciation of sibilants like “z, s, ch”, **teeth will come close together but do not touch**. Silverman’s closest speaking space is used for determining proper vertical dimension.
- **Clattering** of teeth indicates **excess vertical height**.
- “S” resembles “Sh” or **whistling** sound when there is **insufficient degree of jaw separation**



- **Bilabial sounds (p,b ,m)**

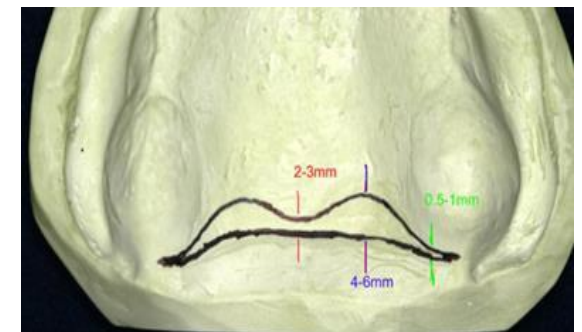
- “P”, “B”, “M” help in determining the correct degree of jaw separation. When the vertical dimension is too high, the patient will not be able to purse his lips together and consequently the articulation of these sounds may be distorted.



- **Incorporation of posterior palatal seal area**

- The patient is asked to keep the mouth open and say 'ah'. A two lines are drawn with indelible pencil in the patient's mouth across the palate extending from one hamular notch to the other that the detect the anterior and posterior vibrating line.

The trial base is inserted into the patient's mouth so that the indelible markings are transferred to the trial base. The trial base is seated on the master cast to transfer the markings marked in the patient's mouth to the cast. The area between the anterior and posterior vibrating line is scraped in the master cast to a depth of 1 to 1.5mm on either side of the mid palatine raphe. In the region of the mid-palatine raphe, it should be only 0.5 to 1mm in depth.



- **Patient's role in trial denture**

- 1.To record their wishes and expectations.
- 2.The patient agreement of any alteration in form from the previous dentures.
- 3.The patient, and any accompanying person, should agree on the acceptability of the trial dentures and that the patient is happy to proceed to completion.

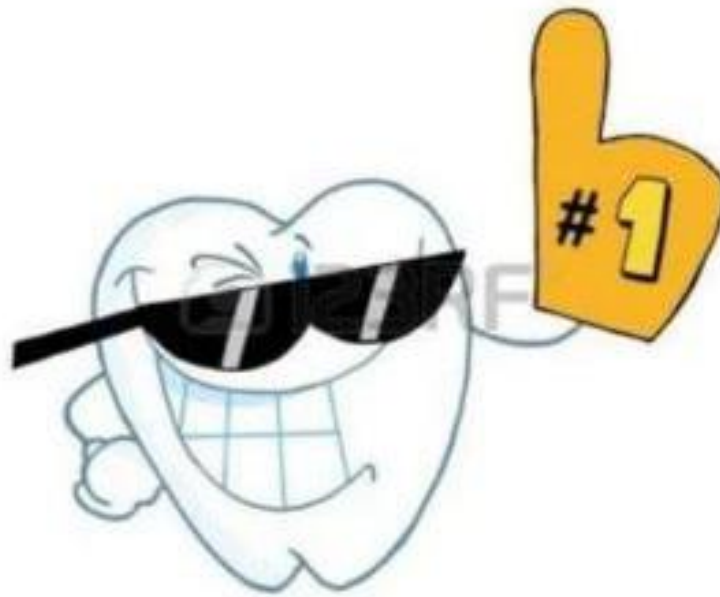
- **Technician's role in trial denture**

- 1.To have replicated the registration records faithfully.
- 2.To place teeth according to prosthodontic norms.
- 3.To provide stable bases.
- 4.To ensure that balanced occlusion/articulation is provided, according to the prescription by the clinician.
- 5.To have articulated casts appropriately and to have set condylar angles to any prescription given.
- 6.To ensure wax work is complementary to the age and personality of the patient.

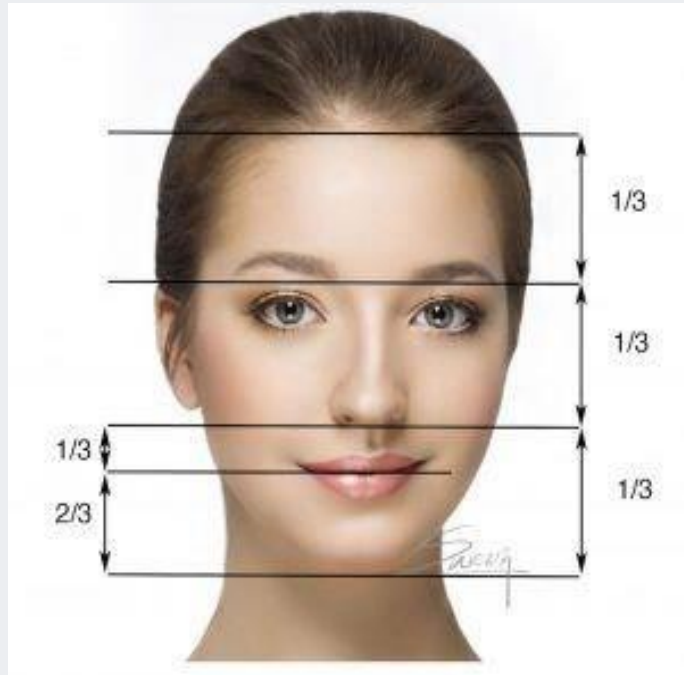


MOST COMMON STATEMENT OF DENTIST TO PATIENT

- “THIS IS THE WAY IT LOOKS RIGHT TO ME”



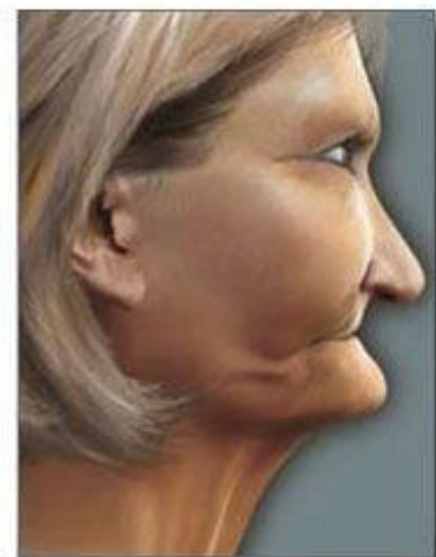
Maxillomandibular relationship record (vertical and horizontal relation)



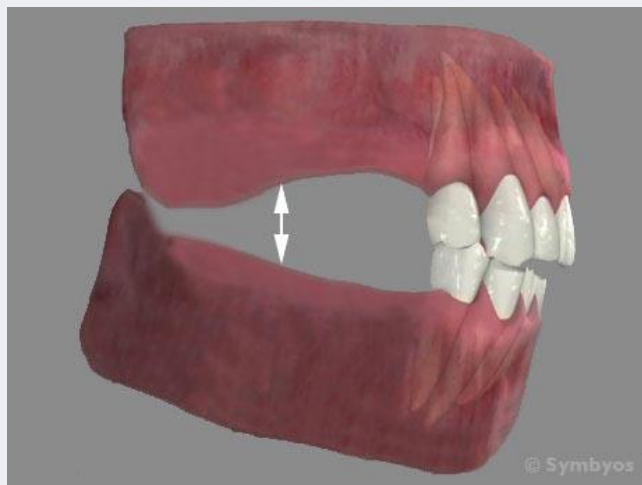
Facial appearance with healthy teeth and jaws



Collapsing bite after dental wear or tooth loss



Facial appearance after tooth and bone loss



Maxillomandibular relationship record:

It is a registration of any positional relationship of the mandible to the maxillae.



1. Orientation of occlusal plan
2. Vertical jaw relation
3. Horizontal jaw relation

Types of Jaw Relations:

A- Vertical relation:

1. Vertical relation of rest position
2. Vertical relation of occlusion

B- Horizontal relation

1. Centric jaw relation.
2. Eccentric jaw relation.

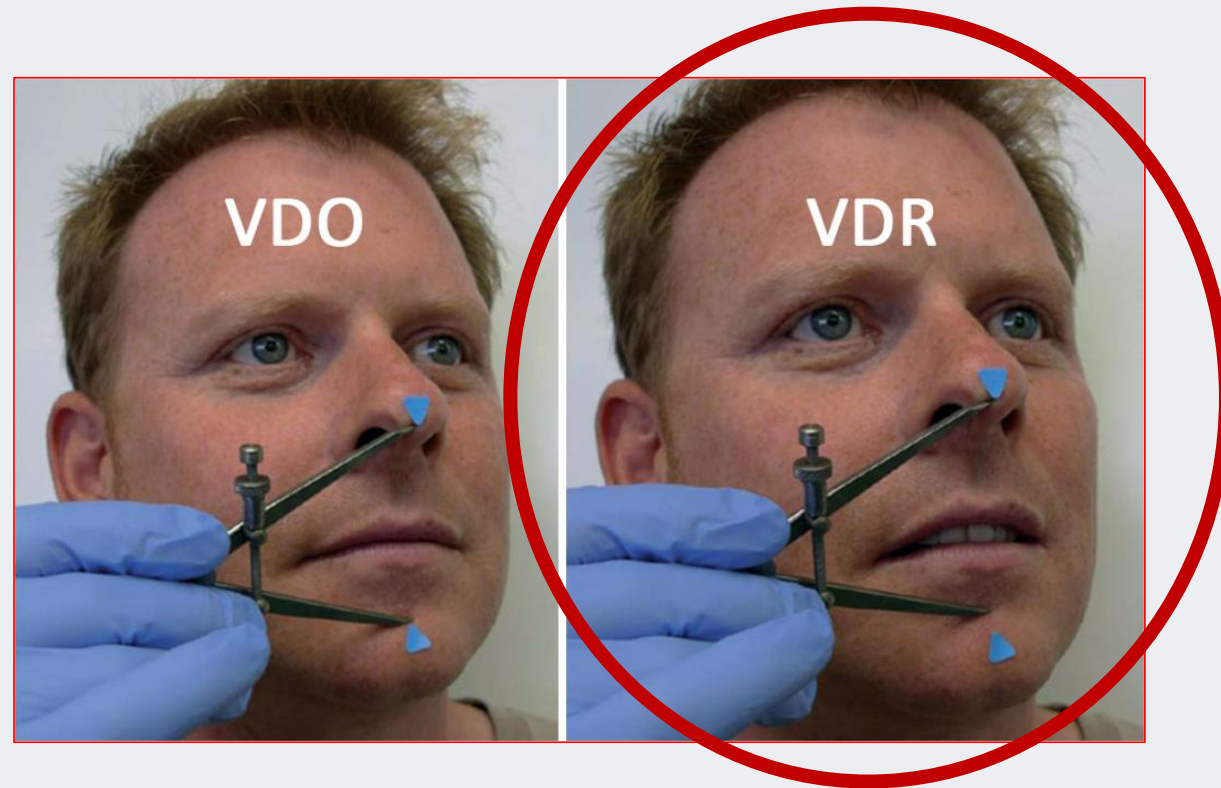
A- Lateral jaw relation.

B- Protrusive relation

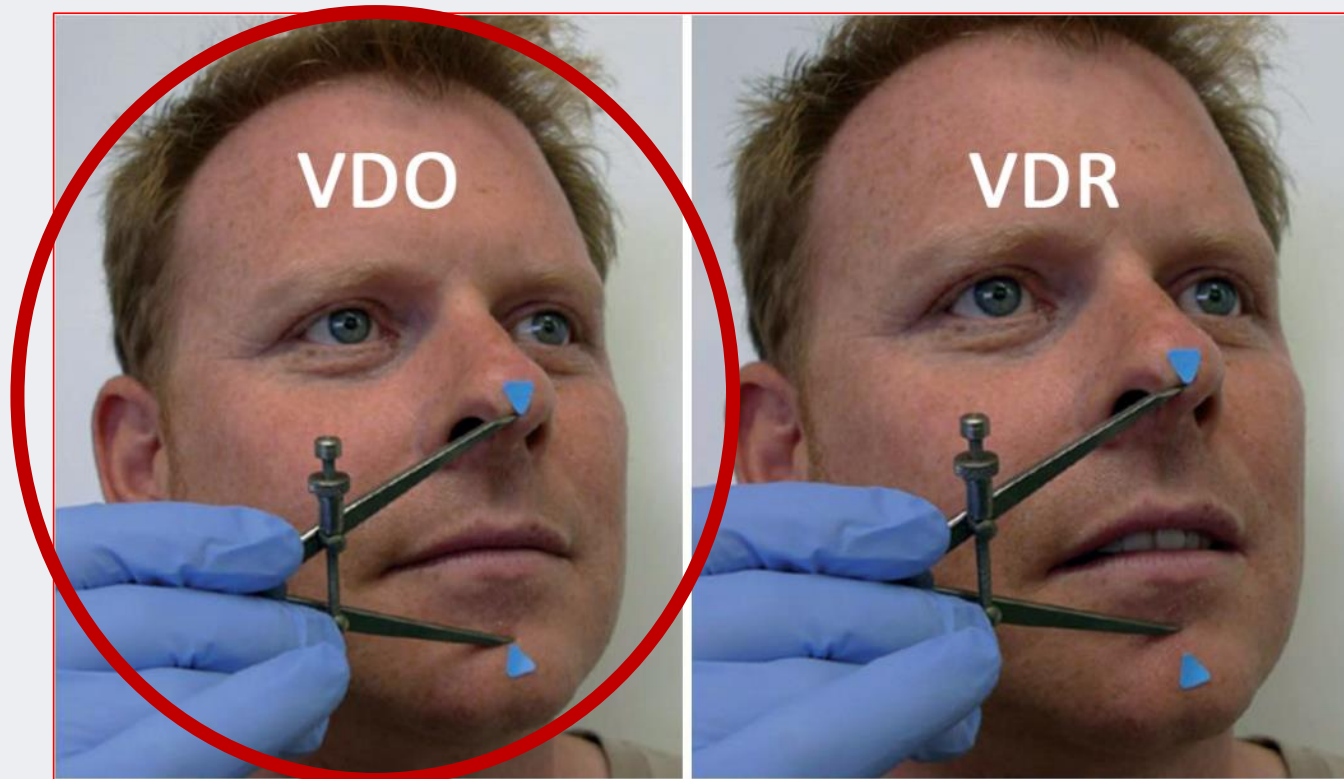
Vertical dimension: the distance between two selected anatomic or marked points (usually one on the tip of the nose and the other on the chin), one on a fixed and one on a movable member.



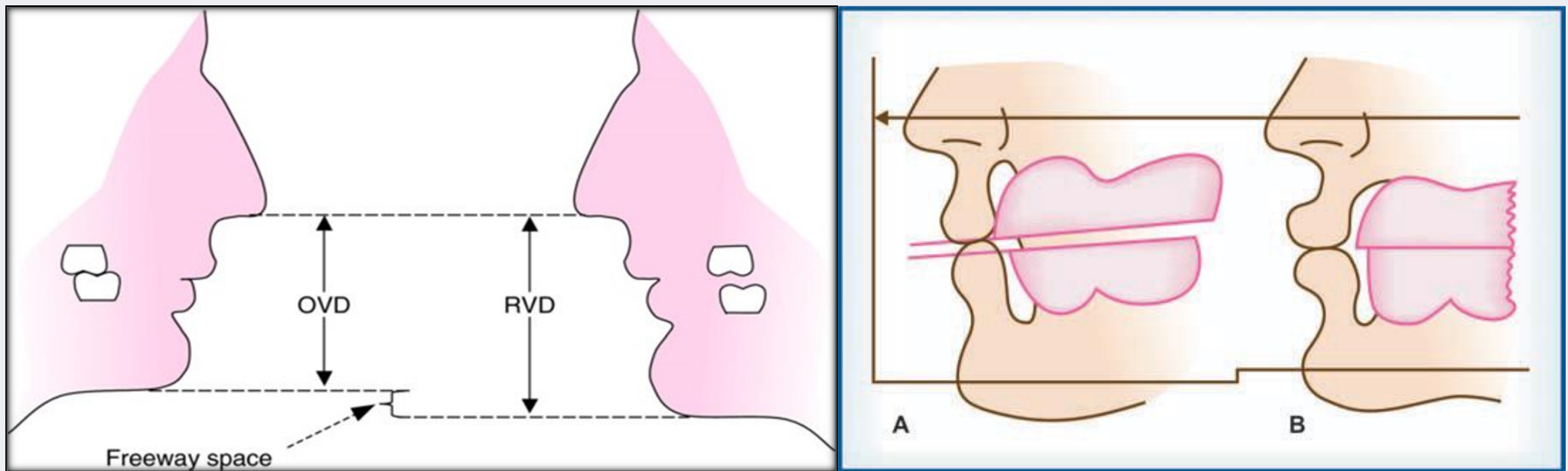
Rest vertical dimension (physiologic rest position): The distance between two selected anatomic or marked points when an individual is resting comfortably in an upright position at the physiological rest position and the associated muscles are in a state of minimal contractual activity,



Vertical dimension of occlusion: the distance between two selected anatomic or marked points (usually one on the tip of the nose and the other on the chin) when the teeth in maximal intercuspal position or occlusal rims are in contact in centric occlusion.



Interocclusal rest distance (freeway space): the difference between the rest vertical dimension and the occlusal vertical dimension (2-4mm).



$$\text{RVD} - \text{OVD} = \text{IOD (2-4mm)}$$

In a normal dentulous patient

The teeth do not maintain contact at rest. The space between the teeth at rest is called the '*free-way space*'.

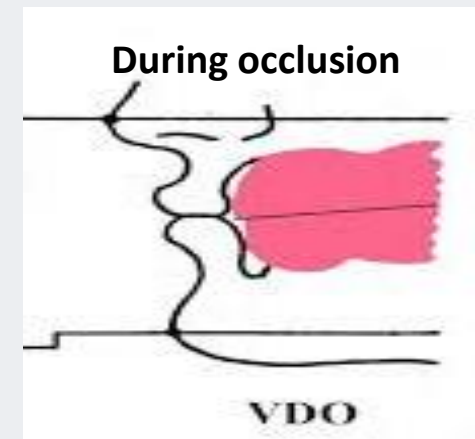
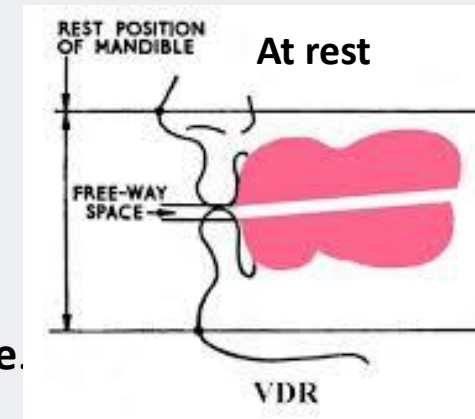
At rest, the free-way space exists only.



During occlusion, the teeth come in contact with one another and the space is lost.



The same relationship should be produced in the complete denture.



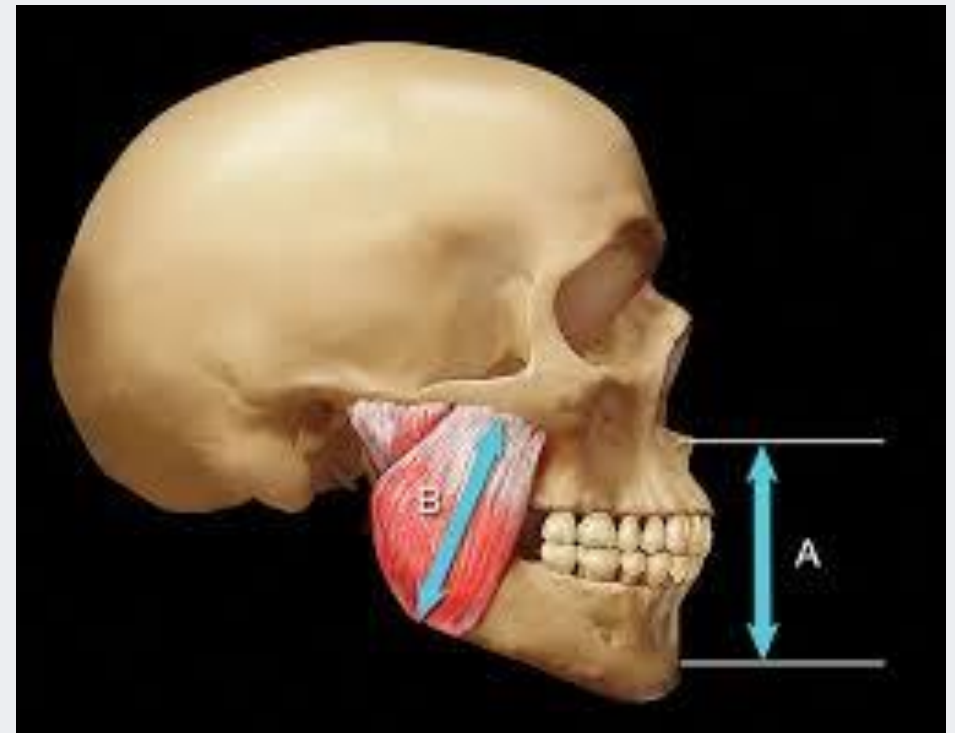
Factors Affecting Vertical Jaw Relation

1-Teeth

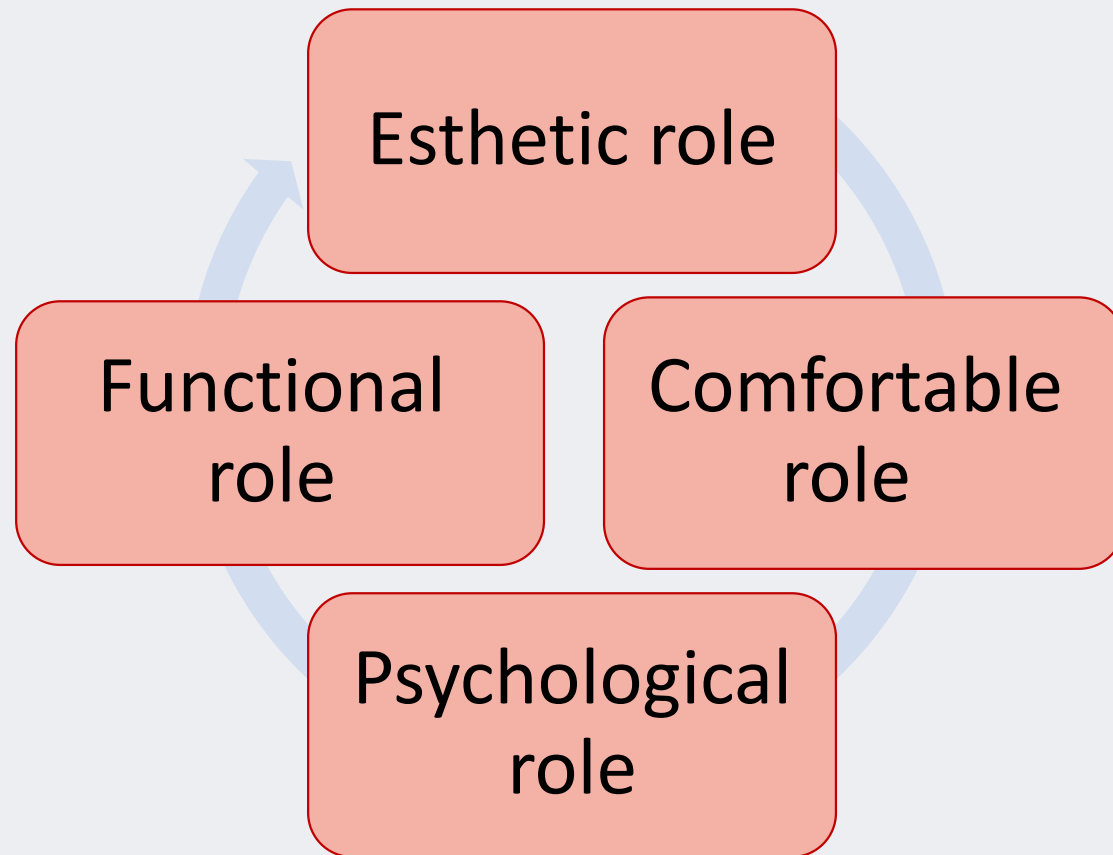
These act as occlusal vertical stops

2-Musculature

The opening and closing muscles tend to be in a state of **minimal tonic contraction**. This determines the vertical jaw relation.



