

### **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 eliminated before the patient wears the denture, the inaccuracies may be result of:

3. It provides a stable working foundation; bases are not shifting on resilient tissues.
4. The absence of saliva makes possible more accurate markings with the articulating paper or tape.
5. 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**

1. If the cusp is high in the centric and in the eccentric position, reduce the premature cusp.
2. 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).

#### **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.

1. Technical errors or errors in judgment made by dentist.
2. Technical errors developed in laboratory.
3. 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:

1. Pressure spots may have been present in the final impression, which was otherwise acceptable and used.
2. 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.
3. 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.
4. It is common to provide relief for the thin mucosa over the lingual bony prominence of the mylohyoid muscle insertion.
5. 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:

1. A clean wipe on the periphery results from cheek rubbing during insertion. Do not adjust clean wipe area.
2. Disturbed brush lines indicate the desirable tissue contact.
3. Undisturbed brush lines indicate no tissue contact yet.
4. 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.

### **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.

### **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:

- 1) Intra-oral (inside the mouth).
- 2) 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:

1. The presence of saliva will complicate the use of articulating paper intraorally.
2. It is difficult to place the articulating paper on both sides of the arch at the same time.
3. The articulating paper may color even the teeth that are not in occlusion.
4. Mucosal displacement and tipping of the dentures can bring non-occluding teeth into contact with the articulating paper.

#### **Extra-oral selective grinding is done in the laboratory either**

(1) 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,

(2) 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:

1. It reduces patient participation.
2. It permits the dentist to see the procedures better.

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.

# Diagnosis and treatment planning for Cr/Co RPD

## Lec:-3

Lect Prosthodontics

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The dentist duty is to provide any dental treatment that patient needs, both the need perceived by the patient and those demonstrated through clinical examination and patient interview. Although similarity have been noted between partially edentulous patient a significance differences exist making each patient and the ultimate treatment plan unique.

description of each patient uniqueness occurs through patient interview and clinical examination. These include four distinct processes:-

1. Understanding the patient desire or chief concern complain
2. Ascertaining the patient dental need through a diagnostic clinical examination.
3. Developing treatment plane that reflects the best management of desire and need.
4. Executing appropriately sequenced treatment with planned follow up.

### **Patient interview**

The interview, an opportunity to develop connection with the patient, involves listening to and understanding the patient's chief complaint or concern about his or her oral health.

The chief complaint is referred to the illness as described by the patient word. This can include clinical symptoms of pain, difficulty with function, concern about appearance, problems with an existing prosthesis, or any combination of symptoms related to the teeth, periodontium, jaws, or previous dental treatment. It is important to listen carefully to what the patient has stated is the reason for presenting for evaluation; this is because all subsequent information gathered will be used to discuss these concerns and to relate whether the proposed treatment will affect the patient in any way. Such a discussion at the outset of patient care helps to outline realistic expectations.



It is mandatory that the dentist clearly understand what brings the patient to the clinic.

Failure to do so leads to the chance that the patient will be unhappy with the treatment result, as it might not see the correction for its chief complain. With experience, this subtle point becomes a major component of a clinician's management focus.

The patient interview (and clinical examination) should follow a sequence that includes:

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

After the previous point being discussed, the time come to make a decision for the most appropriate type of prosthodontics treatment and this must be done in company with the patient by using a communication model termed (shared decision making)

## **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**

It should include visual and digital examinations of teeth and surrounding structure with mouth mirror, periodontal probe and tweezers.

### **Sequence of oral examination**

- 1) Reliefs of pain discomfort and caries lesion by placements of temporary fillings, preliminary examination to determine the need for management of acute needs and whether prophylaxis is required to conduct a thorough oral examination.
- 2) A thorough and complete oral prophylaxis .best doing prophylaxis to obtain:-
  - Teeth free from accumulation of calculus and debris.
  - Accurate diagnostic cast of dental arch can be done