Importance of Vertical Jaw Relation



Effects of increased vertical relation:

1. Speech problems.
2. Sensation of bulky dentures.
3. Premature contact & clicking during function.
4. Increased rate of residual ridge resorption.
5. T.M.J & muscle pain & fatigue.
6. Poor esthetic like separated lips & display of the teeth.
7. Difficulty in swallowing.
8. Inability to open the mouth widely.
9. Increased volume or cubical space of the oral cavity.



Effects of decreased vertical relation:

1. Poor esthetic like thin-lipped appearance, prominence of mandible and chin.

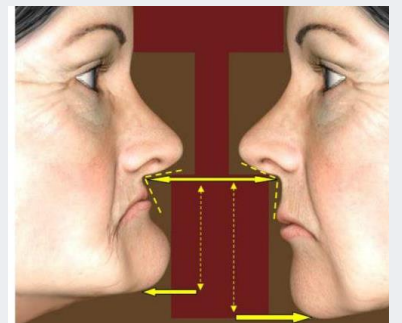


2. cheek biting

3. Presence of excessive wrinkles & folds in corner of mouth which may lead to angular cheilitis.

4. muscular fatigue, pain in T.M.J region and Neuralgia

5. loss of biting power & decreased chewing ability



V.D.R “*The length of the face when the mandible is in rest position.*”

VD at rest= VD at occlusion+ free way space

Methods of recording V.D.R:

- 1. Facial measurements after swallowing and relaxing.**
- 2. Tactile sense.**
- 3. Measurement of anatomic landmarks.**
- 4. Speech or Phonetic.**
- 5. Electro-myographic method.**
- 6. Facial expression.**

Methods of recording V.D.R:

1-Facial measurements after swallowing & relaxing:

The patient should sit or stand comfortably upright, ask the patient to swallow and, relax his facial muscles.



Methods of recording V.D.R:

2-Tactile Sensation



- The patient is asked to stand erect and open his mouth wide till he feels discomfort in his muscles of mastication.

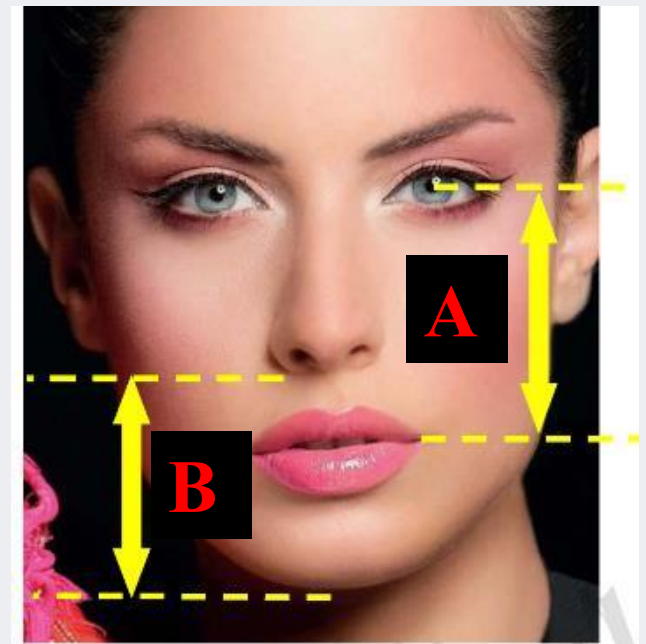
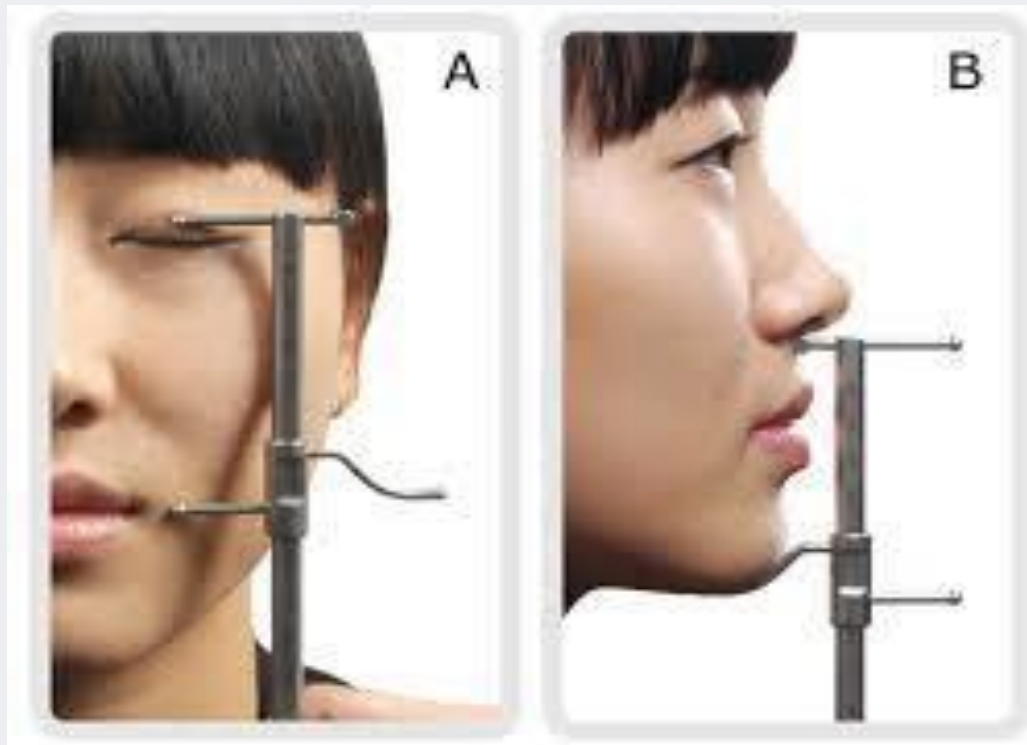


- Next, the patient is asked to close his mouth slowly. The patient is instructed to stop closing when he feels that his muscles are totally relaxed and comfortable.

Methods of recording V.D.R:

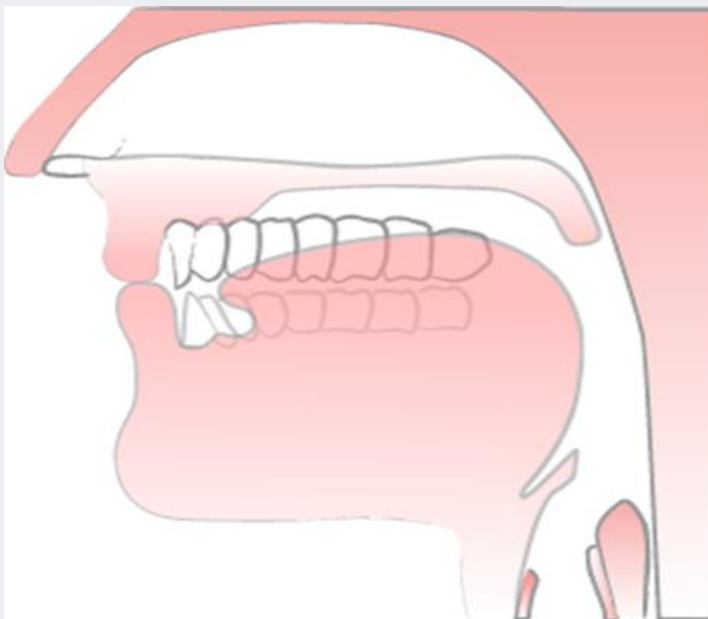
3-Anatomic landmarks

The distance between the pupil of the eye and the rima oris (corners of the mouth) and the distance between the anterior nasal spine and the lower border of the mandible should be measured using a Willis guide (**Distance A=Distance B**)



4-Phonetics

- Letter M
- when patient stops talking



5- Facial expression

The experienced dentist may notice the relaxed facial expression when the patient's jaws are at rest. The following facial features indicate that the jaw is in its physiological rest position:

1. The upper and lower lips should be **even anteroposteriorly** and in slight **contact in a single plane**.
2. The **skin around the eyes and over the chin** should be **relaxed**; it should **not be stretched**, shiny, or excessively wrinkled.

6-Electromyographic method (EMG)

By using a special device that measures the tone of masticatory muscles, when the **tone is at its least**, this means these **muscles are in rest position** and the **jaws are at rest position**



Methods for recording Vertical dimension at occlusion:

Mechanical methods •

A) Ridge relation

- Distance from the incisive papilla to mandibular incisors.
- Parallelism of ridges.

B) Pre-extraction records

- Profile photographs
- Articulated casts
- Facial measurements

C) Measurement from former dentures

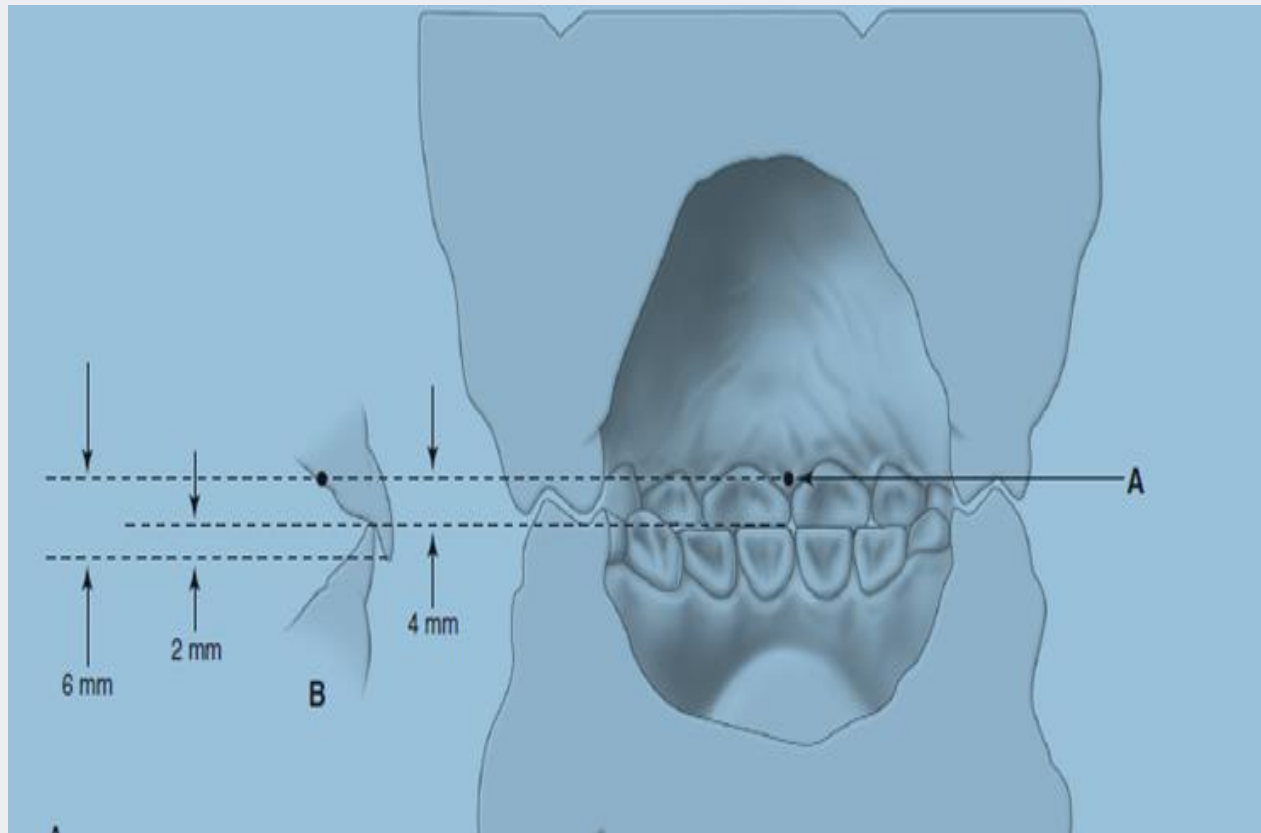
Physiological Methods

- Power point
- Using wax occlusal rims
- Physiological rest position
- Phonetics
- Aesthetics
- Swallowing threshold
- Tactile sense or neuromuscular perception
- Patient's perception of comfort.

Methods for recording Vertical dimension at occlusion:

1. Mechanical methods: A) Ridge relation

Distance of incisive papilla from the mandibular incisors:



Methods for recording Vertical dimension at occlusion:

1. Mechanical methods: A) Ridge relation

-Ridge parallelism

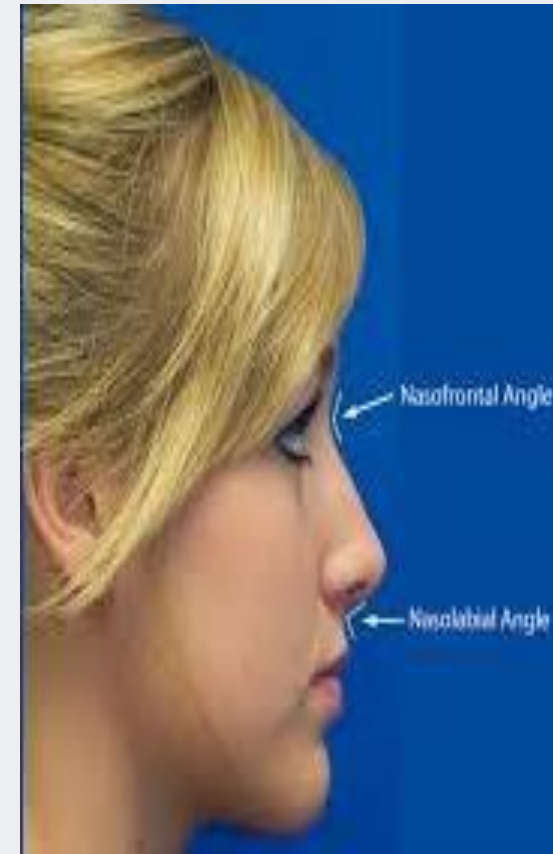
The mandible is parallel to the maxilla only at occlusion. This factor can be used to determine the vertical dimension at occlusion.



Methods for recording Vertical dimension at occlusion:

1. Mechanical methods: B) Pre extraction records

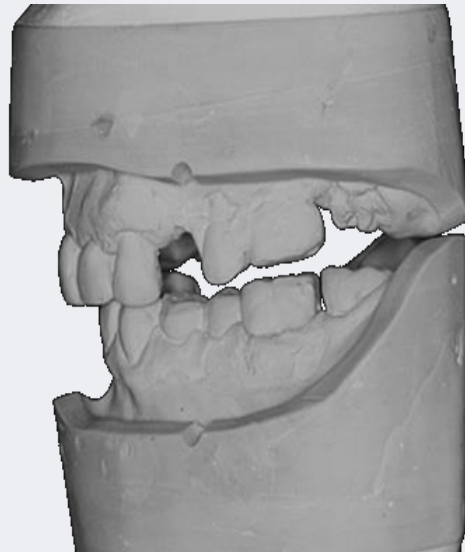
-Profile photographs :These photographs are made before extraction. They should be taken in maximum occlusion as the patient can easily maintain this position during photographic procedures.



Methods for recording Vertical dimension at occlusion:

1. Mechanical methods: B) Pre extraction records

- Articulated casts
- The inter-arch distance between the edentulous casts is compared with that of the articulated dentulous casts.



Methods for recording Vertical dimension at occlusion:

1. Mechanical methods: B) Pre extraction records

- Facial measurements

Two points are marked on the chin and the base of the nose using dividers or calipers before teeth are extracted. The VD is measured at occlusion and recorded.

This measurement is used after extraction.



Methods for recording Vertical dimension at occlusion:

1. Mechanical methods: C) Measurements of former dentures

A Boley's gauge is used to measure the distance between the border of the maxillary and the mandibular denture when both these dentures are in occlusion.

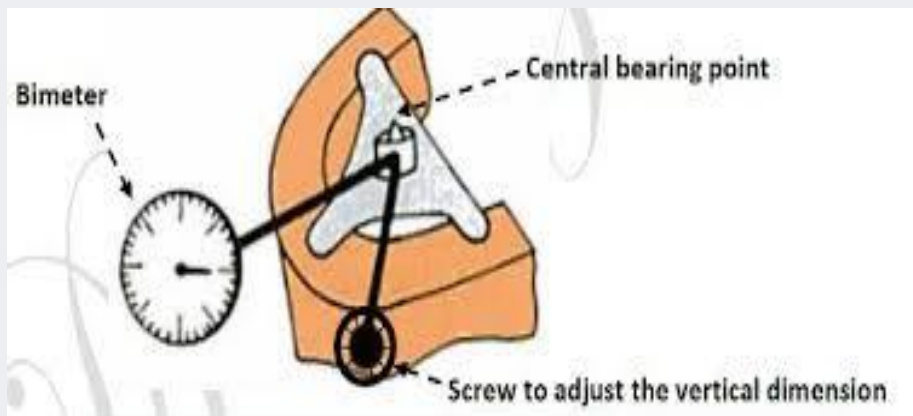
This measurement is used to determine the VD at occlusion.



Methods for recording Vertical dimension at occlusion:

2- Physiological Methods : a) Power Point (maximum force)

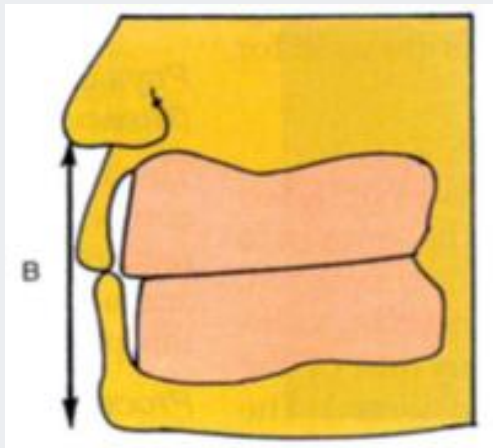
The biting forces are transferred from the central bearing point to the bimeter. The highest value is called the Power point. The bimeter is observed when the power point is reached .



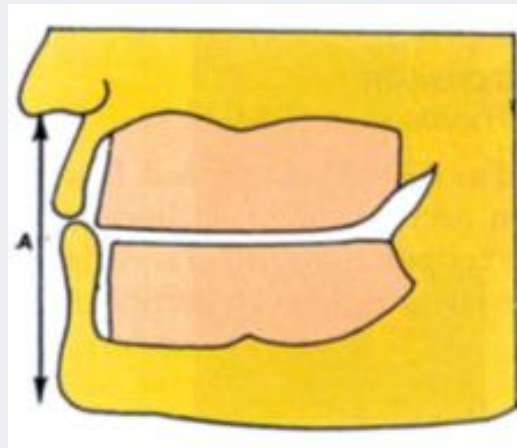
Methods for recording Vertical dimension at occlusion:

2- Physiological Methods : b) Physiological rest position

The patient swallows & lets the jaw relax while the rims are inside his mouth, when relaxation is obvious; the lips are carefully parted to reveal how much interocclusal space is present between the rims. It should be 2-4mm in premolar regions



patient swallows



relaxation is obvious



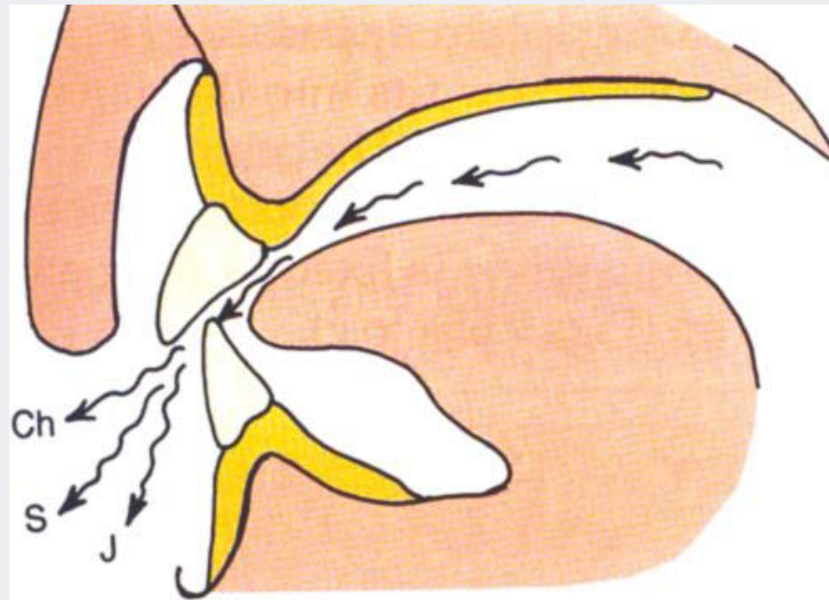
interocclusal space
between the rims

Methods for recording Vertical dimension at occlusion:

2- Physiological Methods :

c) Phonetics (Silverman's closest speaking space)

listening to speech sound production .the production of ch, s, & j sounds brings the anterior teeth close together.



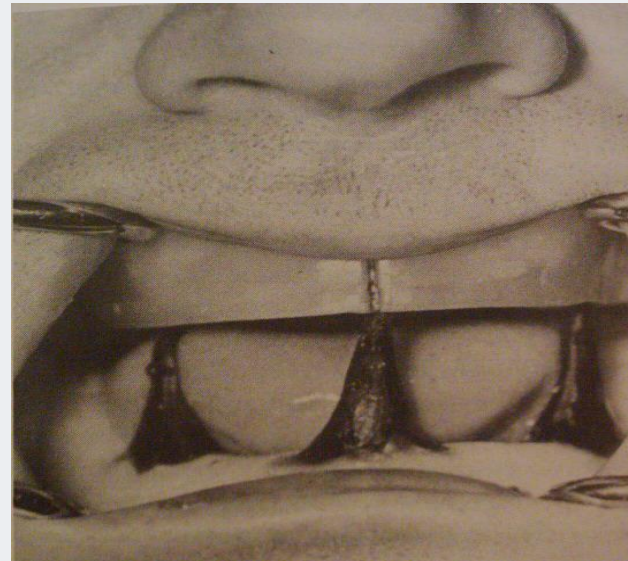
If the distance is too large,
it means that a too small V.D.O

If the anterior teeth click together
the V.D.O is too great

Methods for recording Vertical dimension at occlusion:

2- Physiological Methods : d) Swallowing threshold

When a person swallows, the teeth come in a very light contact at the beginning of the swallowing cycle which can be used as a guide to determine OVD.



The most frequently used tests that aid the dentist in establishing the correct VDO by means of occlusion rims are:

1. Visual observation of the space between the rims when the mandible is in its physiological rest position.
2. Judgment of the overall esthetic facial support.
3. Phonetic tests that include observations when the “s” sound is enunciated accurately and repeatedly—the average speaking space.

Horizontal jaw relations is the relationship of mandible to maxilla in a horizontal plane (in anteroposterior and side to side direction). It include:

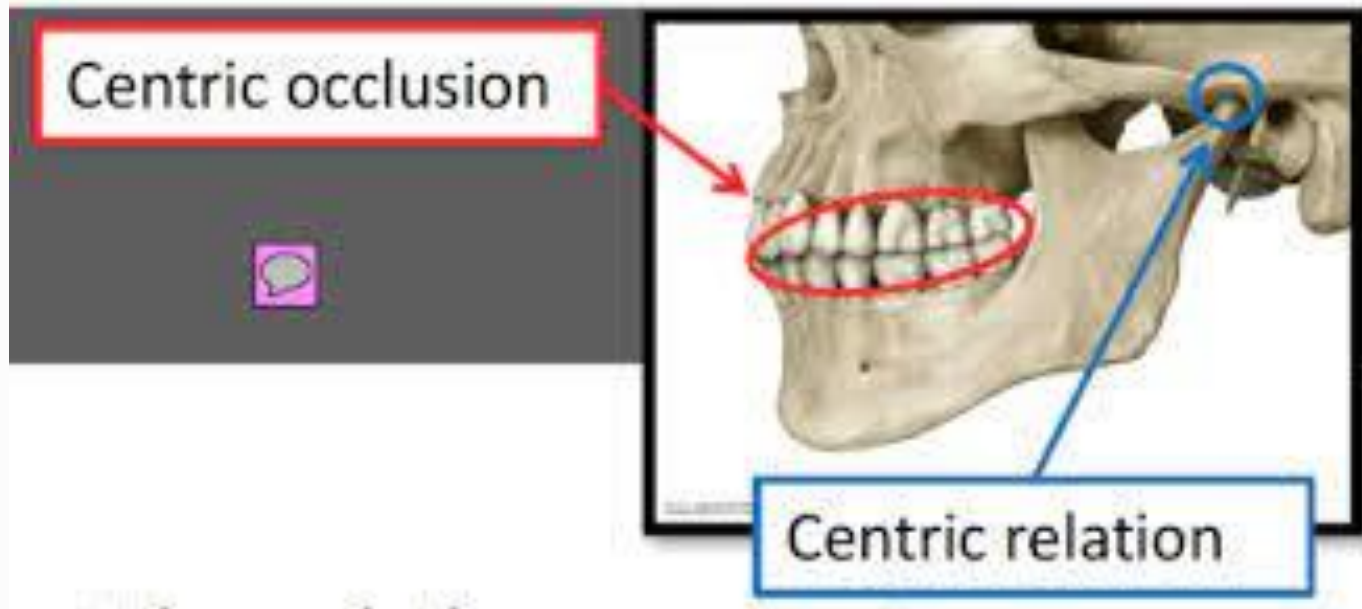
- 1) Centric jaw relation
- 2) Eccentric jaw relation which includes
 1. Protruded or forward relation.
 2. Lateral relation (Left or right).



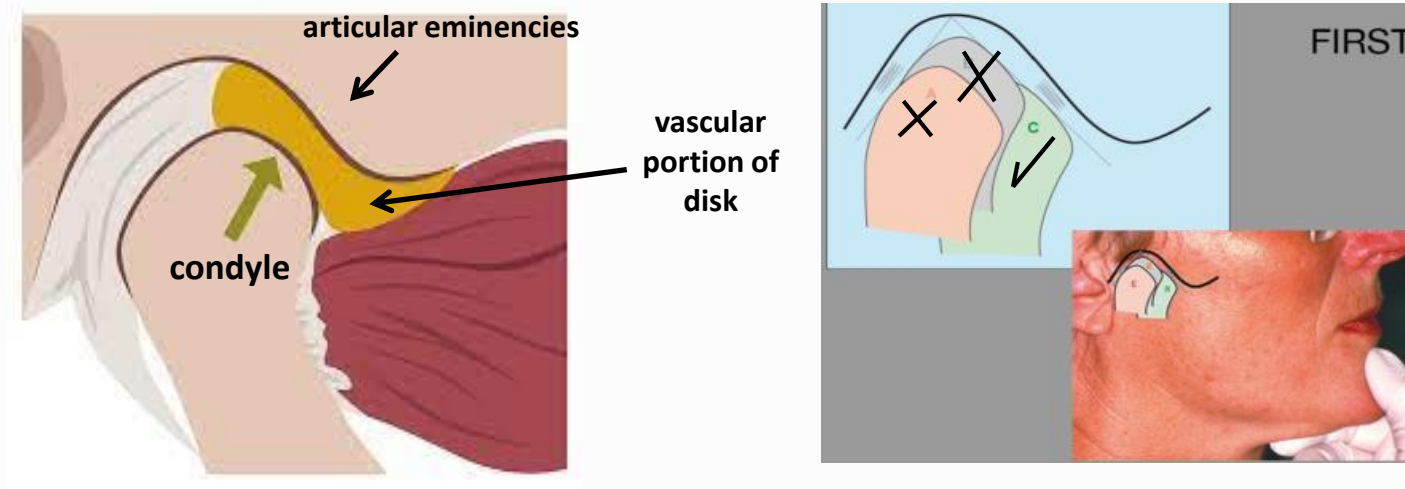
- The **correct** horizontal relationship for fabricating complete dentures is always the **centric relation position**.



Centric occlusion: The occlusion of the opposing teeth when the mandible is in centric relation.



Centric relation: the maxillomandibular relationship in which the condyles articulate with the thinnest a vascular portion of their respective disks with the complex in the anterior-superior position against the shapes of the articular eminencies.



Importance of centric relation

- 1- It is a **reference position**.
- 2- It is **learnable**, **repeatable** and **recordable** position.
- 3- It is the **start point** for developing occlusion.
- 4- **Functional movement** like chewing and swallowing are performed in this position.
- 5- It is a **reliable** jaw relation, because it is bone to bone relation.

Methods of Recording the Centric Jaw Relation

1. Physiological methods

- Tactile or inter-occlusal check record method

2. Functional (chew-in) method

- Needleshouse method
- Patterson method
- Swallowing technique

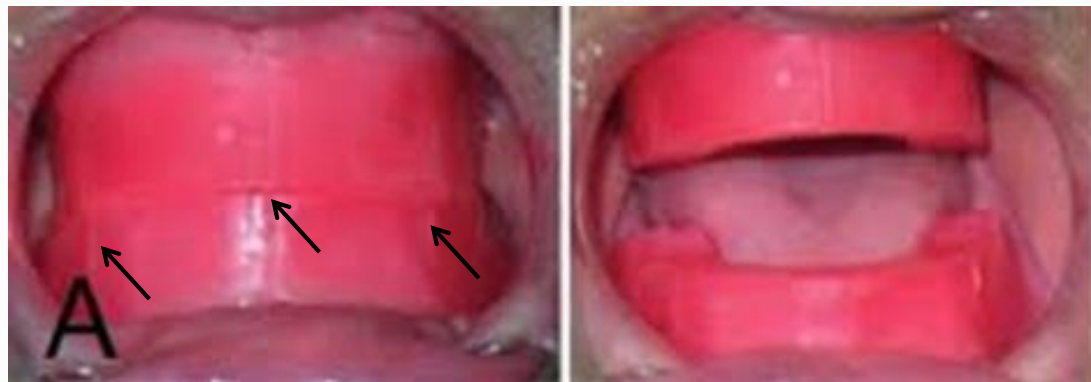
3. Graphic methods

- Intraoral
- Extraoral

4. Radiographic method

The clinician must be able to manipulate the patient's mandible to the centric relation position, as it is:

1- the starting reference point for complete denture fabrication, repeatable and it can be verified, and is a functional position for denture occlusion.



2- Complete dentures should always be fabricated so their occlusal position is coincident with the centric relation, this position then becomes the centric occlusion position for the patient.



The position of the dentist's hands

The position of the dentist's hands is an important factor in making accurate centric relation records and maintaining record bases in their correct position.



- The **non dominant hand is inverted and placed in the mouth** so that the soft tissue of the thumb and index fingers lies on the opposing buccal surfaces of the maxillary and mandibular occlusion rims, between the occlusal surfaces in the first molar region.

- The other hand is used to help guide the patient to centric relation position. Care should be exercised to avoid displacing the mandibular record base in the posterior direction.

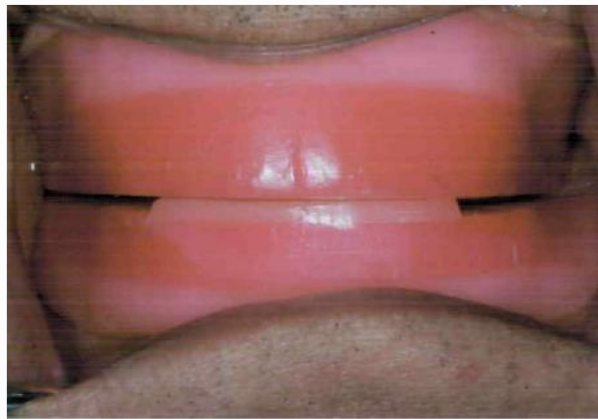


- Because it is sometimes difficult to get the patient into the CR position, it is a good idea to practice this position with the patient prior to attempting to make the recording.

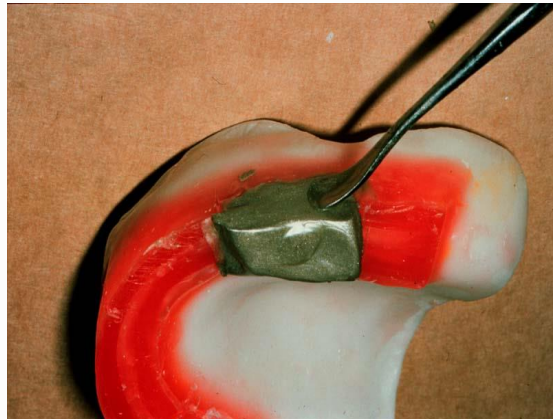
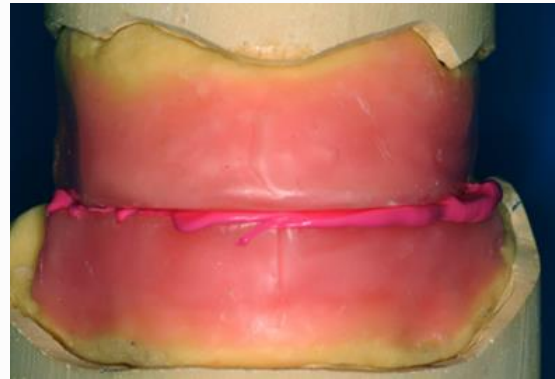
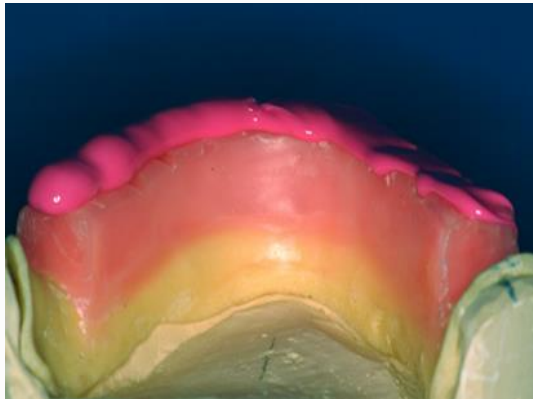
Methods must be used to position the jaw in centric relation.

1. Having [the patient completely relax](#) the mandible while the clinician gently shakes the mandible up and down.
2. Placing [the tip of the tongue](#) in the top and back of the mouth.
3. Telling the patient to "[Stick out the upper teeth.](#)"
4. [Tipping the chair and patient back](#) to allow gravity to help position the mandible.
5. [Using a mirror](#) so that the patient can see the CR mandible position.

- The maxillary master cast has now been properly placed on the articulator using a face-bow recording.
- The mandibular occlusion rim has been adjusted so that there is unrestricted contact with the maxillary occlusion rim at the correct occluding vertical dimension, and it is in centric relation.
- This horizontal relationship will now be captured with some type of recording material.
- because we must make the recording at the correct OVD, space must now be created to allow room for the record material.

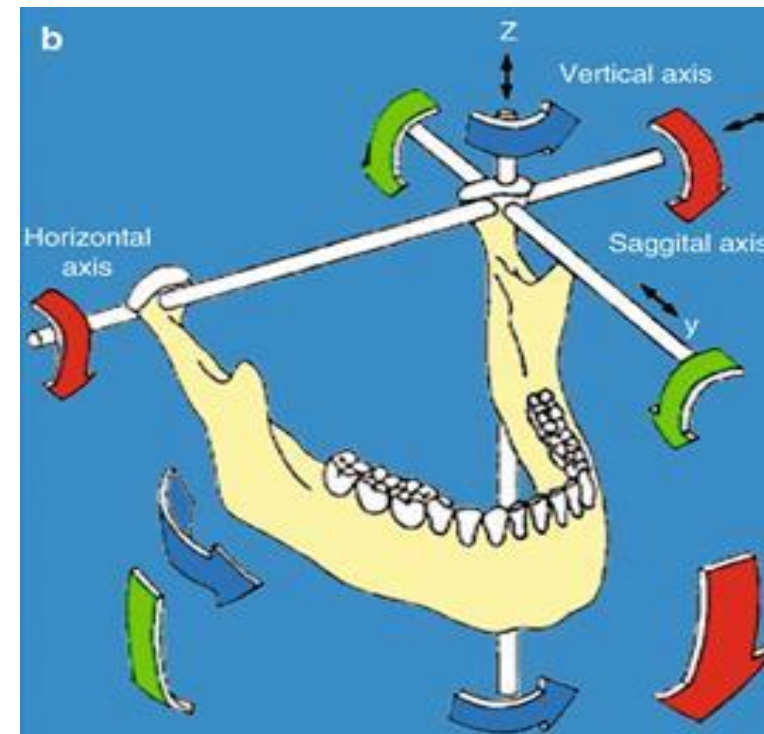
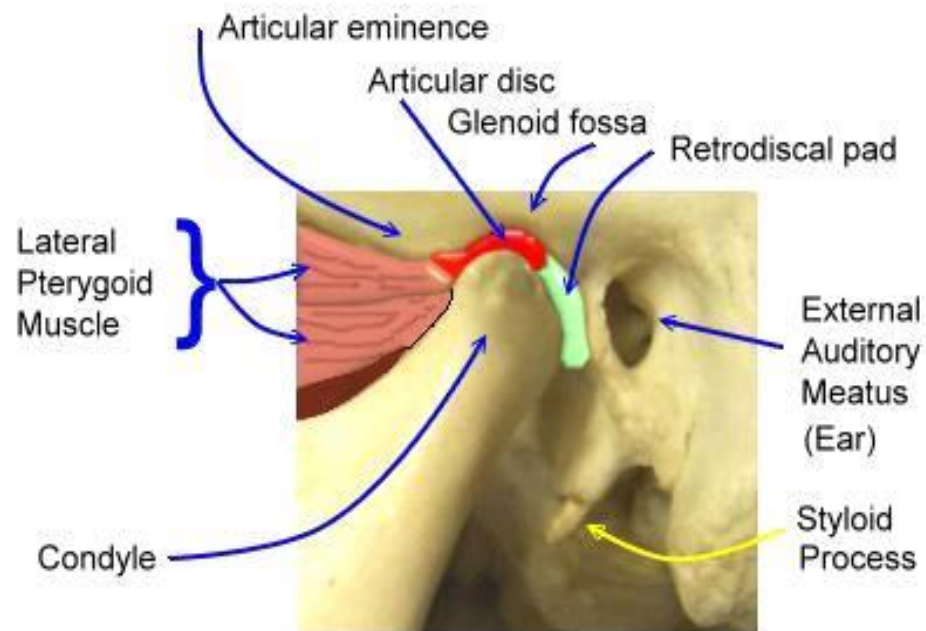


- Apply thin layer of recording medium on the mandibular occlusal rim.
- Instruct the patient to close in centric relation position.
- Remove both rims together



The End

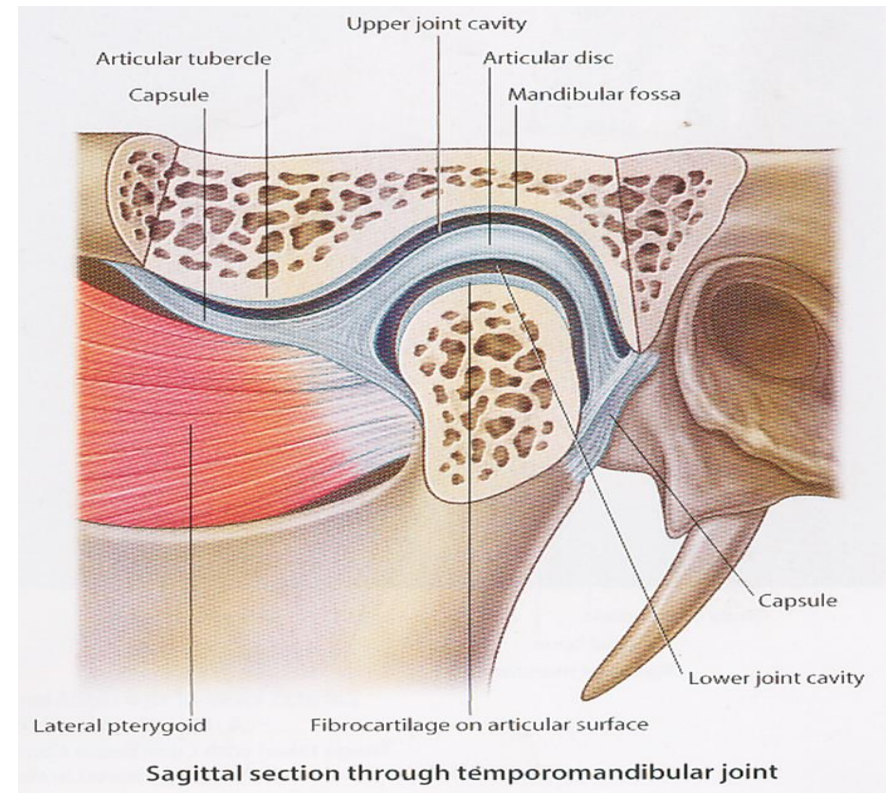
Temporomandibular joint and Mandibular Movement



What is temporomandibular joint??

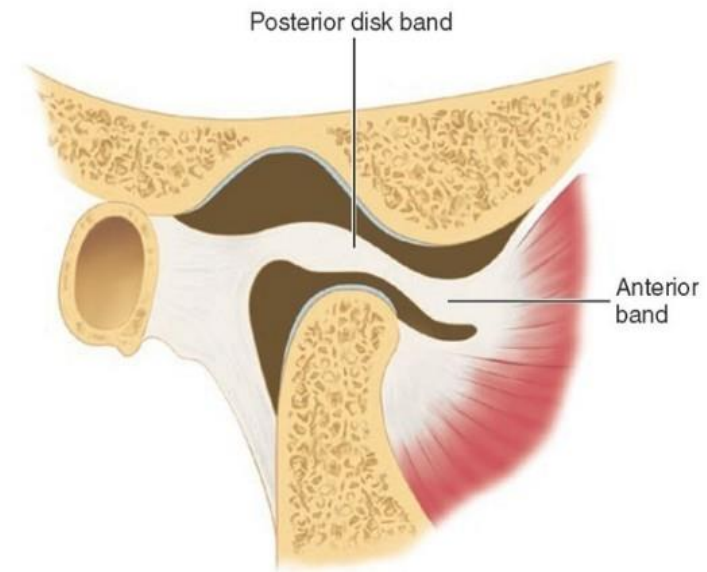
Temporomandibular joint TMJ: Is the articulation of the condyloid process of the mandible and the interarticular disk with the mandibular (glenoid fossa) of the temporal bone.

It Consist of two components: **osseous components and soft tissue components**



The TMJ consist of the following parts:

1. The mandibular or glenoid fossa.
2. The condyle or head of the mandible.
3. The articular disc or "Meniscus" which is found between the condyle and the glenoid fossa. It divides the synovial joint or TMJ into upper (superior) and lower (inferior) compartments.
4. Synovial cavity



How does the TMJ move during function:-

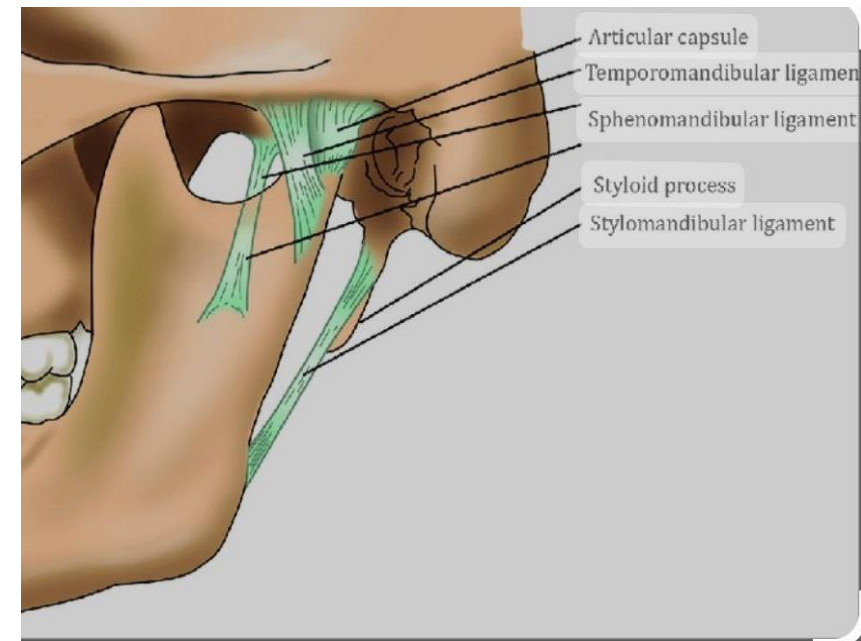
Replacement dentures must work in harmony with the patients TMJ which consist of the condyles which articulate with the temporal bones and are located in the elliptical concave depressions called the glenoid fossae in which they travel forward, from side to side, and in some instances slightly backward. Between the dome- shaped concavities in the temporal bones and the condyles are interposed the interarticular fibrocartilages, the meniscus, which are attached at their margins to the articular capsules. The meniscus divides the joint into upper and lower compartments. Normally the movements in the upper compartment is chiefly gliding anteroposterior motion in which the condyles and the cartilage move as a unit, the movement in the lower compartment is hinge like. Therefore, condylar paths are the controlling factor in the mandibular movements. These movements are results of action of muscles of mastication, suprahyoid, and infrahyoid muscles.