3) Complete intraoral radiograph

The objectives of a radiographic examination are:-

- a. To locate areas of infection and other pathosis that may be present.
- b. To reveal the presence of root fragments, foreign objects, bone spicules, and irregular ridge formations.
- c.to reveal the presence and extent of caries and the relation of carious lesions to the pulp and periodontal attachment;
- d.to permit evaluation of existing restorations as to evidence of recurrent caries, marginal leakage, and overhanging gingival margins;
- e.to reveal the presence of root canal fillings and to permit their evaluation as to future prognosis (the design of the partial denture may hinge on the decision to retain or extract an endodontically treated tooth);
- f. to permit an evaluation of periodontal conditions present and to establish the need and possibilities for treatment;
- g. to evaluate the alveolar support of abutment teeth, their number, the supporting length and morphology of their roots, the relative amount of alveolar bone loss suffered through pathogenic processes, and the amount of alveolar support remaining

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

5) Examination of teeth and residual ridge by instrument and visual means Visual examination will reveal many of the:-

1. signs of dental disease consideration of caries susceptibility is of primary importance The number of restored teeth present signs of recurrent caries initial examination,

2. examination of periodontal disease, gingival inflammation, the degree of gingival recession, and mucogingival relationships should be observed
3. The number of teeth remaining, the location of the edentulous areas, and the quality of the residual ridge will have a definite bearing on the proportionate amount of support that the partial denture will receive from the teeth and the edentulous ridges.
4. Tissue contours may appear to present a well-formed edentulous residual ridge, however, palpation often indicates that supporting bone has been resorbed and has been replaced by displaceable, fibrous connective tissue. Such a situation is common in maxillary tuberosity regions. The removable partial denture cannot be supported adequately by tissues that are easily displaced. In preparing the mouth this tissue should be recontoured or removed surgically, unless otherwise contraindicated. A 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 and an evaluation of their presence in relation to framework design must be made. Failure to palpate the tissue over the median palatal raphe to ascertain the difference in its displaceability as compared with the displaceability of the soft tissues covering the residual ridges can lead to a rocking, unstable, uncomfortable denture and to a dissatisfied patient. Adequate relief of the palatal major connectors must be planned, and the amount of relief required is directly proportionate to the difference in displaceability of the tissues over the midline of the palate and the tissues covering the residual ridges. Or select major connector design not interferes with the presence of tori.
6. During the examination, not only each arch but also its occlusal relationship with the opposing arch must be considered separately.  
A situation that looks simple when the teeth are apart may be complicated when the teeth are in occlusion. For example, an extreme vertical overlap may complicate the attachment of anterior teeth to a maxillary denture. Extrusion of a tooth or teeth into an opposing

edentulous area may complicate the replacement of teeth in the edentulous area or may create occlusal interference which will complicate the location and design of clasp retainers and occlusal rests.

Such findings subsequently will be evaluated further by careful analysis of mounted diagnostic casts.

Such an examination will not provide sufficient information to allow a definitive diagnosis and treatment plane. For this purpose, a complete charting (case sheet) that includes all previous information

7. Determination of height of the floor of the mouth to locate inferior borders of lingual mandibular major connectors. Two methods used in determining the of the floor of the mouth
  - ✓ Direct method
  - ✓ Indirect method

A diagnostic cast should be an accurate reproduction of the teeth and adjacent tissues. In a partially edentulous arch this must include the edentulous spaces because these also must be evaluated in determining the type of denture base to be used and the extent of available denture-supporting area. diagnostic cast made through an impression making with alginate and cast pour with dental plaster but some time with dental stone better than plaster because it's not easily abraded.

Diagnostic casts serve several purposes as an aid to diagnosis and treatment planning. Some of these are as follows:

- a. Diagnostic casts are used to supplement the oral examination by permitting a view of the occlusion from the lingual, as well as from the buccal aspect.
- b. Diagnostic casts are used to permit a topographic survey of the dental arch that is to be restored by means of a removable partial denture. The cast of the arch in question may be surveyed individually with a cast surveyor to determine the parallelism or lack of parallelism of tooth surfaces involved and to establish their influence on the design of the partial denture .
- c. Diagnostic casts are used to permit a logical and comprehensive presentation to the patient of present and future restorative needs, as well as of the hazards of future neglect. Occluded and individual diagnostic casts can be used to point out to the patient (a) evidence of tooth migration and the existing results of such migration; (b) effects