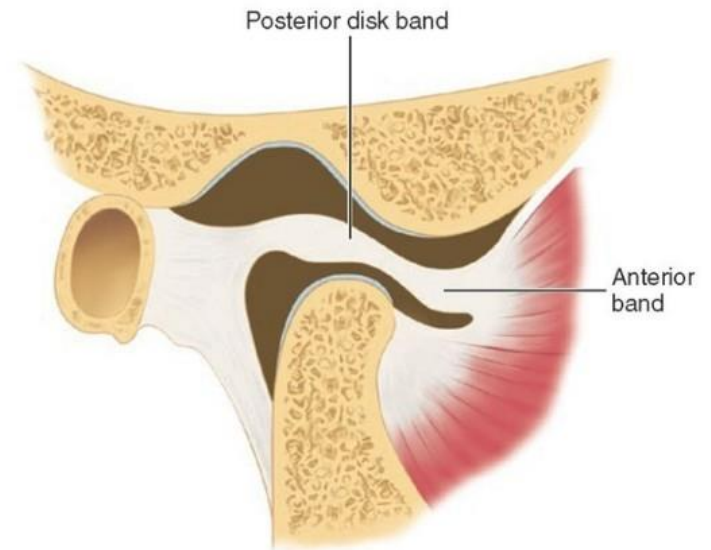
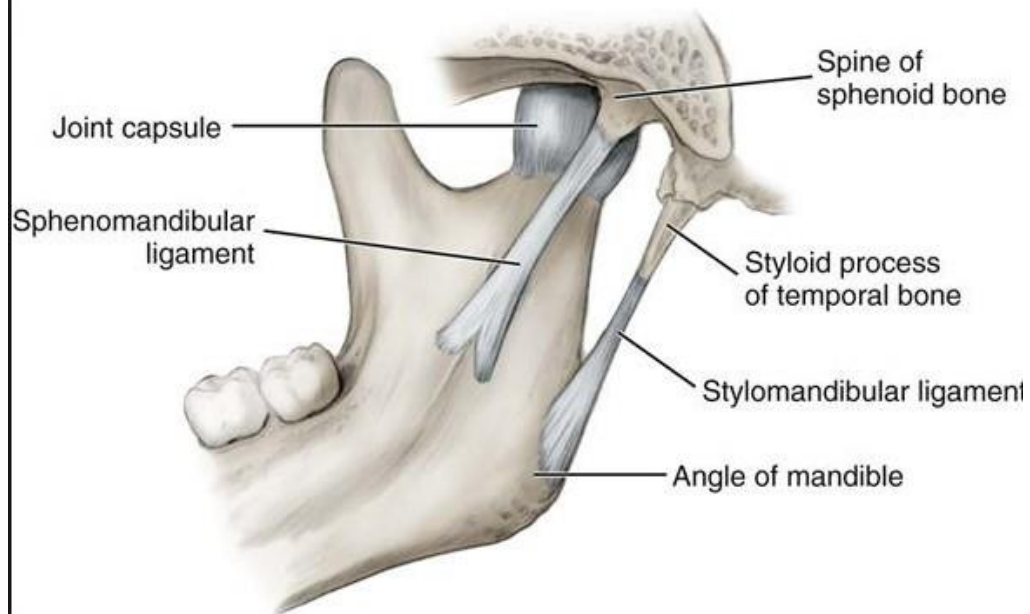
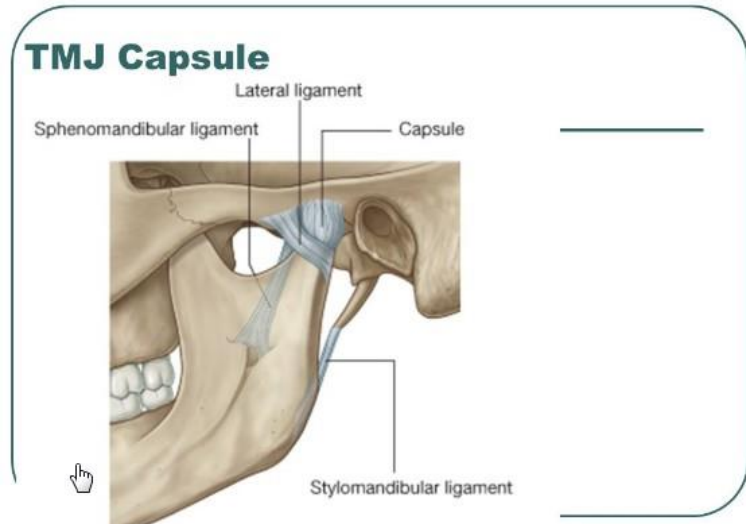
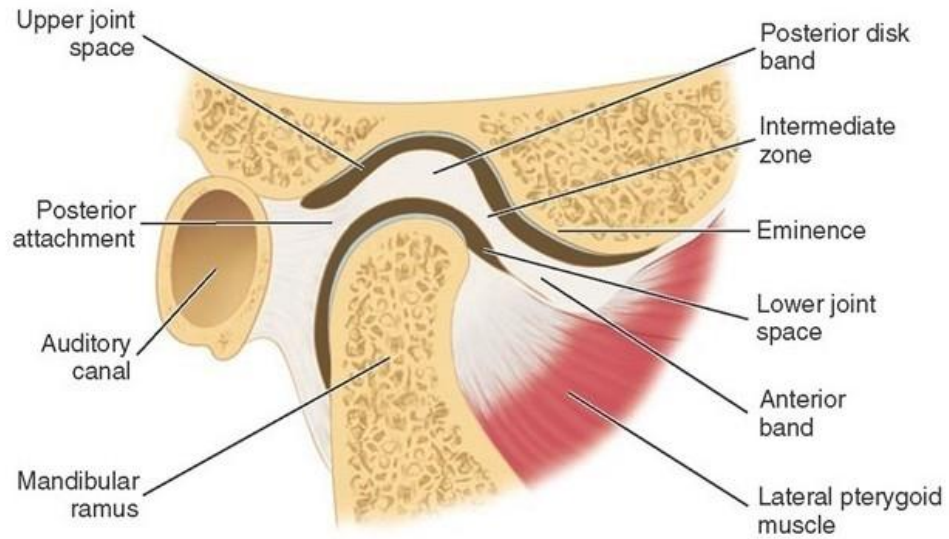
The ligaments that effect the movement of the mandible

consist of:

1. Temporo mandibular and capsular ligaments.
2. Sphenomandibular ligament.
3. Stylomandibular ligament.

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.





The muscles that control the movement of the mandible may be considered in 3 groups:

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

The closing muscles include

- The masseter muscle
- The temporal muscle
- The medial pterygoid muscle.

The direction of their fibers is essentially vertical, their origin is superior to their insertion on the mandible

The gliding muscles include:

Medial pterygoid muscles (muscle of mastication). The actions of these muscles are to pull the mandible forward if they both contract simultaneously, or to pull the mandible laterally if they contract individually.

The opening muscles:

- Suprahyoid muscles their origin below the mandible
- Infrahyoid muscles action-downward and backward

Muscles involved in mandibular movements

Muscles of mastication and suprahyoid muscles	Mandibular movements
Masseter	Closing and retrusion
Temporalis	Elevation and retrusion
Medial pterygoid	Closing and lateral movements
Lateral pterygoid	Opening, protrusion and lateral movements
Suprahyoid group of muscles	Depress (open the mouth) the mandible assisted by infrahyoid group

The teeth could not occlude or disocclude without the action of four (paired) muscles of mastication that make it all possible.

The masseter, temporalis & medial pterygoid muscles supply the power for pulling the mandible against the maxillae (elevating & closing mandible).

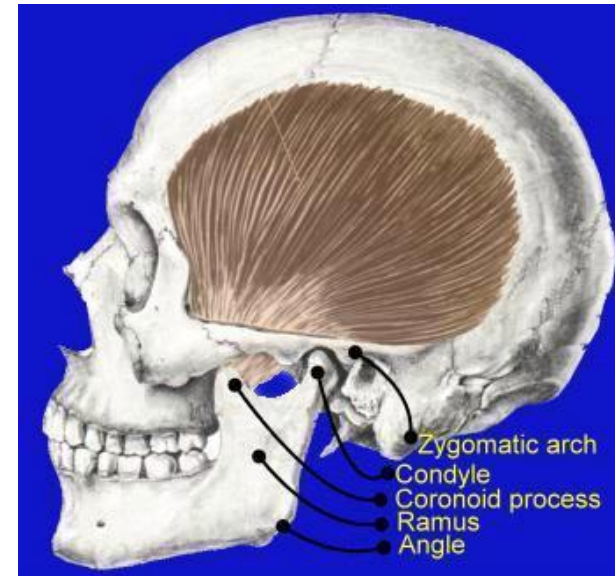
*The lateral pterygoid muscles connect the mandible to the lateral pterygoid plate in such a way as to act as the steering mechanism for the mandible & act to protrude the jaw or to move it laterally.

* While the muscles that depress the mandible (open) consist of three groups, suprahyoid muscle and platysma, infrahyoid muscles, and lateral pterygoid muscles.

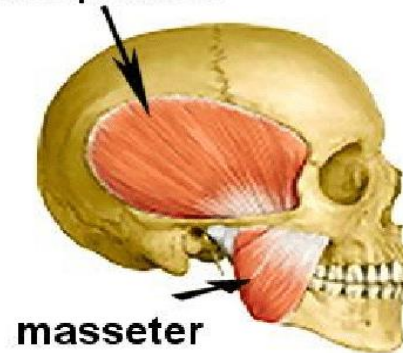
Prosthodontic treatment has a direct relation to the structures of the temporomandibular articulation, since occlusion is one of the most important parts of treatment of the patients with complete dentures. The temporomandibular joints affect the dentures and likewise the dentures affect health and function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

The muscles of mastication

1. Masseter
2. Temporalis muscle
3. lateral pterygoid muscles
4. Medial Pterygoid muscles



temporalis



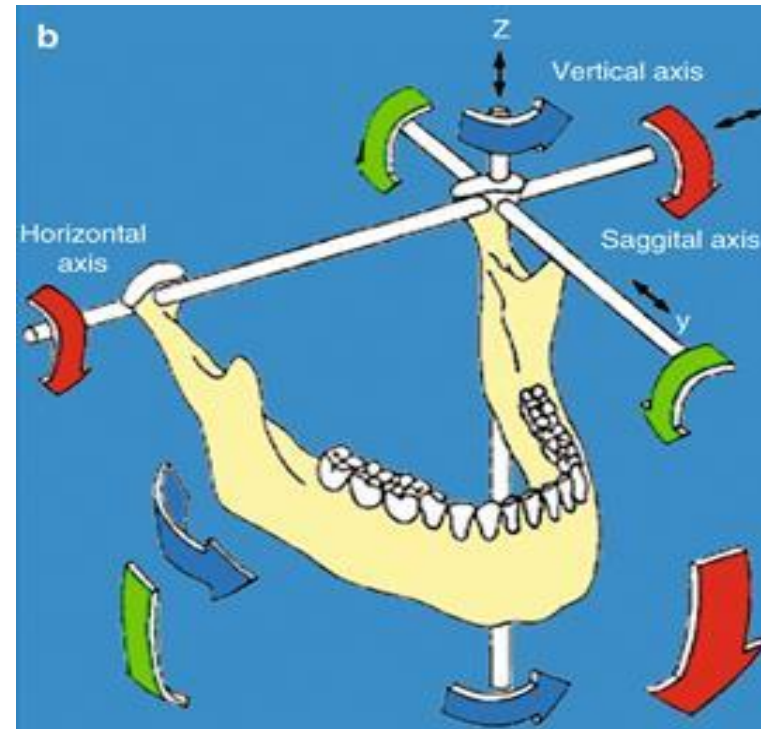
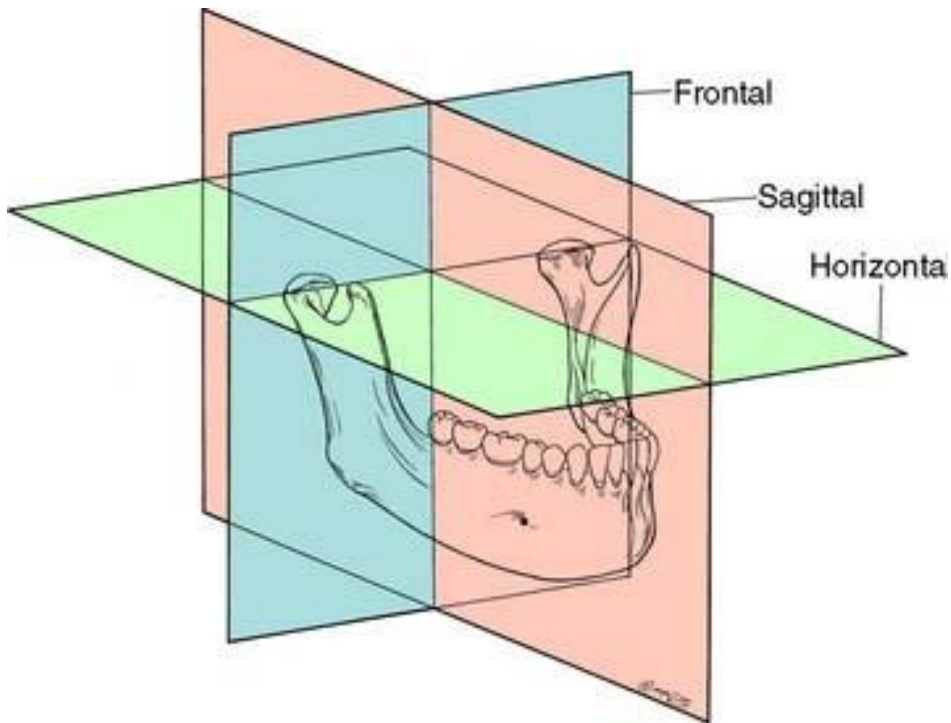
masseter

lateral pterygoid



medial pterygoid

Mandibular axis: There are three axes around which the mandibular movements takes place in horizontal, sagittal and frontal planes. These axes include the followings

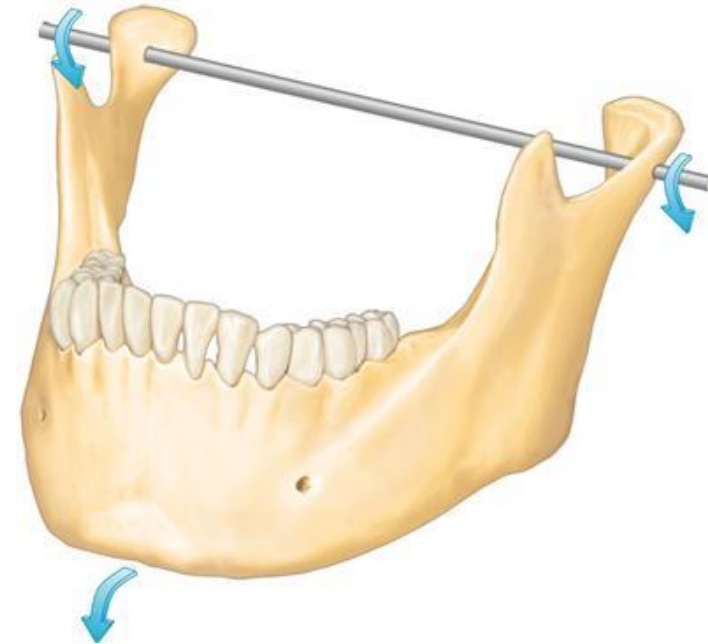


1. Hinge axis: or transverse horizontal axis:

An imaginary line around which the mandible may rotate within the sagittal plane. (During the opening and closing movement) **refer as hinge movement**, and the horizontal axis around which it occurs is therefore referred to as the **hinge axis**.

When the condyles are in their most superior position in the articular fossae and the mouth is purely rotated open, the axis around which movement occurs is called **the terminal hinge axis**.

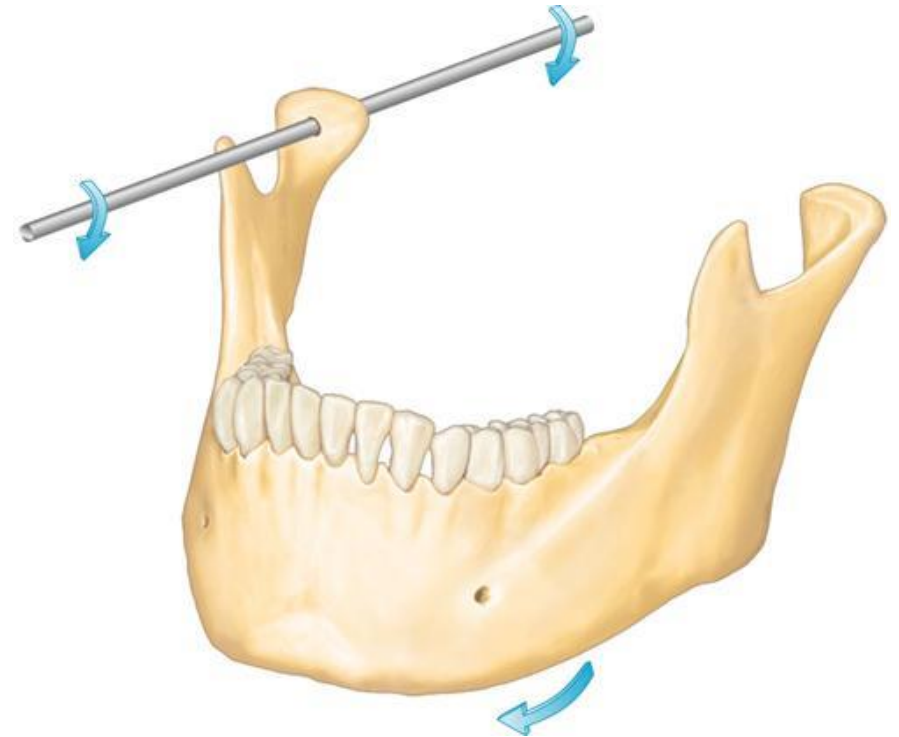
Opening and closing (Hinge) movement takes place in the sagittal plane around transvers (hinge) axis



2. Sagittal axis of the mandible :

An imaginary anteroposterior line around which the mandible may rotate when view in the frontal plane.

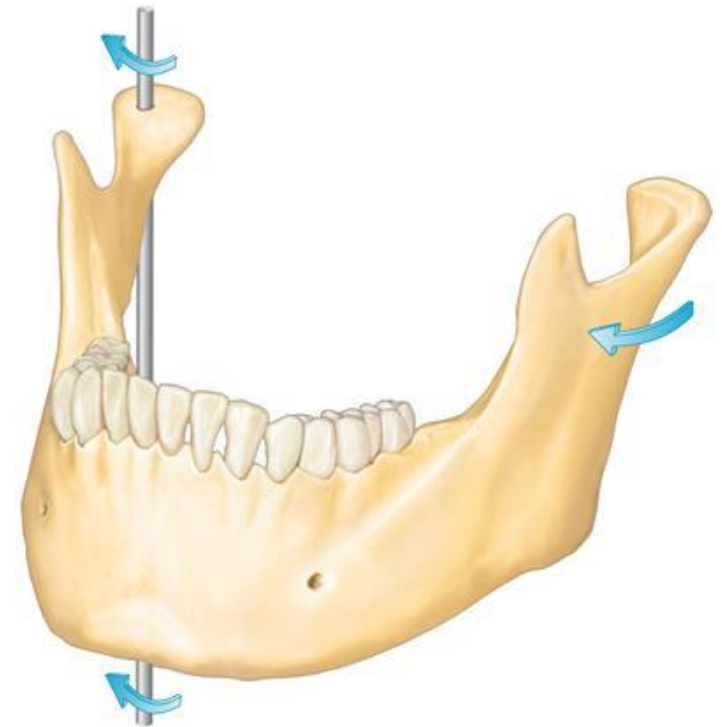
Lateral movement takes place in frontal plane in which the condyle twists while rotating around antero-posterior or sagittal axis.



3. Vertical axis of the mandible:

An imaginary line around which the mandible may rotate through the horizontal plane

Rotational movement takes place in horizontal plane in which the condyle twists laterally and backward around vertical axis



Mandibular Movements:

Movement of the condyle occur along the posterior slop of the articular eminence and extend as far forward as its crest. In some instances, movements may involve part of the anterior slope.

*Mandibular movements are related to three planes of the skull--- the horizontal, frontal, and sagittal. The mandible rotates in each of the three planes of space. The point of intersection of the three axes is called the center of rotation

Mandibular Movements:

Mandibular movements may be divided into two types either basic or functional movement.

1. Basic movements: This movements occurs at the level of TMJ it may be divided into two types:

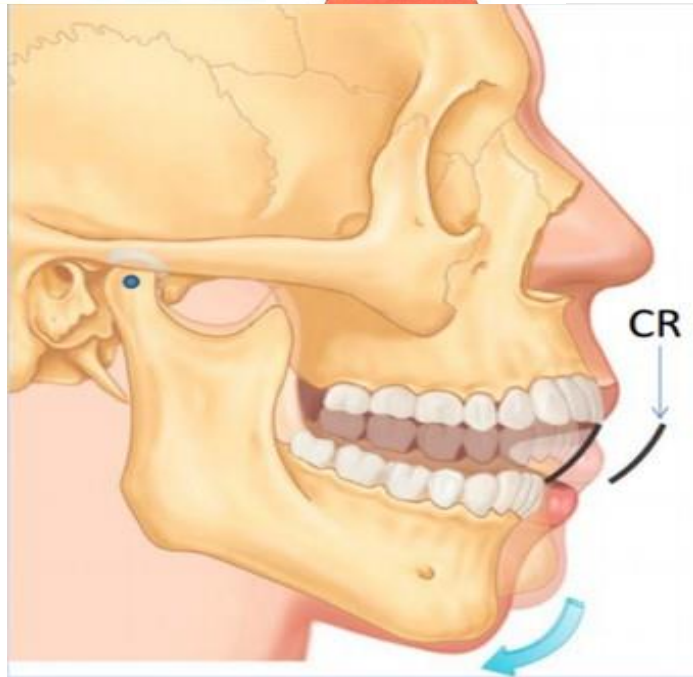
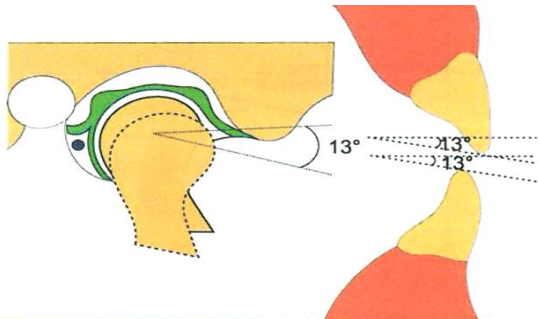
a- Rotational movement:

The rotational movement occurs between the condyle and the inferior surface of the articular disk, i.e. **in the lower compartment of the TMJ**. Centric relation which is called uppermost, rearmost, midmost or most posterior position is purely rotary movement about the transverse horizontal axis.

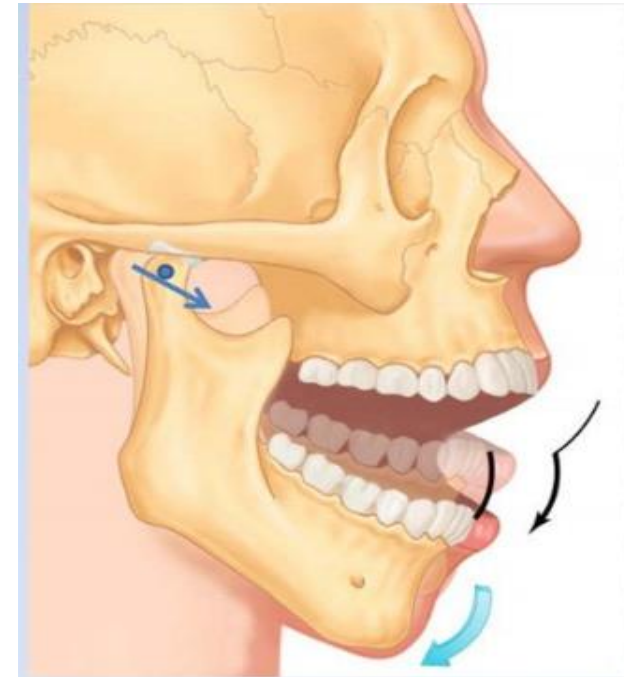
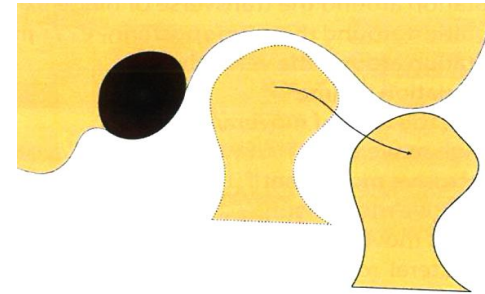
b- Translatory or gliding movement: It take place in the **upper compartment** of the TMJ, i.e. between the superior surface of the articular disk and the glenoid fossa.

These called mandibular border movement.

Mandibular movement, except the opening and closing in its most posterior position (posterior terminal hinge movement) are combination of rotation and translation, and referred to as functional movements.



pure rotational movement of
the condyle **(20-25)** mm
incisal separation



condylar translation that occurs
beyond **(20-25)** mm incisal
separation

2- Functional movement: All mandibular movements except the terminal hinge movement, are combination of rotational and transitional, are most frequently and are referred to as being functional movement. They are including:

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

The opening and closing movements are considered the most important mandibular movements and they are divided into:

- Habitual movement.
- Border movement.

Border Movements:

Tack place within three dimensional limits the mandible can move about (10 mm laterally), open about (50 to 60 mm), protrude approximately (9mm), and retrude about (1 mm). These limits describe by [possite in 1952](#) and which are known as **border movements of the mandible**. It's the most extreme positions to which the jaw is able to move in any direction

The border positions are **limits by nerves, bones, muscles, teeth when present and ligaments**

Border movements, subdivided into:

- **Anterior border movement**, appear as one arc in the sagittal plane, the condyles rotate and translate in this movement.
- **Posterior border movement**, appear as two arcs in the sagittal plane, the condyles rotate in the opening and closing up to the point of terminal hinge opening and translate to the point of maximal opening
- **Maximum Protrusion** depicts complete contact with the teeth as the mandible is completely protruded, anteriorly. It is the most anterior of the positions, when viewed from the sagittal plane

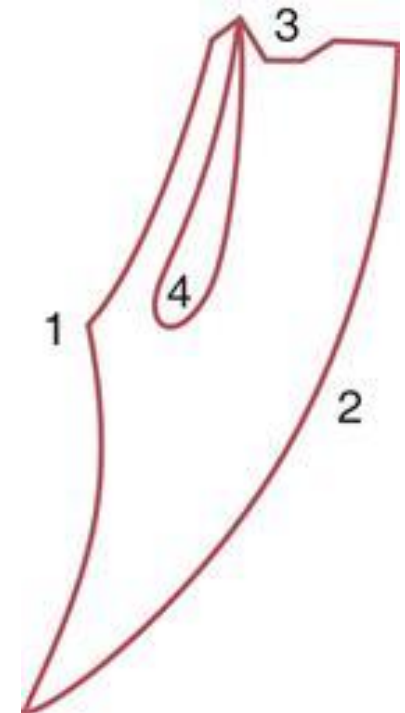
Envelope of Motion

Sagittal Plane Border and Functional Movements

Mandibular motion viewed in the sagittal plane can be seen to have four distinct movement components

1. Posterior opening border (two arcs)
2. Anterior opening border (one arc)
3. Superior contact border
4. Functional

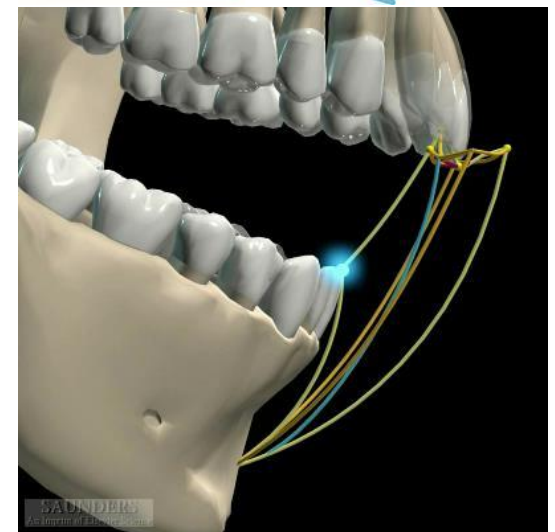
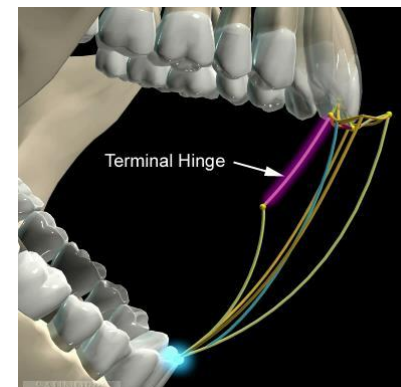
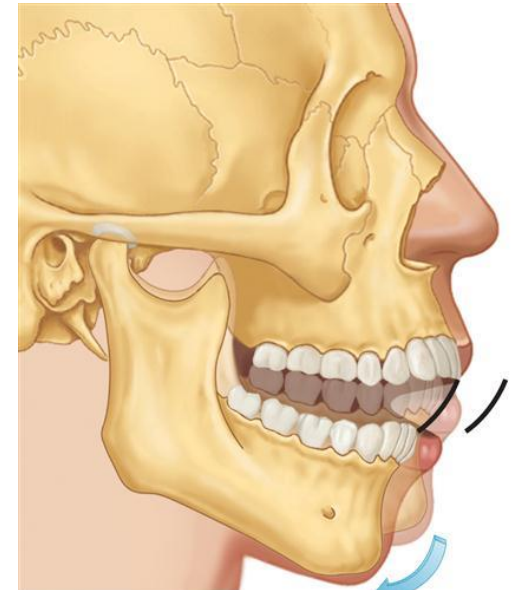
- ❖ The superior surface of the envelope is determined by the tooth contacts
- ❖ The other borders are primarily determined by the TMJ anatomy and the ligaments
- ❖ Functional movements determined by the conditional responses of the neuromuscular system



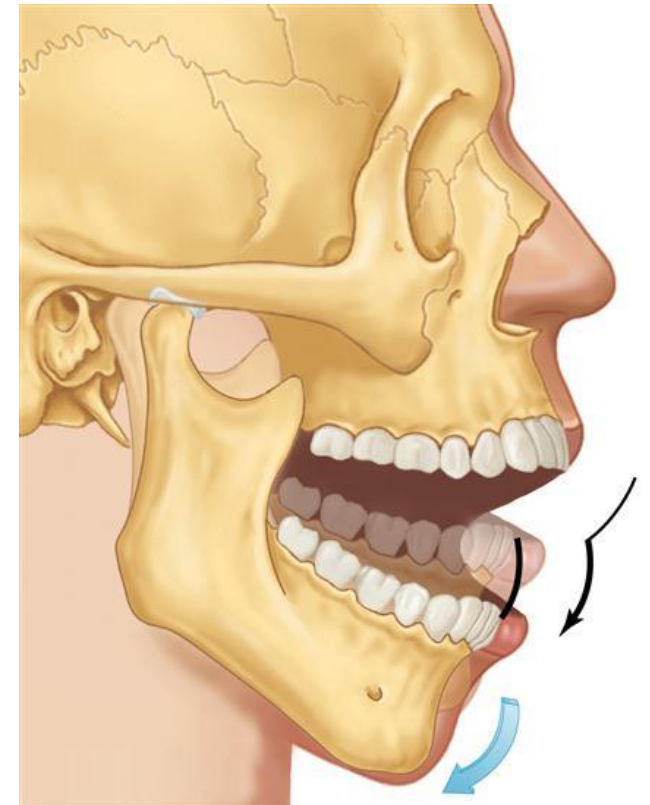
Posterior opening border movements

Posterior opening border movements in the sagittal plane occur as two-stage hinging movements.

first stage The mandible will open along the hinge axis, with the condyles rotating within the glenoid fossa. The rotational movement will terminate at the Terminal Hinge Axis Position. In CR, Rotational movement of the mandible with the condyles in the terminal hinge to a distance of **only 20 to 25 mm** as measured between the incisal edges of the maxillary and mandibular incisors. The condyles are rotating completely within the glenoid fossa. It is a reproducible and consistent movement. the Terminal Hinge Axis is the rotational movement that occurs from CR to the Terminal Hinge Axis position.



Second stage During this stage, in which the mandible is rotating around a horizontal axis passing through the rami. Maximum opening is reached when the capsular ligaments prevent further movement at the condyles. **Maximum opening is in the range of 40 to 60 mm** as measured between the incisal edges of the maxillary and mandibular teeth.



Sagittal plane movements:-

A map of the boundary of the movements of mandible when viewed from one side of the head, it is tracing of the maximum vertical and anteroposterior movements of the mandibular central incisors. It includes

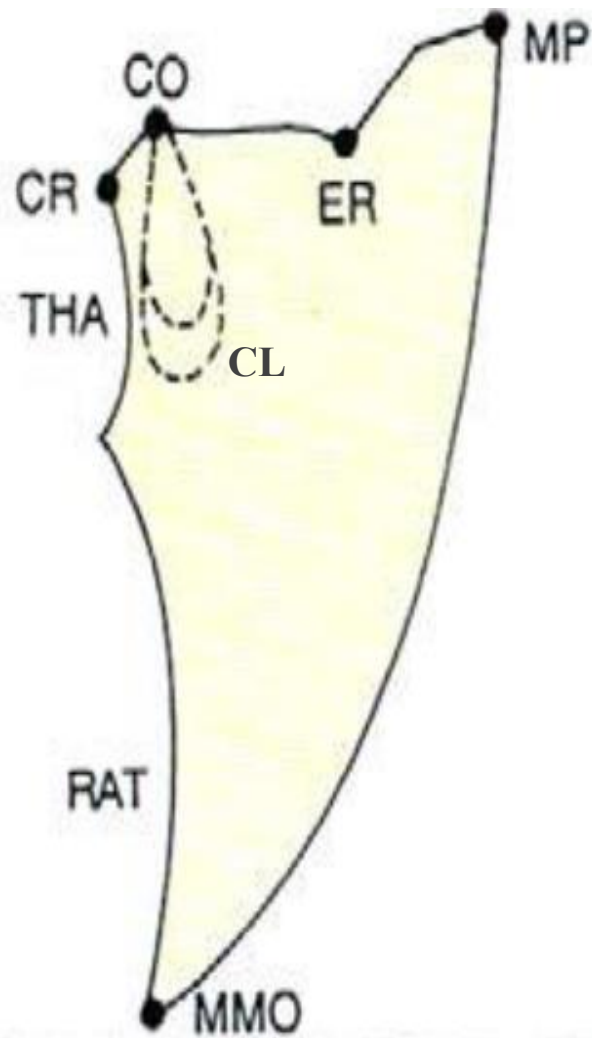
1- **Maximum intercuspation** or centric occlusion (**CO**) this border position is usually defined as that point where the teeth best interdigitate.

2- If the mandible is retruded farther to its posterior most superior, most terminal hinge position, the limits of movement and the border position are determined by structures of the T.M.J.

Some have also referred to this position as (**Centric relation**) **CR**.it has been defined in number of different ways.

Extreme Movements in the Sagittal Plan

A characteristic '**Beak tracing**' is formed while recording border movements in the sagittal plane. Here, the patient is instructed to move the mandible from centric relation (CR) to centric occlusion (CO), then to the edge to edge relationship (ER) guided by the incisal guidance, progress further forward to the maximum protrusive (MP) position and then arc downward to the maximum mouth opening (MMO) position. Once this position is reached the operator should guide the mandible backward and close the mouth. While closing the mouth the mandible arcs upward (RAT-rotation after translation) around a transverse axis passing through the mandibular foramen. Consecutively the condyle translates back to the centric relation position where the mandible continues to arc upwards around the true hinge axis passing through the condyle (THA).



Legend:

CR = Centric Relation

CO = Centric Occlusion (Maximum Intercuspatation)

ER = Edge to Edge Relation

MP = Maximum Protrusion Point

MMO = Maximum Mouth Opening

RAT-Rotation after Translation

THA = Terminating Hinge Axis

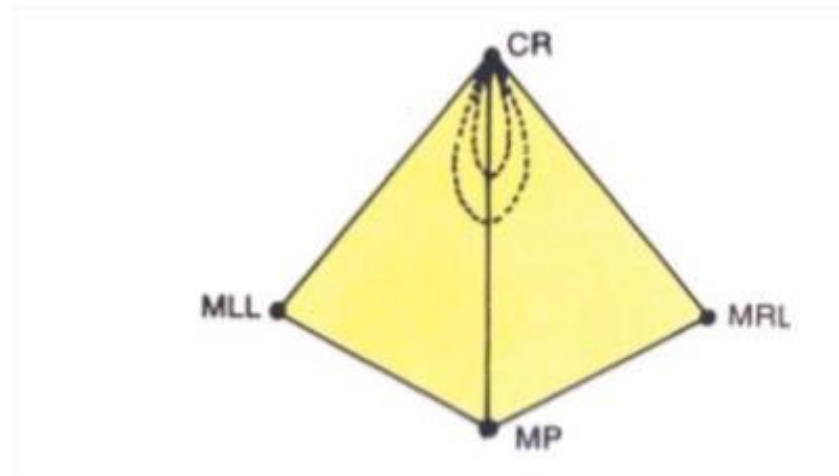
HA = Hinge Axis Arc

CL= Chewing Loop

Extreme Movements in the Sagittal Plan

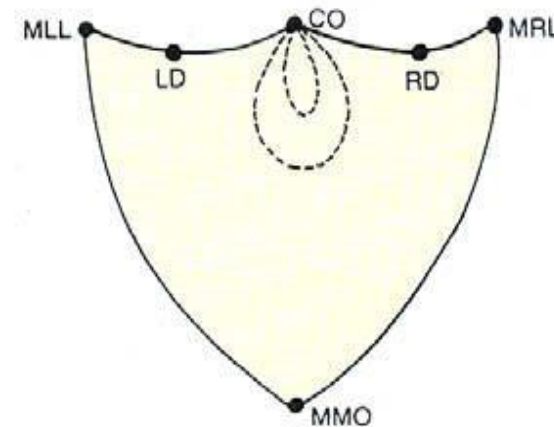
Border Movements in Horizontal Plane

Characteristically described as a “diamond” shape. While recording the tracing, the patient is instructed to move his mandible from the centric relation position (CR) to the maximum right lateral (MRL) position to the maximum protrusive (MP) position, to the maximum left lateral (MLL) position and return to centric. An arrow point tracing formed using Gothic arch tracers should and will coincide with this pattern.

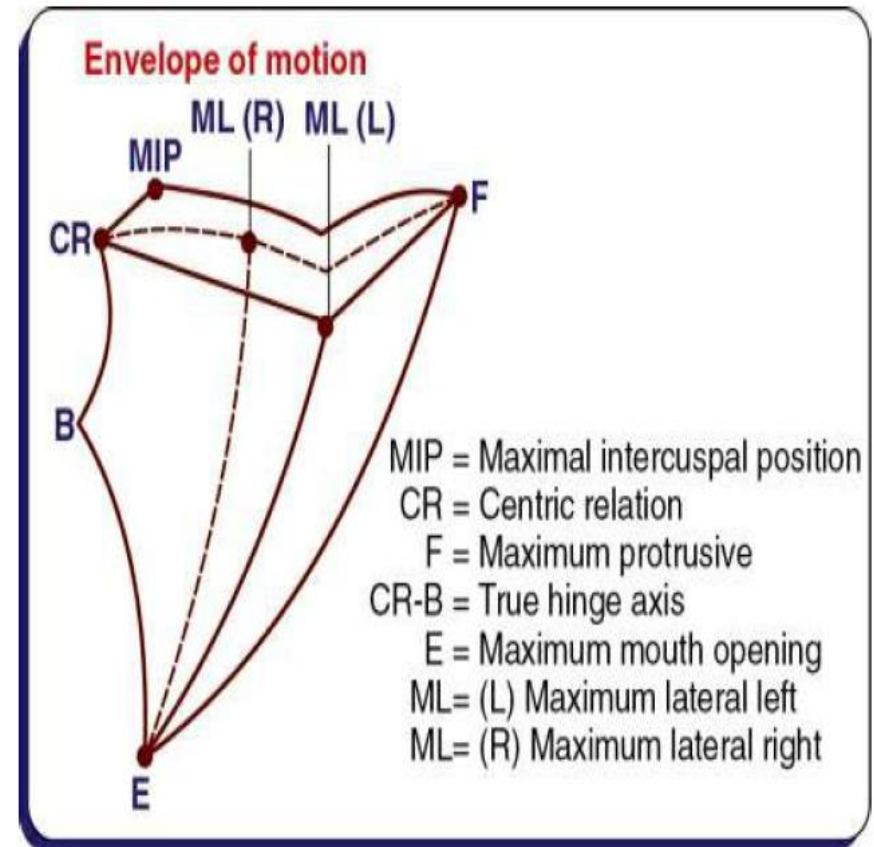


Extreme Movements in the Coronal Plane

Border movements produced in this plane produce a characteristic ‘**shield tracing**’. Here the patient is instructed to move his mandible from centric occlusion (CO) to canine-guided disocclusion on the right side (RD) and then to the maximum right lateral position (MRL) then arc downwards to the maximum mouth opening position (MMO). From this position, the patient is instructed to arc upward to the maximum left lateral position (MLL), return medially to canine guided disocclusion on the left side (LD) and then return to centric occlusion (CO)



When we combine the border movements of all the three planes, we get a three-dimensional space within which mandibular movement is possible. This three-dimensional limiting space is called the *envelope of motion*. It was first described by Posselt in 1952.



Envelope of motion as described by Posselt

Four movements of prime importance to complete denture service are:

1- Hinge like movement used in opening and closing the mouth for the introduction of food

2- A protrusive movement used in the grasping and incision of food

3- Right or left lateral movements for use in the reduction of fibrous as well as other types of food

4- Bennett movement – the bodily side shift of the mandible which when it occurs, may be recorded in the region of the advancing non-working side

Functional mandibular:- movements include all natural or characteristic movements occurring during mastication, swallowing, speech and yawning

Parafunctional movements: - movements that occur in the clenching, tapping or grinding of the teeth.

Jaw Registration of Condylar Movements

What is it and why do we record it?

It is a recording of the paths/positions of the condyles during border movements that are recorded in order to program the articulator to simulate the patient's condylar movements

How is it recorded ?

1. Pantographic tracing to program a fully-adjustable articulator
2. Interocclusal records to program a semi-adjustable articulator

Face bow record

CR record

Protrusive record

Lateral record

Articulator: Mechanical Systems used to Replicate Mandibular Movement.

Types of articulators:

Class I- a simple holding instrument capable of accepting a single static registration; vertical motion is possible (e.g. .non-adjustable).

Class II-an instrument that permits horizontal as well as vertical motion, but does not orient the motion to the temporomandibular joints (Mean value).

Class III-an instrument that simulates condylar pathways by using averages or mechanical equivalents for all or part of the motion; allow for orientation of the casts relative to the joints and may be arcon or nonarcon instruments (e.g. semi-adjustable)

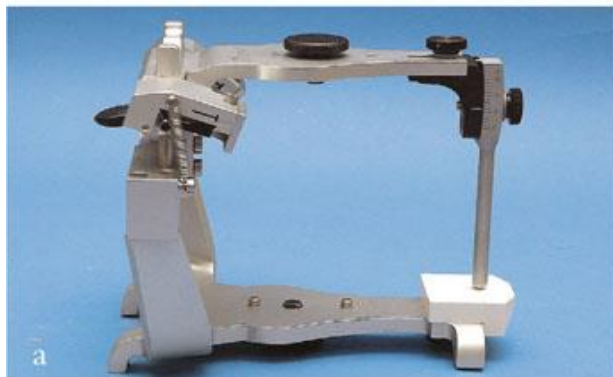
Class IV- an instrument that will accept three dimensional registrations; allow for orientation of the casts relative to the joints and simulation of mandibular movements (e.g. fully adjustable)



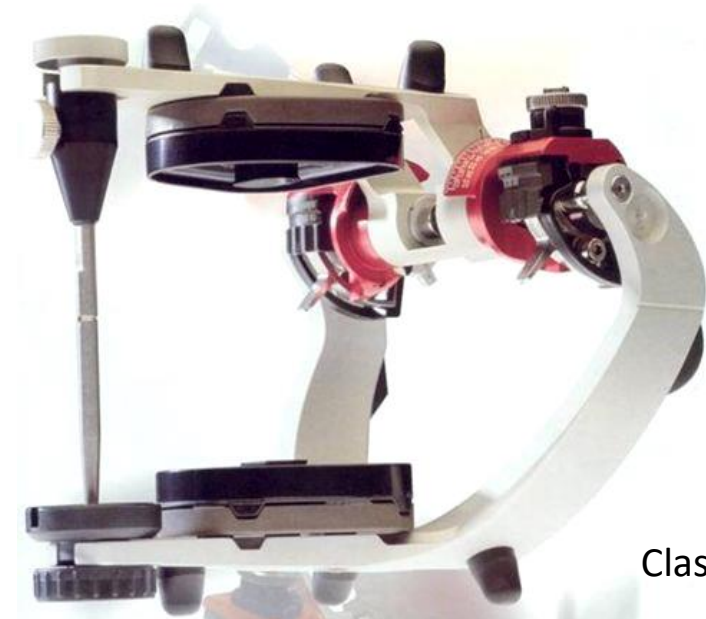
Class I



Class II



Class III



Class IV

Third visit in complete denture construction (clinical step)

Occlusal plane orientation, vertical dimension, face-bow transfer, centric relation.