- of further tooth migration; (c) loss of occlusal support and its consequences; (d) hazards of traumatic occlusal contacts; and (e) cariogenic and periodontal implications of further neglect .
- d. Can be used in the fabrication of individual trays .
  - e. Diagnostic casts may be used as a constant reference as the work progresses. Penciled marks indicating the type of restorations, the areas of tooth surfaces to be modified, the location of rests, and the design of the partial denture framework, as well as the path of placement and removal, all may be recorded on the diagnostic cast for future reference .
  - f. Unaltered diagnostic casts should become a permanent part of the patient's record because records of conditions existing before treatment are just as important as are preoperative roentgenograms. Therefore diagnostic casts can be used as permanent record.

### **Interpretation of Examination Data**

As a result of the oral examination and diagnosis, certain data should be recorded, much of which are based on decisions that are the result of the diagnosis and reflect the patient's present and predictable health status. These are as follows:

#### 1) Roentgenographic interpretation

Many of the reasons for roentgenographic interpretation during oral examination are outlined and are considered in greater detail in other texts. The aspects of such interpretation that are the most pertinent to partial denture construction are those relative to the prognosis of remaining teeth that may be used as abutments.

The quality of the alveolar support of an abutment tooth is of primary importance because the tooth will have to withstand greater stress loads when supporting a dental prosthesis. Abutment teeth providing total abutment support to the prosthesis, be it either fixed or removable, will have to withstand a greater load and especially greater horizontal forces. Abutment teeth adjacent to distal extension bases are subjected not only to vertical and horizontal forces but to torque as well because of the movement of the tissue supported base .

#### 2) Value of interpreting bone density

Its importance to the dentist when evaluating the quality and quantity of the alveolar bone are the height and the quality of the remaining bone structure

Roentgenographic evaluation of bone quality is often necessary. Optimum bone qualities are ordinarily expressed by normal sized interdental trabecular spaces, The normal interproximal crest is ordinarily shown by a relatively thin white line crossing from the lamina dura of one tooth to the lamina dura of the adjacent tooth.

Roentgenographic findings should serve the dentist as an adjunct to clinical observations. Therefore roentgenographic findings should always be confirmed by clinical examination.

### **Root morphology**

The morphologic characteristics of the roots determine to a great extent the ability of prospective abutment teeth to resist successfully additional rotational forces that may be placed on them. Teeth with multiple and divergent roots will resist stresses better than teeth with fused and conical roots, because the resultant forces are distributed through a greater number of periodontal fibers to a larger amount of supporting bone

### **Periodontal considerations**

An assessment of the periodontium in general and abutment teeth in particular must be made before prosthetic restoration. One must evaluate the condition of the gingiva, 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. If mucogingival involvements, osseous defects, or mobility patterns are recorded, the causes and potential treatment must be determined. Oral hygiene habits of the patient must be determined, and efforts made to educate the patient relative to plaque control. In addition, the patient must be advised of the importance of regular maintenance appointments after treatment. The most decisive evidence of oral hygiene habits is the condition of the mouth before the initial prophylaxis. Good or bad oral hygiene is basic to the patient's nature, and although it may be influenced somewhat by patient education ,.

Mucous membrane consideration:

Mucous membrane attach to bone compose of two layer

- Mucosa
- Sub mucosa

Types of Mucous membrane

- a. Lining mucosa. (Stratified Squamous epithelium non keratinized Sub mucosa loosely or tight attach to the underlying mucosa lip, cheek, under side of tongue, usually comes in contact with denture border. (masticatory mucosa (keratinized stratified Squamous epithelium.

Mucosa of soft palate

Stratified Squamous epithelium non keratinized

Sub mucosa with numerous gland supporting membrane

It is a transition between loosely and fixed type of mucosa.

In the mandibular arch the distal end of the gingival area is well marked appear shaped area papilla .It is, pale, easy distinguish from retromolar pad firm, soft red

### **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 anethetically located as to justify its removal to improve appearance.