Objectives of this visit

- **Occlusal plane:** - To determine the horizontal and vertical level of the teeth.
- **Vertical dimension:** - To determine the amount of space between the rims with jaws at rest and with the wax rims in occlusion.
- **Face-bow transfer:** - To record the position of the jaws as related to the opening axis of the mandible and transfer this position so that the casts on the articulator will have the same relationship to the opening axis of the patient.
- **Centric relation:** - To record the most posterior position of the mandible to the maxilla and transfer this position to the articulator.

Face-bow transfer

A face-bow is a caliper- like device used to record the patient's maxillae/ hinge axis relationship and to transfer this relation to the articulator during mounting of the maxillary cast.

If the face-bow transfer procedure properly done, the arc of closure on the articulator should duplicate that exhibited by the patient.

A face-bow transfer should be used when:-

- Cusped posterior teeth are selected.
- Balanced occlusion in eccentric positions is desired.
- Interocclusal check records are used for verification of jaw relationships.
- The occlusal vertical dimension is subject to change.

some authors reported that if cuspless teeth and a monoplane occlusion are selected, a face-bow transfer is unnecessary. Other recommend the use of face-bow, even for cuspless teeth to provide more accurate placement of casts in the articulator than would be obtained by simply placing arbitrarily

There are two types of face-bow, the kinematic and the arbitrary.

The kinematic face-bow is used to accurately locate the hinge axis, it is attached to a clutch which is in turn attaches to the mandibular teeth. As the mandible makes opening and closing movement, the condyle styli move in an arc. The kinematic face-bow generally not used for CD fabrication because the resiliency of the soft tissues make precise location of the rotational centers almost impossible.

Several varieties of arbitrary face-bows are available. All are based on an average location of the hinge axis. It is located over measured points on the face or by some type of earpiece. One average measurement places the rotational point 13mm anterior to the distal edge of the tragus of the ear, along a line from the superior-inferior center of the tragus to the outer canthus of the eye. The condyle styli of the face-bow are then placed directly over the dots. This technique is used with Hanau H-2 and Dentatus articulators.

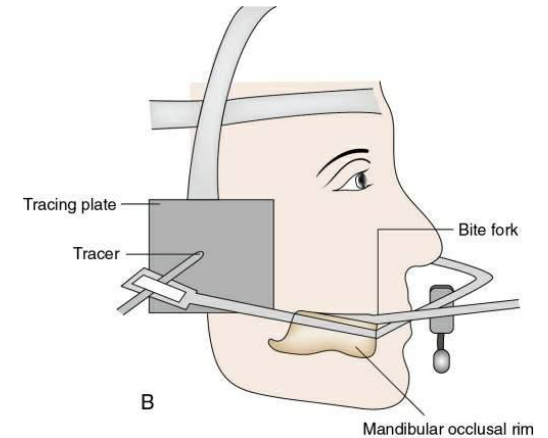


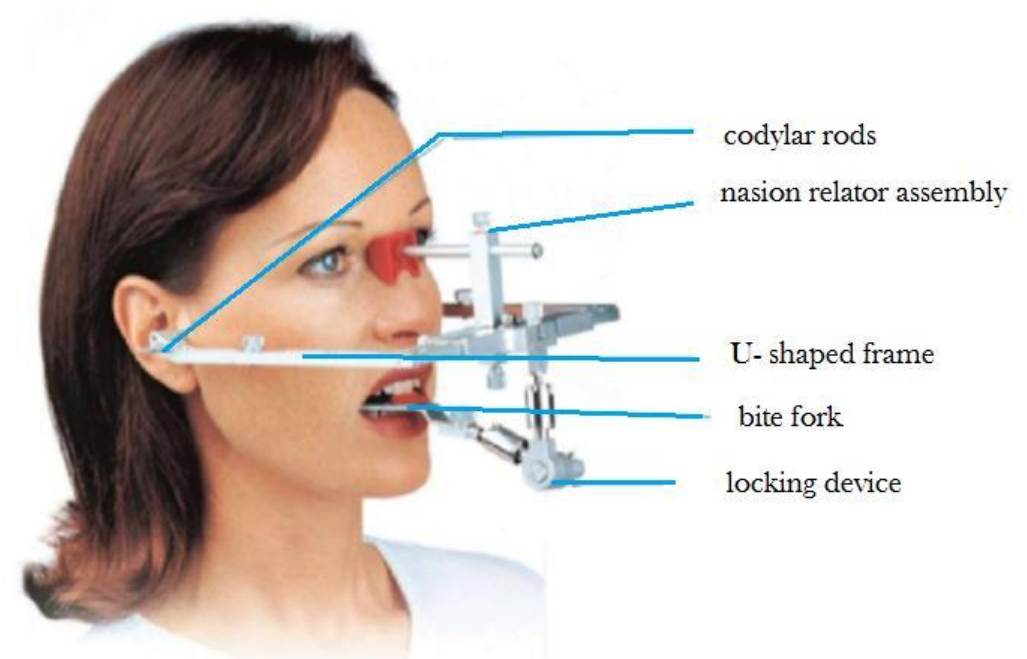
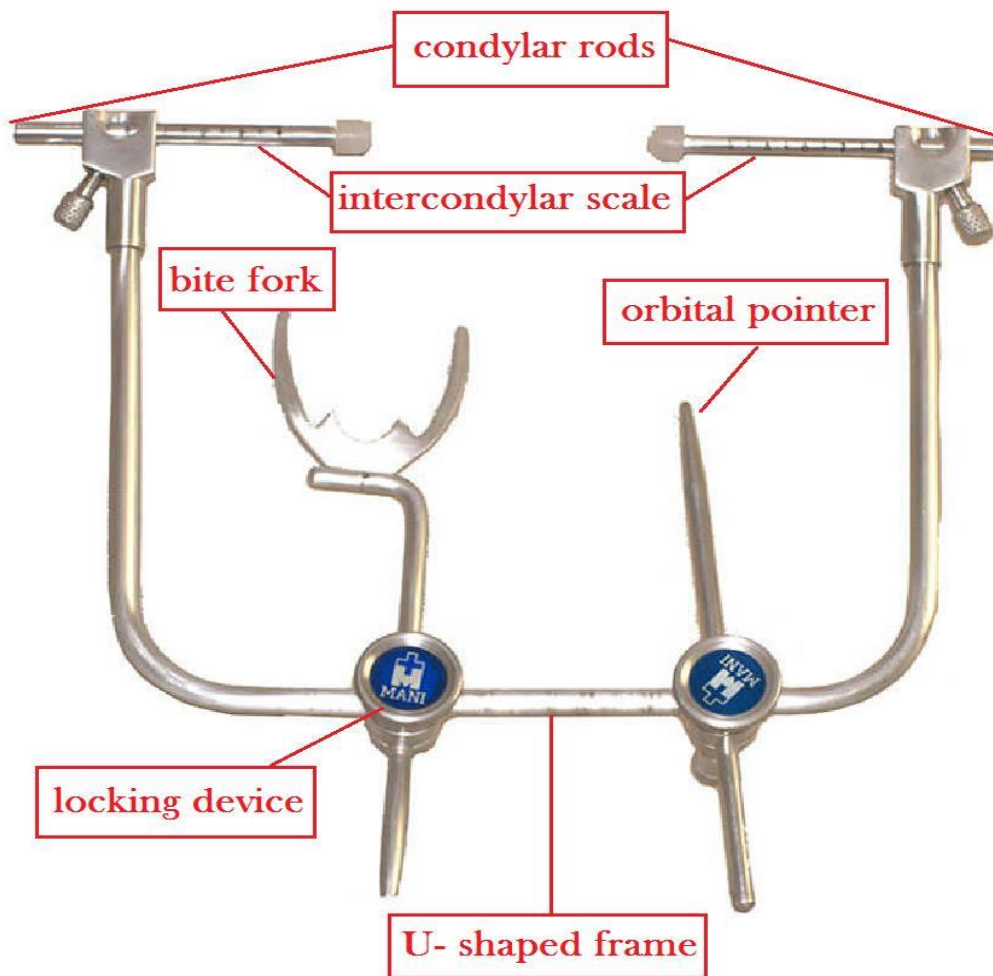
Facebow Registration

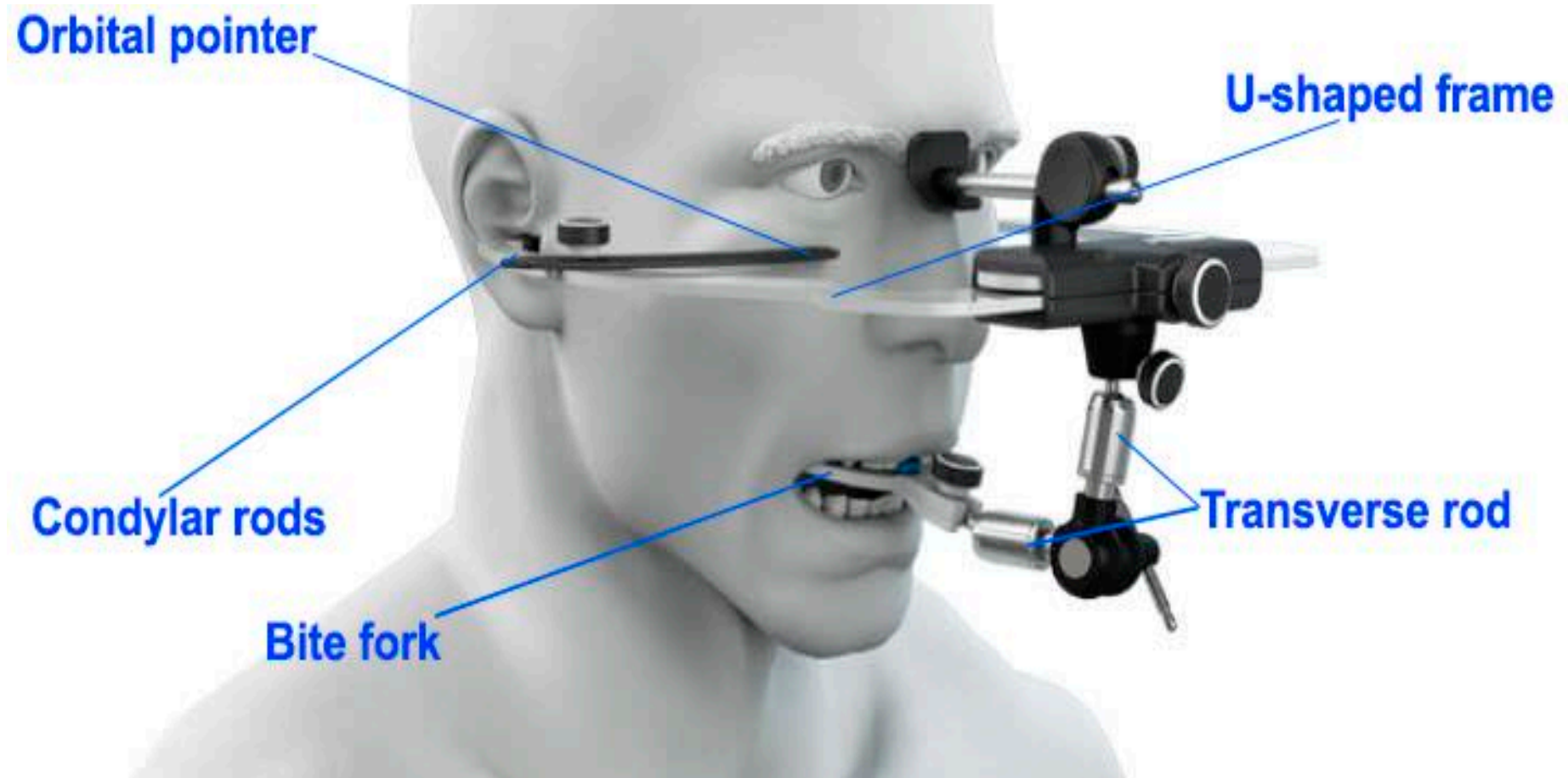
- On a **fully adjustable articulator**, the “true hinge axis” must be located
- On a **semi-adjustable articulator**, the “arbitrary hinge axis” is used, and this is determined by the manufacturer of the facebow and articulator system.

In order to understand the maxillomandibular relation and concepts of occlusion we have to study the mandibular movements.

Recording the mandibular movements affected by TMJ, muscular involvements, neuromuscular regulation of mandibular motion, and ligaments.







THANKS FOR
ATTENTIONS



Impression for complete denture



- **Impression**

It is the negative replica of the teeth and surrounding structure in the oral cavity, introduced as a gel form then becomes relatively hard or set while in contact with these tissues.



- **Complete denture impression**

It is the negative registration of the entire denture bearing, stabilizing and border seal areas present in the edentulous mouth.



Objectives of complete denture impression

- 1- Preservation of the remaining residual ridge.
- 2- Support.
- 3- Stability.
- 4- Retention.
- 5- Esthetic.



- **Objectives for impression of complete denture; (importance is the sequence)**
1) preservation

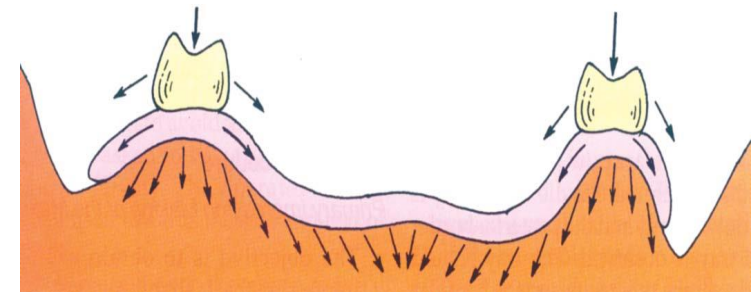
Preservation of the remaining residual ridges is one objective. As the teeth extracted the stimulation of natural teeth to alveolar ridge will loss so the alveolar ridge will atrophy or resorbed,

the effect of impression technique and impression material on denture base may have continued effect on health of both soft and hard tissue jaws.

- 2) Support**

It is the resistance to the force try to dislodge the denture in tissue ward direction .Maximum coverage provides distribution of applied forces over as wide an area as possible and this help in preservation, stability and retention

Support depends on: Denture base + Bone + soft tissue



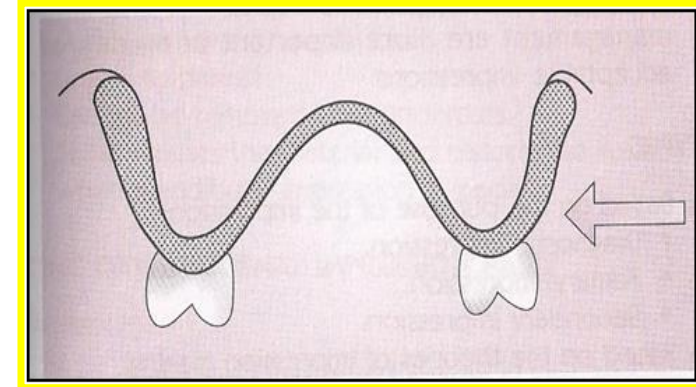
- **3) Stability**

Stability is resistance to horizontal movement.

Close adaptation to undistorted mucosa is most important.

Stability decrease with the

1. Loss of vertical height of the ridge.
2. increase in movement of flabby movable tissue



- **4) Esthetics**

Border thickness varies with the need of each patient in accordance with the extent of residual ridge loss.

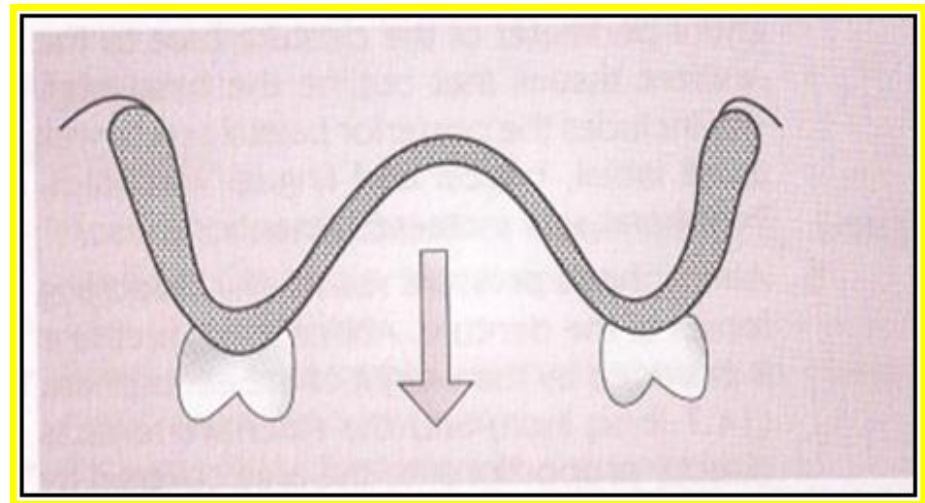
Esthetics depends on thickness of the border so the vestibule should be filled, but not over filled to restore facial contour.

5) Retention

If the other objectives are achieved the retention will be adequate:

Factors affect retention

- a) Atmospheric pressure
- b) Adhesion
- c) Cohesion
- d) Mechanical interlock
- e) Muscle control.
- f) Patient tolerance



Atmospheric pressure

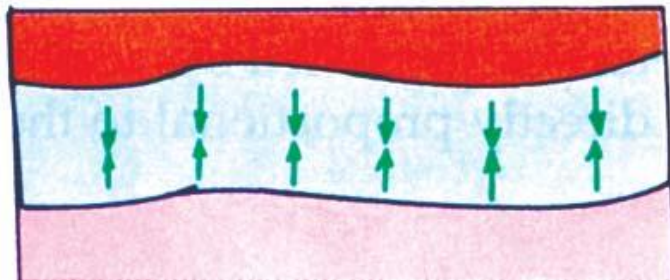
Depend on **peripheral seal** (contact between the peripheral borders of the denture and the resilient-limiting structures) to ensure this seal the denture border should extend into but not to the extent to damage movable tissue.

Adhesion

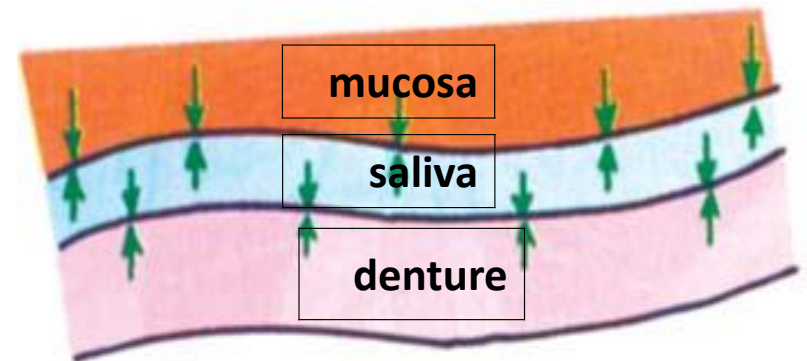
It is the **attraction of unlike molecule** .i.e.: it is the attraction of saliva to denture.

Cohesion

It is the **attraction of like molecules (saliva to each other).**



Cohesion



Adhesion

Mechanical interlock

Mechanical interlock of **undercut** usually proves to be into level able to the patient. The soft tissue is subjective to damage during the insertion and removal of the denture

Muscle control and Patient tolerance

They are amazing influence. Dentures are often retained in the mouth and appear satisfactory, **not because of the accuracy of conforming to the support but because of the adaptability of the muscle of the lip, tongue and cheek and patient tolerance**

- **BIOLOGIC CONSIDERATIONS FOR MANDIBULAR IMPRESSIONS**

1. The **basal seat** of mandible is different in **size and form** from the maxillary counterpart.
2. The **submucosa** in some parts of mandibular basal seat contains **anatomic structures** different from those in the upper jaw.
3. The **nature the supporting** bone on the crest of residual ridge usually differs between the two jaws.
4. The presence of the **tongue** complicates the impression procedures for the lower denture.
5. The available area of **support from** an edentulous **mandible** is **14 cm²** while the same for the edentulous **maxilla** is **24cm²**.
6. Supporting and the **peripheral sealing areas** will be in contact with the **dentures fitting or impression areas**. The support for the **mandibular** denture is derived from the **body of mandible**

- **There are several methods for classifying the impression and each method depend on certain criteria.**

i. The most practical and easiest one depends on the amount of pressure exerted during impression taking. Impression can be classified into three categories

1. non-pressure technique(mucostatic)
2. Selective pressure techniques,
3. pressure techniques

- **Non-pressure technique (mucostatic)**

Attempts made to **record the tissue at rest**. It require **minimal pressure** be applied to the oral tissue during the seating of the impression tray and set of the impression material. it eliminate all distortion of the oral tissue and thus **create a denture base that models the unloaded tissue**.

Requirement of (Mucostatic) technique

- a) The impression is made with the oral mucous membrane and the jaws in a normal, **relaxed condition**. **Border moulding is not done here**.
- b) The impression is made with an **oversized tray, Spaced tray**
- c) It requires a material of **high fluidity** (low viscosity) Impression material of choice is impression **plaster, alginate**.
- d) **Retention** is mainly due to **interfacial surface tension**. The mucostatic technique results in a denture, **which is closely adapted to the mucosa of the denture-bearing area but has poor peripheral seal**

Mucostatic technique

Maxilla: full coverage spacer with tissue stops in canine and molar region

Mandible: full coverage spacer with tissue stops in canine and buccal shelf area (molars)



Pressure technique (Mucocompressive)

In this technique the impression is subjected to pressure during taking, this pressures either applied by

- dentist finger
- by the teeth of the patient and in this case it is called functional impression

Functional impression techniques

- a) Uses in complete denture that is delivered ,relieved on its internal aspects and filled with the slow-seating impression material(tissue conditioning material)
- b) The patient wears prosthesis for several days, allowing the tissue to be recorded in function.
- c) The complete impression then is converted to hard reline material via laboratory processing
- d) This seeks to create a denture base that models the functional loaded tissue.
- e) Records the oral tissues in a functional and displaced form. The materials used for this technique include impression compound, waxes and soft liners.
- f) The oral soft tissues are resilient and thus tend to return to their anatomical position once the forces are relieved. Dentures made by this technique tend to get displaced due to the tissue rebound at rest. During function, the constant pressure exerted onto the soft tissues limit the blood circulation leading to residual ridge resorption.