### **Indications for RPD**

There are several specific indications for the use of removable partial denture-:

- 1) The most common situations are partial edentulous space Cl I and Cl II which have an edentulous space on the opposite side of the arch is often conveniently present to aid in the required retention and stabilization of the partial denture.
- 2) The replacement of teeth recent extraction cannot be accomplished satisfactory with fixed restoration.
- 3) Along span may be totally tooth supported if the abutments and the means of transferring the support to the denture are adequate and if the denture framework is rigid.
- 4) Need for bilateral stabilization
- 5) The removable partial denture may act as a periodontal splint through its effective cross arch stabilization of teeth weakened by periodontal disease.
- 6) Excessive loss of residual bone

7) Economic considerations

**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 operatory. 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.

**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 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.

Types of RPD base material

- 1) **Gold alloy**
- 2) **Chromium cobalt alloy**
- 3) **Titanium**



## Fourth Grade

**Prosthodontics****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* or *failure of the patient to adapt to the prosthesis* or even to *faults in the construction*.

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 careful discussion with the patient and 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 of saliva 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:

1. Pain/discomfort.
2. Looseness of one or both dentures.
3. Speech problems.
4. Chewing problems.

### **1. 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.

- ***Pain on crest of the alveolar ridge:*** This may be due to the poor quality of supporting tissues or the unemployed ridge phenomenon. 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.

## **2. Looseness of one or both dentures:**

When the patient complains of looseness, you need to check:

- (A) Peripheral extensions
- (B) Posterior palatal seal
- (C) Adaptation of the bases
- (D) Occlusion
- (E) Shape of the polished surface
- (F) 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.

### **3. 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:

1. 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.
2. The thickness of the palatal acrylic - If this is bulky, then the problem may be resolved with reduction of the bulk.

### **4. 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.



## Prosthodontics

### Lec: Relining Complete Dentures

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.
- 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.
- 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.
- 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.

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

Other indications for relining may have to do with flange length problems or non-displaced fractures of existing dentures.

If conditions have led to abused support tissues, some corrective actions must be taken prior to the relining procedures. A tissue conditioning material is often used in conjunction with other procedures (such as surgery) to return abused oral tissues to a healthy state. Because tissue conditioning material has a short, usable, functional life, both the tissues and material must be examined frequently, with the material being replaced as necessary.

**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 and several additional objectives that must be achieved simultaneously when making the impression for relining a denture.

**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.



An occlusal equilibration of the existing dentures may be necessary before the reline procedure to insure adequate positioning of the dentures during the impression procedures.



Dentures demonstrating simple looseness without apparent occlusal disharmony, and without noticeable changes in the vertical dimension of occlusion or appearance, are ideal candidates for being relined. However, because these dentures fit closely to the underlying tissues, an extra step is necessary prior to making the final impression. The viscosity of the impression material can prevent a denture from being properly seated when attempting the impression, if insufficient space or sufficient relief exists for the impression material. Additionally, even if tissue conditioning was done, some areas of the denture may be placing unacceptable forces on the underlying tissues. Therefore approximately 1.5 mm of resin must be removed from the tissue side of the denture prior to making the impression. This may be difficult or impossible in those dentures whose base may be little more than 1 mm in thickness.

- **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. Once relined, it will provide a stable opposing arch when relining the mandibular denture.

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

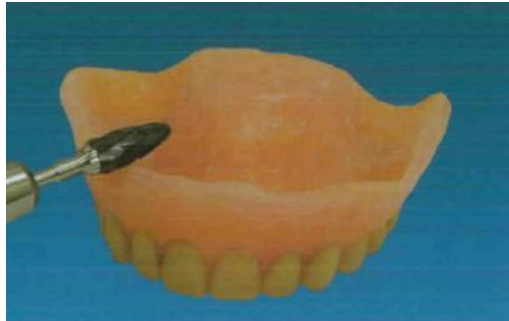
Because one of the primary objectives of a denture reline is maintaining the proper occlusion, many clinicians select the closed-mouth technique.

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.

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.

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

The occlusion is continuously evaluated to make sure no changes in denture position have occurred.



- 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. Three holes are generally placed following the midline raphe, beginning with one hole at the incisive foramen. Two holes are cut on each side lateral to the midline, in approximately the canine areas. Care should be exercised to avoid making these holes through the existing denture teeth.

Generally, unless the denture is very large, no holes are required on the mandibular arch—unless the ridges are massive and there is concern about hydraulic pressures within the impression material that may prevent the complete seating of the denture. When required, holes may be placed approximately 12 mm (half inch) apart.

- 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. Centric occlusion, occluding vertical dimension and denture position are all examined for correctness at this time. The impression material is allowed to set according to the manufacturer's instructions.
- 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 reseat 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.

## Pre-prosthetic Surgical Considerations

### Soft Tissue Procedures

With loss of teeth, bony resorption, and remodelling, soft tissue relationships may become a concern. 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 hyperplastic tissues in the denture bearing and peripheral tissue areas may occur. These hyperplastic 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 hyperplastic 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 hyperplastic tissues should be submitted for histopathologic examination.

## **Maxillary Soft Tissue Tuberosity Reduction**

Interarch distance is a critical element for proper fabrication of denture bases, and hyperplastic maxillary tuberosity tissues often impinge on adequate interarch 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 interarch 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**

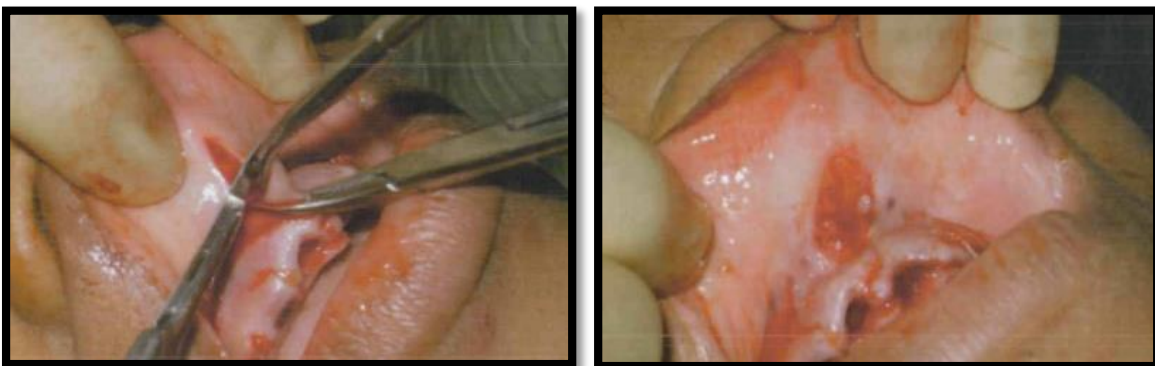
Labial frenal attachments are thin bands of fibrous tissue/muscle covered with mucosa that extend from the lip or cheek and attach into the periosteum on the sides of, or the crest of, the alveolar ridge.

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





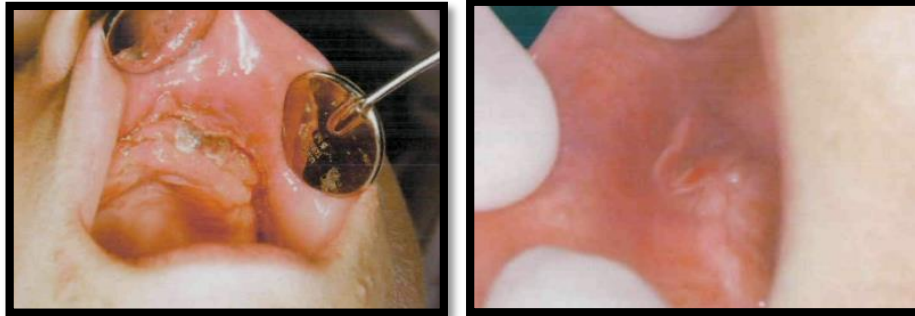
### **Excision of Redundant/Hyper mobile Tissue Overlying the Tuberosities**

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.