Selective pressure techniques

- Uses custom tray constructed with less relief in the primary denture stress bearing area and greater relief in the non bearing areas.
- Variation in relief result in theoretically in greater amount of pressure being applied directly to the primary bearing area, which are biologically and biomechanically more capable of supporting and distributing the load.
- Low pressure is applied through greater relief for impression materials to the non bearing areas
- This technique seeks to create a denture base that selecting loads the oral tissue during function of the prostheses, thus optimizing the stability and retention of the prostheses.

Selective pressure technique

Mandible: crest of the ridge

Maxilla: relief areas (incisive papilla and mid palatine raphe) and over flabby tissues if present.



ii. Depending on the technique

- Open mouth impressions

The open mouth impression is built in a tray which carries the impression material of choice into the desired contact with the supporting tissues and into an approximate relation to the peripheral tissues when the mouth is opened and without applied pressure

The rationale behind this method is that the dentures do not dislodge when subjected to biting force

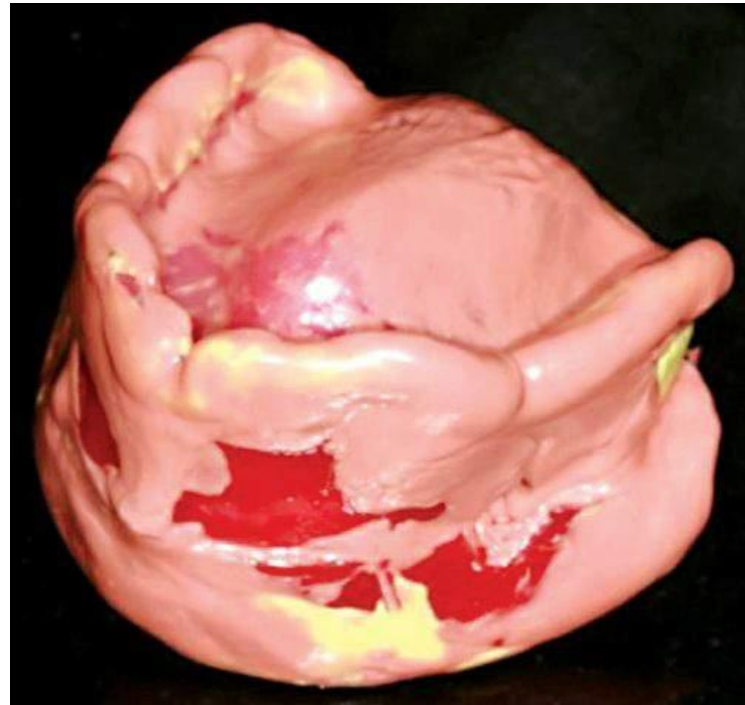
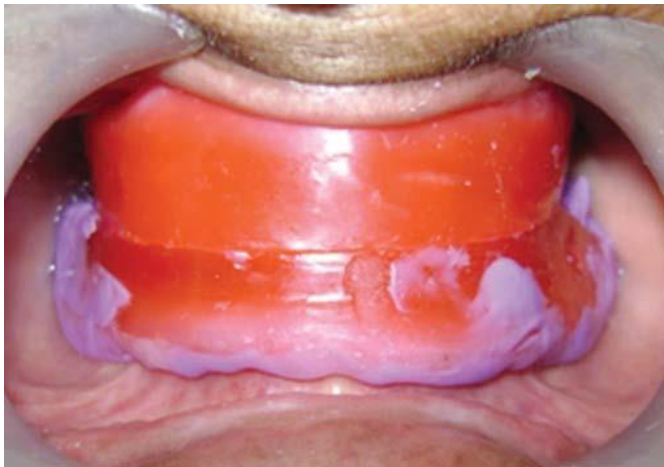
The open mouth methods provide clearance for the tissues that are pulled over the edges of the dentures as in function of speech.

It develops a contour of impression surface which is in harmony with the relaxed supporting tissues, and which may be out of perfect adaptation with these tissues when the denture is subjected to occlusal loading.



- **Close mouth impression technique**

These require wax occlusal rims to be fabricated on the preliminary cast. The patient is made to close on these rims and a generous clearance is made for the various frenula so that the patient can manipulate his tissues by closing, grimacing, sucking and swallowing to form peripheral borders



- **iii. Impression can be classified depend on the sequence of the impression into:**

- 1. Primary impression.**
- 2. Secondary (final) impression).**

The primary impression:

The patient should be seated in an upright and relaxed position in the dental chair. The jaw should be at the level of the operator's elbow for the upper impression and at the level of the operator shoulder for the lower impression.



A Patient and operator position for maxillary impression.



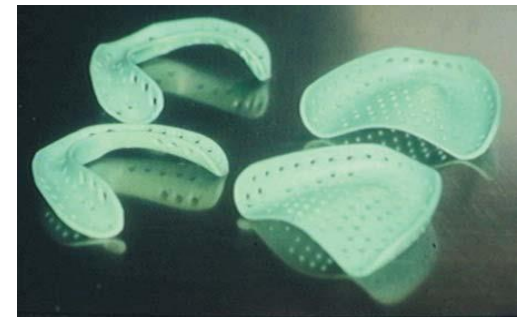
B Patient and operator position for mandibular impression.

The aim of the primary impression is to record the entire denture bearing area. Failure to record the denture-bearing area on the primary impression will create difficulties in recording a satisfactory definitive impression and ultimately result in a poorly retentive denture. Consequently, it is unwise to disregard the importance of having a satisfactory primary impression in the hope that deficiencies will be rectified in the definitive impression.

The nature of primary impressions is such that control of the tissues when recording the impression is minimal, and thus the impression will be **overextended**. If a denture is made on a model cast from such an impression, then it too will be **overextended and not retentive**.

Tray, materials and technique for primary impression:

- Stock trays are constructed in either metal or plastic and may be perforated or unperforated. An edentulous stock tray that is approximately 5 mm larger than the outside surface of the residual ridge is selected.



- The dentist places the tray in the mouth and initially positions it by centering the labial notch of the tray over the labial frenum.
In the maxilla, the distal extension covers to the vibrating line, allowing space and coverage of the tuberosities.
- The mandibular tray should extend to the ascending ramus.
- The preliminary impression should be as accurate as possible and **overextension of peripheral borders is preferred to under** extension as ultimately a slightly under extended custom tray will be fabricated on this overextended preliminary cast.
- Therefore when the preliminary impression is made, it is advisable **to select an impression material that has a relatively high viscosity, thereby allowing the material to compensate more easily for the deficiencies of the tray. The most suitable materials are alginate (irreversible hydrocolloid), silicone putty, or impression compound.**



- **Making impression compound primary impression**

Impression cake compound is a **thermoplastic material** with a **high viscosity**. Uniform softening of the material when **heated in a waterbath to temperatures between 55°C and 70°C**.

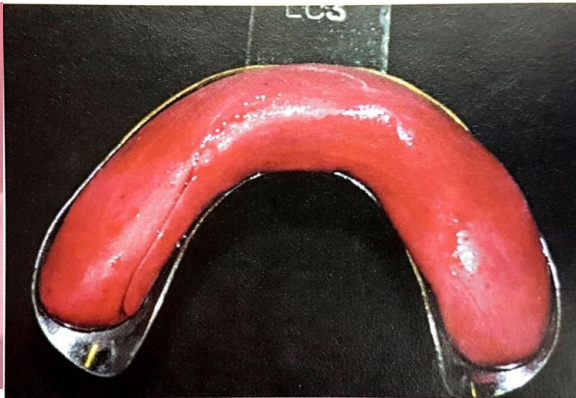
- **For the upper** impression the material loaded in ball like shape while for the lower, the compound loaded in a roll like shape.

- The procedure for making the impression is the same as alginate except that **the borders of the stock tray do not require modification**.

There is no need to use a tray adhesive for impression compound, preloading of material in the mouth is usually not required.

The tray is loaded with the impression material and seated in the mouth in exactly the same manner as for alginate impression material.

Mandibular preliminary impression With impression compound



Forming material as a **roll** and placed in tray A **trough** is indented in the compound



Final seating



Completed lower impression

Maxillary preliminary impression With impression compound



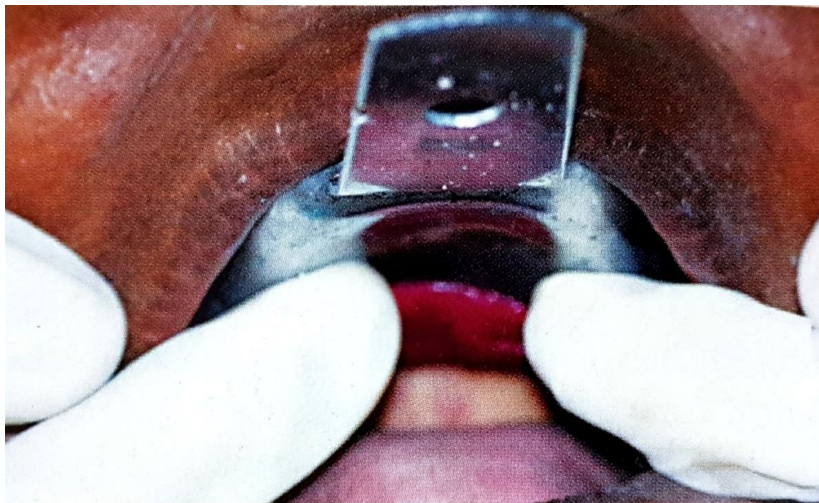
shape of a ball and placed
in center of tray



Molding



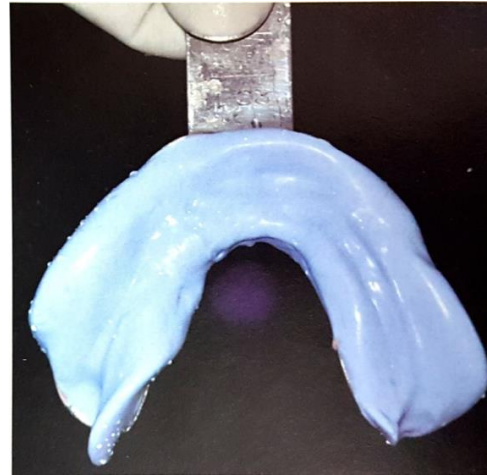
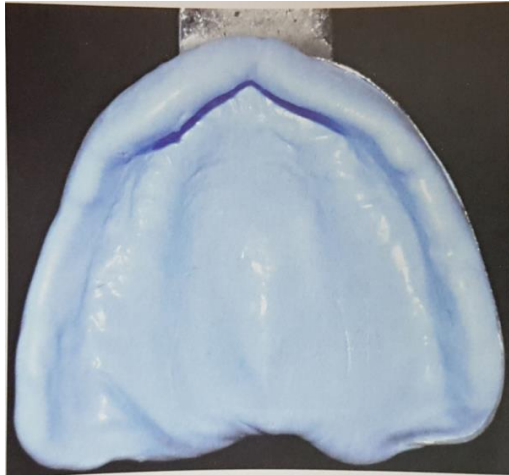
creating a trough in the ridge
areas



Final
impression

- **Impression putty:**

This is a **rigid** material and, like impression compound, should ideally be used in a **metal stock tray**, but a **plastic tray will suffice** (tray adhesive is necessary for putty). It is **more elastic** than compound, and therefore **suitable for use in undercut areas**. Its main **disadvantage** is its cost.



ALGINATE WASH IMPRESSION
(corrective impression technique)
Sever resorption residual ridge



Common faults or errors in impression making:

1. **Incorrect tray position** in the mouth, which has caused one or more anatomical areas not to be captured in the impression.
2. Excessive **areas of the impression tray showing** through the impression material **indicating pressure** that may have resulted in a distorted impression.
3. **Any void** or discrepancy too large to accurately correct on the cast.
4. **Incorrect border formation** as a result of incorrect border length of the tray. A **sharp border** usually indicates that the impression is **under extended** in that area.
5. **Obviously distorted impression** because of movement of the tray during the setting of the final impression material.
6. **Poor detail in the impression** because of a poor mixing technique or because the material had begun to set before the impression was fully seated.

- **Final (secondary) impression:**

The impression that represents the completion of the registration of the surface or object.

It is an impression made for the purpose of fabrication of prosthesis.

This impression is made with individual tray.

Final impression must be poured with stone material to produce the master cast.

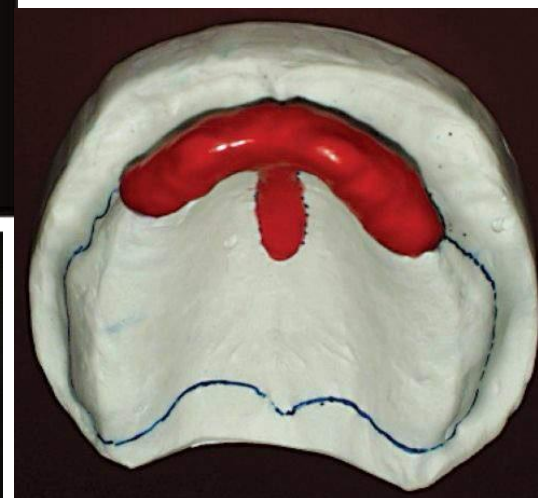
- **Materials used for final impression:**

1. Zinc oxide eugenol impression material.
2. Impression plaster.
3. Alginate impression material
4. Elastomers impression material (rubber base).

Steps for making final impression:

For making final impression, a properly **constructed special tray** should be made over relieved primary cast (The relief area is created by applying one thickness of baseplate wax over all non-stress-bearing areas of the diagnostic cast prior to fabricating the impression tray, this wax is commonly called "relief wax."

Additionally, to allow tray removal from the diagnostic cast, all excessive undercuts and tissue irregularities present on the diagnostic cast are minimally relieved or blocked out using a baseplate wax. This is often referred to as "block out" wax.



- **Correction of special tray:**

- 1. Laboratory correction:

- a. The flange should be **2 mm away** from the mucobuccal fold.
 - b. There must be enough **room for the frenum**.
 - c. The border should be **smooth, rounded, and well-polished** (this can be checked by little finger).

- 2. Clinical correction:

- At this stage, the special tray inside the patient mouth should be checked for:

- a. The flange is **2mm away** from the mucobuccal fold.
 - b. There must be enough **clearance** for labial and buccal frenum.
 - c. The borders must be **smooth and rounded**.
 - d. Reasonable **retention and stability** are recommended.
 - e. Check for **over extension** of the special tray, for the maxillary there must be **no interference with the pterygomandibular raphe**, while for the mandibular tray there must be **no overextension of buccal flange at the buccinator** muscle region, also **lingually** there must be **no over extension at the site of sublingual region, mylohyoid and retromylohyoid areas**.

- **Border molding of the special tray:**

Border molding can be performed using two techniques namely:

- Single step or simultaneous border molding.
- Incremental or sectional border molding.

Single step or simultaneous border molding

It is a procedure by which the entire periphery of the tray is refined in a single step. Polyether impression material is the material of choice.

Advantages:

- a. It is one step that means the procedure is carried out at the same time.
- b. Less possibility of error if placed correctly.

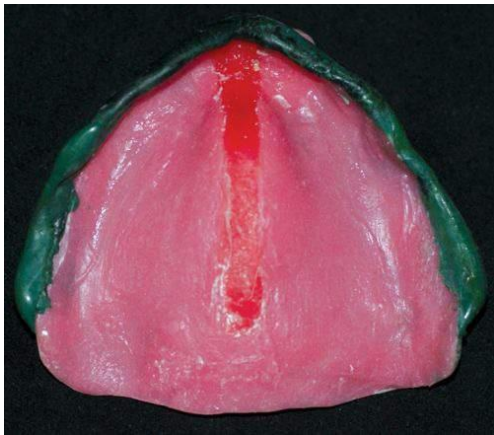
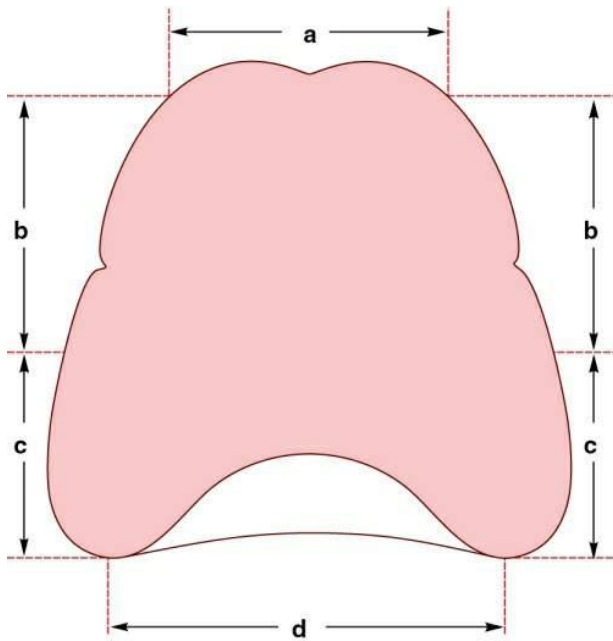
Disadvantages:

It is difficult and need well trained dentist.

Incremental or sectional border molding:

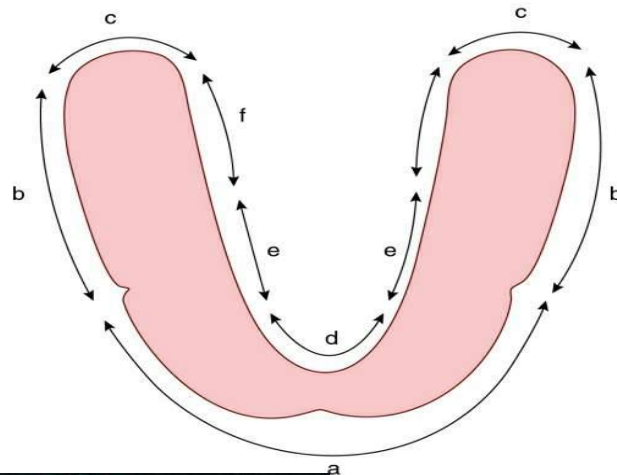
It is a procedure in which portions of the periphery of the tray are refined individually. The material of choice for this procedure is green stick compound





Maxillary tray border molding segmental

**Mandibular
border
molding
segmental**



- **Maxillary tray border molding:**

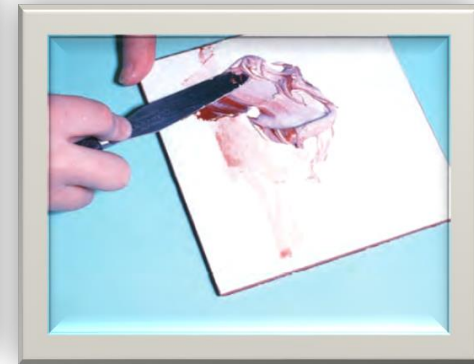
1. The lips are first elevated and then extended **outwards, downwards and inward.**
2. The cheek is elevated and then pulled **outward, downward and inward.**
3. The **buccal frenum** is recorded by pulling the cheek **backwards and forwards.**
4. The **disto-buccal** region is recorded by pulling the cheek **outwards, downwards and inwards followed by opening the mouth wide and moving the mandible from side to side.**
5. Next the posterior part of the palate is recorded. The patient asked to say “ah” while refining the posterior border

• Mandibular tray border molding

1. The labial portion is molded by moving the lip outward, upward and inward.
2. The buccal frenum is recorded by moving the cheek outward, upward, backward and forward.
3. To record the disto-buccal sulcus, the cheek should be well retracted and moved upward and inward.
4. To record the action of the masseter muscle, the patient is asked to willfully close his mouth, while the operator applies pressure in a downward direction. The masseter muscle acting on the buccinator, produces a depression in the impression, called the masseteric notch.
5. Recording the lingual flange at the anterior lingual border is by asking the patient to protrude his tongue out and later to touch the anterior part of the palate. Protrusion of the tongue helps to record the length of the lingual flange and touching the anterior part of the hard palate helps in establishing the width of the flange.
6. The distolingual flange is border molded by asking the patient to protrude his tongue and move it to the right and left buccal vestibules.
7. Recording the retromolar pad, the patient is asked to open his mouth wide.
8. Finally, after border molding is complete, the patient should be able to touch the entire upper lip with the tongue without displacement of the tray.

- **Making the final impression:**

- a. The **wax spacer is removed** and **escape vents** are made in the palatine raphe area and on either sides **to permit excess material to flow out**.
- b. **Zinc oxide eugenol** impression material is used according to manufacturer's instructions. (Two equal length of base and catalyst are mixed together.
- c. The homogenous mixture applied to the inner surface of the special tray and the border.
- d. The loaded tray is inserted into the patient's mouth, **centered correctly (using the labial frenum and tray handle as a reference)**, and seated in position. Tissue function simulated and pressure is maintained till the material has set.
- e. The tray is then withdrawn and the impression is rinsed in cold water, followed by thorough examination of the impression surface.

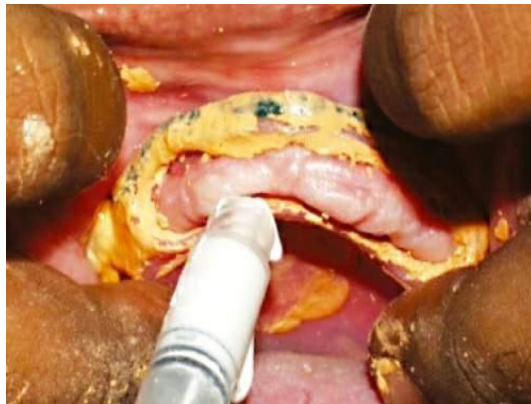


Final maxillary impression with zinc oxide eugenol impression paste



Final mandibular impression with zinc oxide eugenol impression paste

Final impression using custom tray with window
This is indicated for flabby or displaceable tissues.



Completed final impression (custom tray with window) – combination of ZOE paste and impression plaster.

- **Making final impression utilizing digital intraoral scanner:**

Recently computer-aided design and computer-aided manufacturing (CAD/CAM) technology have been applied to complete dentures. A specialized scan retractor was used to retract the mobile tissues of lips, cheeks and vestibule while taking a digital impression





pre prosthetic surgery

By: Lec. Marwa M. Shehab

م. مروة مروان الشهبواني



Pre-prosthetic Surgical Considerations

Treatment methods to improve the patient's denture foundation and ridge relations are usually either nonsurgical or surgical in nature, but can be a combination of both methods

- **NONSURGICAL METHODS**

Nonsurgical methods of edentulous mouth preparation include the following methods;

- 1. Rest for the Denture-Supporting Tissues**

Rest for the denture-supporting tissues can be achieved by removal of the dentures from the mouth for an extended period or the use of temporary soft liners inside the old dentures. Both procedures allow deformed tissue of the residual ridges to return to normal form. Clinical reports and experience also support the merits of regular finger or toothbrush massage of denture-bearing mucosa, especially of those areas that appear edematous and enlarged.