### **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.

## 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 intension. 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.





# Support for the Distal Extension Denture Base

**Support:** resistance to vertical components of masticatory force in a direction toward the basal seat

All partial dentures have two things in common:

- 1- They must be supported by oral structures and
- 2- They must be retained against reasonable dislodging forces.

Support can be classified according to **Cradock:**

1. Dental support
2. Mucosal support
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 commonly obtained by occlusal rests.

**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.

In the class III PD three components are necessary, support provided by rests, the connectors (stabilizing components) and the retainers. 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 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.

\*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.

\*The distal extension removable partial denture must depend on the residual ridge for some support, stability, and retention. Indirect retention, to prevent the denture from lifting away from the residual ridge, should also be incorporated in the design.

***In addition provision must be made for three other factors:***

- 1-** Best support must be obtained from the resilient tissues that cover the edentulous ridges. This is accomplished by the impression technique more than by the PD design. The area covered by the pd base is a factor in such support.
- 2-** The method of direct retention must take into account the inevitable tissueward movement of distal extension

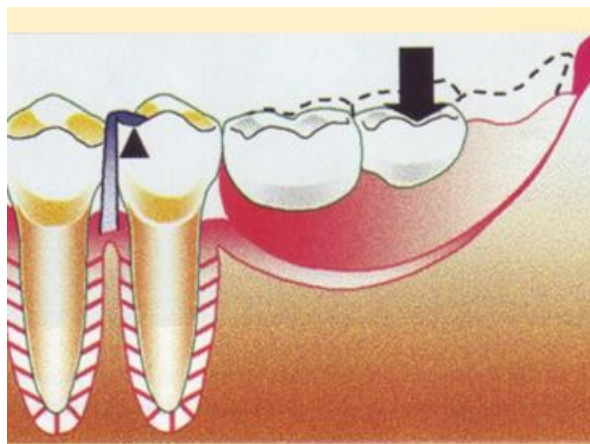
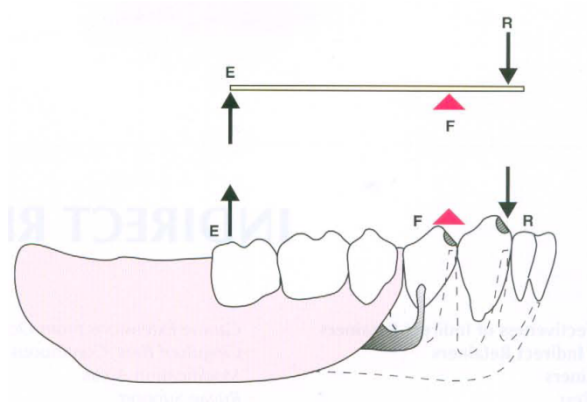
base(s) under the stress of mastication and occlusion. Direct retainers must be designed so that the occlusal loading will result in the direct transmission of this load to the long axis of the abutment teeth.

- 3-** The PD, with one or more distal extension denture bases, must be designed so that movement of the unsupported and unretained end away from the tissues will be prevented by indirect retainer.

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

- 1- Mucosa is resilient and displaceable and can lead to unstable prostheses.
- 2- Difficult to record mucosa at resting and at displaced condition simultaneously.
- 3- 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 the partial frame work.**
- 6- Total occlusal load applied,**

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

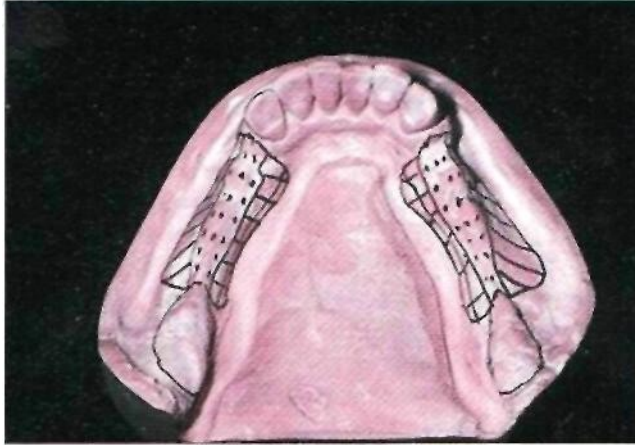
- The ideal residual ridge to support a denture base would consist of cortical bone that covers

relatively dense cancellous bone with a broad rounded crest and high vertical slopes, and covered by firm, dense fibrous connective tissue.

- Buccal self-area (bounded by the external oblique line and crest of alveolar ridge) in the lower ridge as primary stress bearing area, because it is covered by relatively firm, dense, fibrous connective tissue supported by cortical bone, while the crest is mostly cancellous not good for support. While in maxillary ridge the crest is primary stress bearing area.
- Slopes of the ridge can resist horizontal forces.



Crest of maxillary residual ridge (*diagonal lines*) is primary supporting region for maxillary distal extension denture base. Buccal and palatal slopes may furnish limited vertical support to denture base. It seems logical that their primary role is to counteract horizontal rotational tendencies of denture base. *Dotted portion* outlines incisive papilla and median palatal raphe. Relief must be provided for these regions, especially if tissues covering palatal raphe are less displaceable than those covering crest of residual ridge.



*Dotted portion* outlines crest of residual ridge, which should be recorded in its anatomic form in impression procedures. Similarly, retromolar pads should not be displaced by impression. Buccal shelf regions (*diagonal lines*) serve as primary support and therefore additional pressures may be placed on these regions for vertical support of denture base. Lingual slopes of residual ridge (*cross-hatched*) may furnish some vertical support to restoration; however, these regions principally resist horizontal rotational tendencies of denture base and should be recorded by impression in undisplaced form.

## **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. A denture base should cover as much of the residual ridge as possible and be extended the maximum amount within the physiological tolerance of the limiting border structures or tissue lead to better distribution of load and better withstanding of vertical and horizontal forces.

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

- Flat ridge will provide good support, poor stability.
- Sharp spiny ridge will provide poor support, poor to fair stability.
- Displaceable tissue on ridge will provide poor support and poor stability.

The DERPDP derives its support from the residual ridge with its fibrous connective tissue covering. The length and contour of residual ridge significantly influence the amount of available support and stability.



Comparison of two removable partial dentures for same patient. A, A distal extension base that is adequately extended, as it covers both the buccal shelf and retromolar pad. B, Underextension of this base results in less support to the prosthesis from the residual ridge, which can cause increased instability of the prosthesis.

### **3-Type and accuracy of impression registration.**

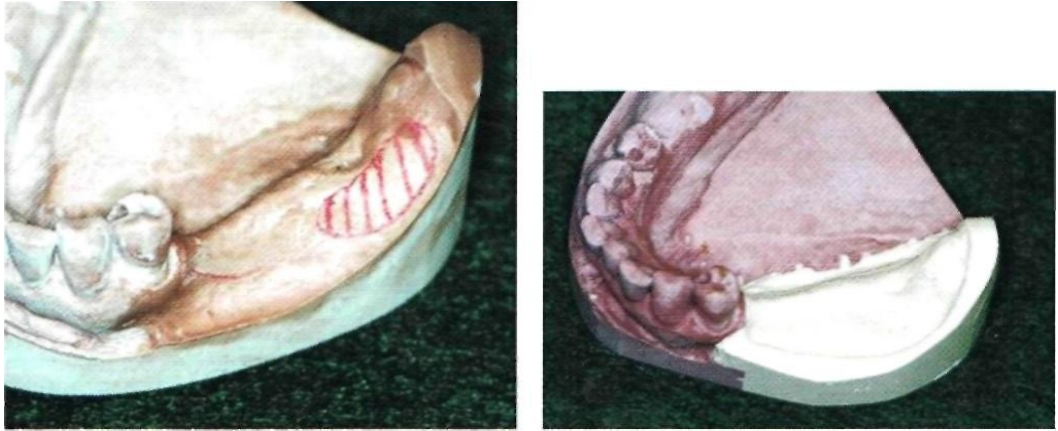
The residual ridge may be said to have two forms:

- 1- The anatomic form: The anatomic form is the surface contour of the ridge when it is not supporting an occlusal load. The anatomic form and the relationship of the remaining teeth in the dental arches, as well as the surrounding soft tissue, must be recorded accurately so that the denture will not exert pressure on those structures.