- **2. Occlusal Correction of the Old Prosthesis**

An attempt should first be made to **restore an optimal vertical dimension of occlusion** to the dentures presently worn by the patient with **an interim resilient lining material**. This step enables the dentist to prognosticate the **amount of vertical facial support** that the patient can tolerate, and it allows the presumably deformed tissues to recover.

3. Good Nutrition

A **good nutritional** program must be emphasized for each edentulous patient. This program is especially important for the **geriatric patient** whose metabolic and masticatory efficiency may be compromise

- **SURGICAL METHODS**

Frequently, certain conditions of the denture bearing tissues require edentulous patients to be treated surgically. These conditions are the result of unfavorable morphological variation the denture bearing area or, more commonly, result from long term wear of ill-fitting dentures.

- It is often far easier to make alterations in the prosthetic techniques and materials used than to subject the patient to a surgical intervention.
- The key consideration is whether a good prosthodontic prognosis will result from the surgical outcome.

- **Surgical Guides (Templates)**

When moderate amounts of bone **recontouring** are required and the treatment plan requires a degree of **precision in the amount and location of bone to be removed**, **surgical guides** are excellent adjuncts.

- Using a **duplicated diagnostic cast**, the areas of concern are **modified to achieve the ideal ridge form**. A **clear rigid guide** is then fabricated using a vacuum-formed technique. During the surgical procedure, after **recontouring has been accomplished**, the **surgical guide is placed over** the area with the flap repositioned, and areas of soft tissue **blanching are observed**. These blanching areas represent areas where **additional removal of bone** and recontouring are still required. This procedure is **repeated until no blanching exists and the surgical guide is stable when seated**. Soft tissue trimming, if necessary, can now be done

Surgical Guides (Templates)

thin transparent resin base shaped used as a guide for variety of surgical procedure, duplicated on diagnostic cast after modified to achieve the ideal ridge form



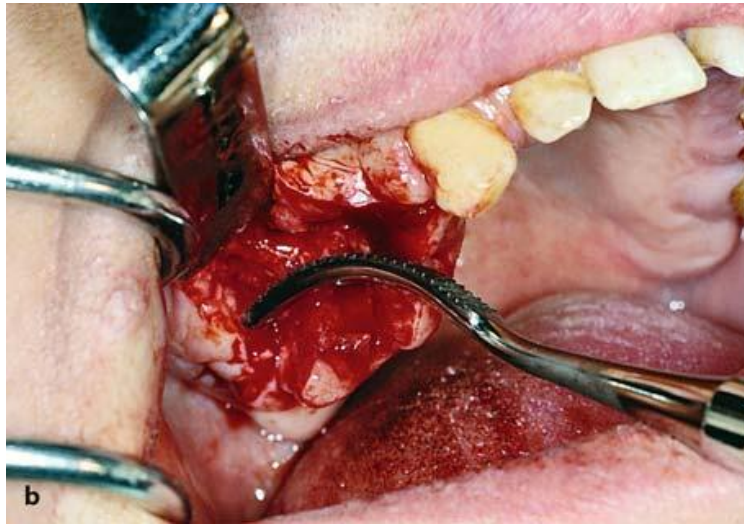
- **Commonly Used Preprosthetic Procedures**

1. Ridge alveoloplasty with or without extractions for recontouring of the knife edged ridge or other ridge deformity or contour problems.
2. Intraseptal alveoloplasty.
3. Maxillary tuberosity reduction.
4. Recontouring of palatal and lateral exostosis and contour problems these include: mandibular tori removal; maxillary tori removal; mylohyoid ridge reduction; and genial tubercle reduction.
5. Soft tissue procedures might include maxillary tuberosity soft tissue reduction, maxillary labial frenectomy, mandibular lingual frenectomy, and excision of redundant tissue.

Alveoloplasty: is the surgical procedure performed to smooth or recontour the alveolar bone, aiming to facilitate the healing procedure as well as the successful placement of a future prosthetic restoration

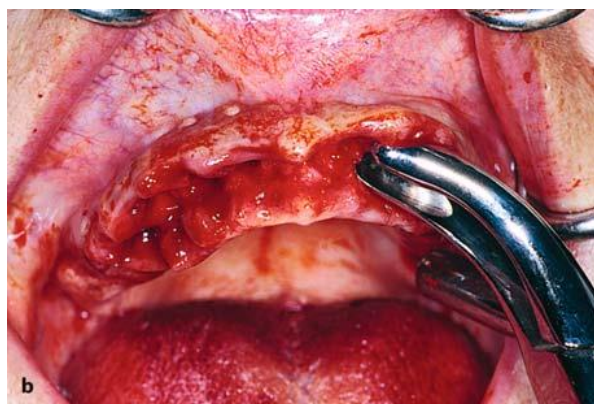
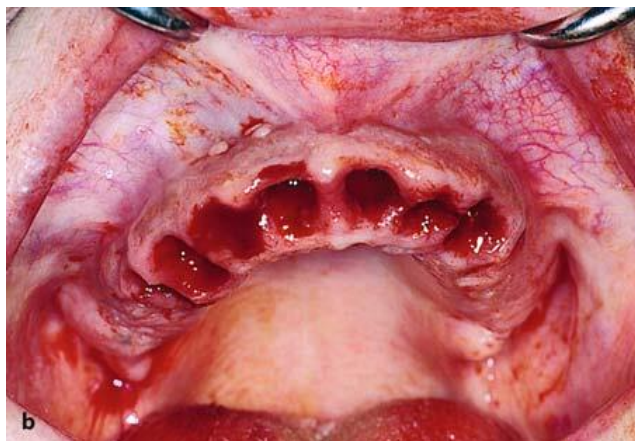
- **Ridge Alveoloplasty with Extraction**

After extraction of a tooth or teeth, the clinician must make a **determination** about the appropriateness of the **remaining ridge contour to fit** into the preprosthetic plan, and if the recontouring will be made at the time of the extraction or at a later time. If more than **finger compression** is needed, a **full thickness flap** should be elevated to a point **apical to the area in need of recontouring**. Depending on the amount of recontouring needed, a **bone file** may be sufficient to produce the desired contours. For greater recontouring, a side cutting **rongeur or handpiece and acrylic resin** bur can be used, **when using these burs, always use copious irrigation to avoid overheating the bone and subsequent bony necrosis. Irrigation also cleans the flutes of the bur and carries away debris.** After bulk recontouring, a bone **file is used to "fine tune" the recontouring**



- **Intraseptal Alveoloplasty**

When the ridge has acceptable contour and height but presents an unacceptable undercut, which extends to the base of the labial vestibule, the intraseptal alveoloplasty might be considered. This procedure is best accomplished at the time of extraction or early in the postoperative healing period, after extraction of the teeth, the crestal tissue is slightly elevated to fully expose the extraction sockets. Using a small rongeur or handpiece and bur, the intraseptal bone is removed to the depth of the socket. After adequate removal of bone, finger pressure is applied in a constant, controlled manner until the labiocortical plate is greenstick fractured and can be positioned palatally, narrowing the crest and eliminating the undercut. A bone file can be used to smooth roughened edges, and the site can be irrigated. The crestal soft tissue can now be approximated and closed with interrupted or continuous sutures. Ideally, a surgical stent or soft-tissue-lined immediate denture can be inserted to maintain the repositioned bony segment until the initial stages of healing have taken place, at about two weeks after the procedure.



- **Edentulous Ridge Alveoloplasty**

For routine elimination of sharp (knife-edged) ridges and removal of undesirable contours, undercuts, or prominences, direct vision and frequent palpation until the desired endpoint is reached will be sufficient. When the mandibular or maxillary edentulous ridges require multifocal, moderate, or greater amounts of recontouring, use of diagnostic casts to identify areas of concern, and fabrication of surgical guides, are recommended. In this way, the clinician has a model with the specific areas outlined to assist in the exact orientation once tissues are reflected and a surgical guide to assist with the detailed removal and recontouring of the bone. The edentulous ridge alveoloplasty begins with identification of the areas of concern. A full thickness flap is designed and implemented to fully expose the targeted areas. Using bone files/rasps, rongeurs handpiece, and burs or combinations, the targeted areas are recontoured. Digital palpation with the flap in place is done until the desired endpoint is achieved. The site is irrigated and close primarily with an interrupted or continuous suture technique.

• Buccal Exostosis

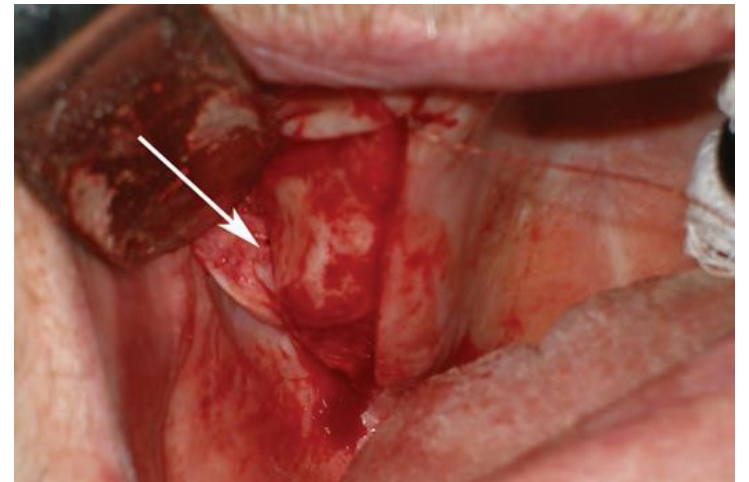
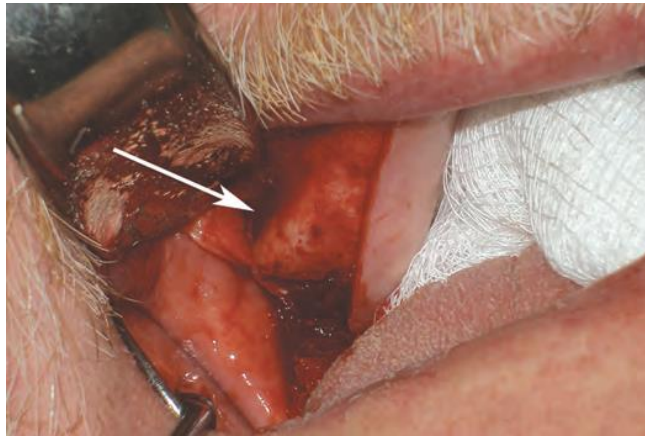
This approach can be used on **either arch** and for **irregularities on the palatal aspect of the maxillary alveolus**. A crestal incision is made to extend beyond the margins of the areas requiring recontouring. A full thickness flap is elevated to completely expose the involved area. When an envelope flap will not provide the necessary exposure without placing tension on the flap, a releasing incision, as described earlier, may be incorporated into the flap design. For gaining access to a **palatal exostosis**, **make the incision longer and reflect more tissue to gain enough relaxation in the flap**. Because of the greater **palatine and incisive branch anastomosis**, vertical releases in the palate area not recommended. Once the irregularity is exposed, the tissue is elevated and protected, and the appropriate instrument is used to recontour the bone to the desired endpoint. The area is palpated through the flap to confirm adequate reduction or recontouring. When completed, the area is irrigated and closed



- **Maxillary Tuberosity Reductions**

Maxillary hyperplastic tuberosities present **real problems for gaining appropriate interarch distance posteriorly**. The tuberosities can be **hyperplastic in the horizontal or vertical planes**, and may involve **osseous hyperplasia, soft tissue hyperplasia, or both**. To **identify the hard tissue and soft tissue component that requires recontouring**, a **panoramic radiograph** will usually suffice. This will provide information about the hard and soft tissue contributions and the overall contour of the tuberosity and proximity to the maxillary sinus. It is important to remember that maxillary sinuses may pneumatize into the tuberosity areas. A crestal incision is made from a point anterior to where the recontouring will start, over and up behind the tuberosity. Tissue must be elevated on both the buccal and palatal aspects to fully expose the tuberosity.

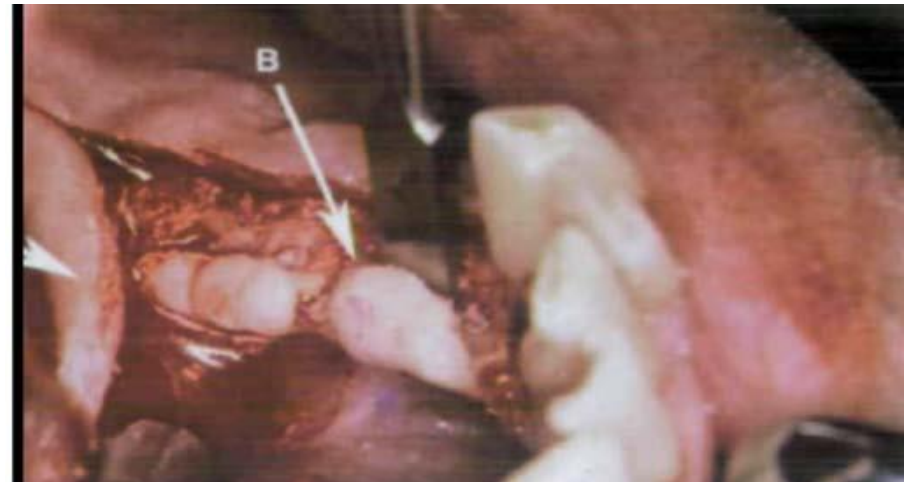
After making sure that all soft tissue is protected, instrumentation can start. The tuberosity can be recontoured with bone file, rongeur, or bur if a great deal of bone needs to be removed, again as in other procedures, a surgical guide may be necessary. If the maxillary sinus has pneumatized, care must be taken when removing the bone and the sinus membrane may become exposed. However, this is not a problem as long as the membrane is intact.



- **Mandibular Tori**

In the **dentate arch**, tori pose few, if any, problems. Occasionally tori can be large enough to interfere with tongue mobility and speech, and the thin mucosa overlying the tori may be chronically irritated or injured when eating certain foods.

- In the edentulous arch, tori may pose significant interference when wearing a removable prosthesis and often must be removed. After all tori have been removed and bone smoothed, the flap is repositioned and the lingual plate palpated to confirm achieving the desired contours.



- **Maxillary Tori**

Maxillary tori may pose a significant problem in the fabrication and wearing of a maxillary complete denture. The tori may be especially problematic when it is positioned more posteriorly, creating problems with posterior palatal seal of the prosthesis

- A midline incision is placed over the torus with oblique releasing incisions at each end. When the tori are multilobulated and pedunculated, elevation of the thin mucosa may be difficult. After the torus is exposed, adequate flap control for best visualization is important. An excellent method of keeping the flaps open is to suture the margin of the flap to the crest of the ridge on the same side. For some larger pedunculated multilobulated tori, a midcrestal incision with elevation of the entire palatal mucosa is recommended. **This dissection must stay subperiosteal to avoid injury to the palatal blood supply.** The desirable end point is for the palatal vault to be smooth and confluent with no undercuts or elevations.

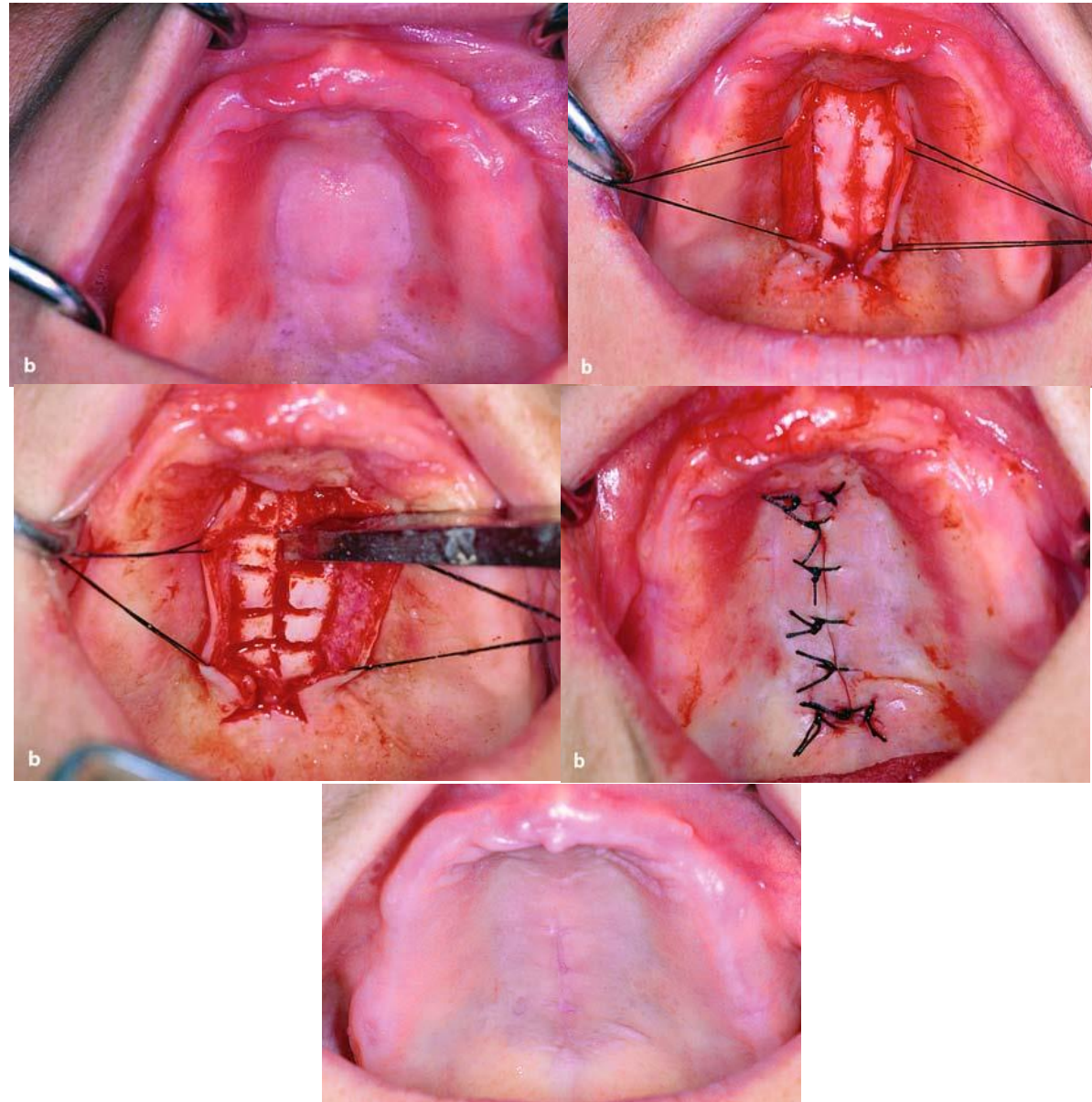
Hematoma formation in the palate under the flap is a great concern. **Excellent methods of applying pressure** are with the placement of a temporary denture with soft reline material over the surgical site or with a well-fitting, surgical guide with soft reline placed over the area. The pressure should be maintained for several days. The patient can remove the appliances for local wound care and oral rinsing

Excision of tori –Palatal torus

Bony exostosis in the palate ,origin is unclear , found twice as much in female than male it causes speech problems ,ulcers interfere with prosthesis. Usually present in the midline of the hard palate . Most palatal tori are less than 2cm in diameter ,but their size can change throughout life.

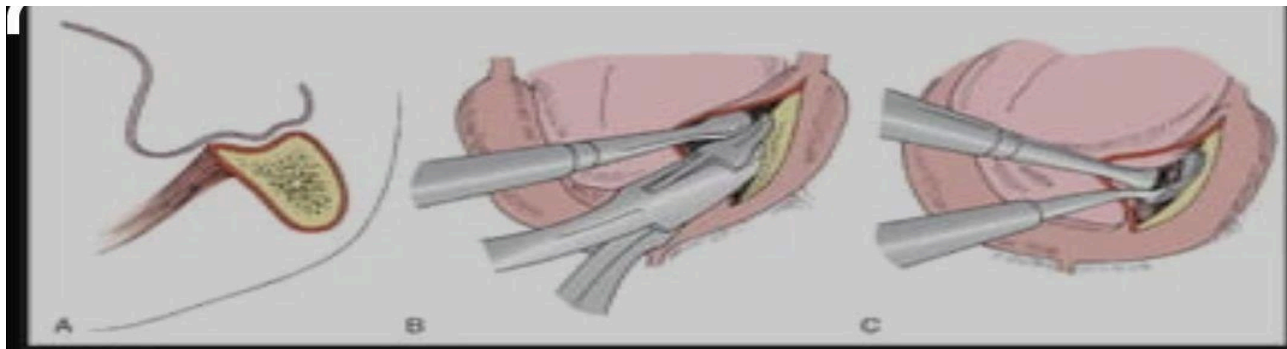
Indications for surgery

- 1-an extremely large torus filling in the palatal vault.
 - 2-a torus that extend beyond the posterior dam area
 - 3-traumatized mucosa over the torus.
 - 4-deep bony undercuts interfering with denture insertion and stability
 - 5-interference with function (speech and deglutition)
- Small tori can be relieved during denture construction but large tori should be surgically removed.



- **Mylohyoid Ridge Reduction**

In the mandibular post-extraction ridge remodeling sequencing, the alveolar bone and external oblique ridge resorb because of lack of stressing and functional remodeling. The mylohyoid ridge, which supports the attachment of the mylohyoid muscle, remains relatively intact, and becomes a prominent feature in the posterior mandible. After providing profound anesthesia, a midcrestal incision is made anterior to the site of ridge reduction and carried posteriorly gradually deviating toward the buccal, to avoid potential injury to the lingual nerve. The flap is elevated to expose the mylohyoid ridge and attached muscle. Using sharp dissection, the tendinous attachments of the mylohyoid muscle are stripped. When completed, the area should be copiously irrigated and closed primarily with interrupted or continuous sutures. Once the flap has been closed, **ideally a denture with a soft reline is placed to allow for the lingual flange to help with displacement of the detached mylohyoid muscle**



- **Genial Tubercle Reduction**

In the post-extraction ridge remodeling of the anterior mandible, the alveolar ridge and tooth-bearing areas resorb because of lack of stressing and functional loading. The superior pair of genial tubercles provides insertion for the paired genioglossus muscles, while the lower paired tubercles provide insertion for the paired geniohyoid muscles. Because of the constant movement of the tongue and stressing of the tubercles once the alveolus has resorbed and remodeled, the genial tubercles can become very prominent structures in the anterior mandible and impede proper seating of the denture.

The clinician must be aware that this surgical site lies between two moving structures—the tongue and the lip. Therefore this is an area that may be prone to wound dehiscence. Making this a very difficult surgery. With exposure of the bone and protection of the flap, the bone height can be reduced with the instrument of choice to the desired level. The wound is copiously irrigated and closed primarily.