2- The functional form of the residual ridge is the surface contour of the ridge when it is supporting a functional load. The support form of the soft tissues underlying the DE base of the PD should be recorded so that firm areas are used as primary stress-bearing areas and readily displaceable tissues are not over loaded, only in this way can maximum support of the PD base be obtained.

\*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.

Many of the requirements and advantages that are associated with the distributed stress denture apply equally well to the functionally or physiologically based denture. Some of these requirements are:  
(1) Positive occlusal rests; (2) an all-rigid, nonflexible framework; (3) indirect retainers to acid stability; and (4) well-adapted, broad coverage bases.



Comparison of anatomic and functional ridge forms. A, Original mandibular cast showing left residual ridge area recorded in its anatomic form. Buccal shelf region is outlined. B, Same cast after left residual ridge area has been repoured to its functional form as recorded by secondary impression.

#### **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 tissue surface of the denture base must optimally represent a true negative of the basal seat regions of the master cast.
- In addition, 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. Every precaution must be taken to ensure this relationship when the altered cast technique of making a master cast is used.

#### **5- Design of the the partial frame work.**

\*Some rotation movement of a distal extension base at the distal abutment is inevitable under functional loading.

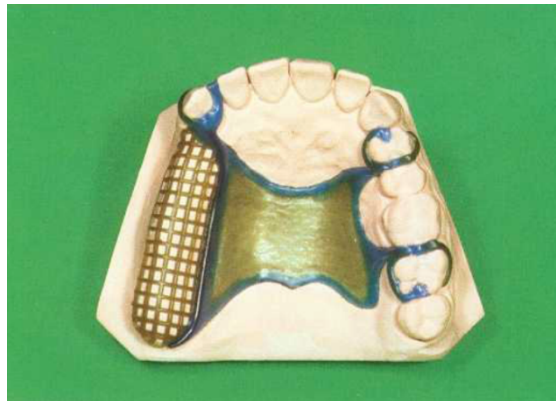
\*The greatest movement takes place at the most posterior extent of the denture base, the retromolar pad region of the mandibular residual ridge and the tuberosity region of the maxillary residual ridge therefore are subjected to the greatest movement of the denture base

\*use of more anterior or mesial rest is suggested as it allow vertical ridge loading,

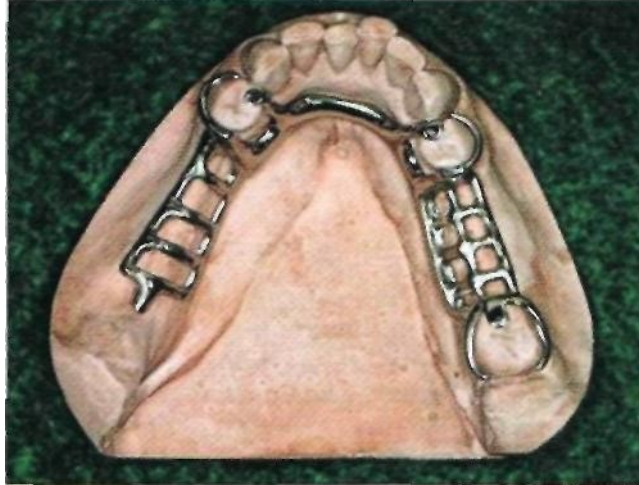
Permit greater ridge area for support, transfer stress to anterior abutment.

\*Incorporation of indirect retainer.

\*Incorporation of RPI system in free end saddle which make stress release.



A typical framework for restoring a unilaterally shortened maxillary arch. A maximally extended denture base combined with a wide palatal strap helps resist rotation.



Occlusal rest is placed on mesioocclusal surface of left mandibular first premolar, which will move point of rotation anterior to conventionally placed disto-occlusal rest if contact of proximal minor connector on distal guiding plane is designed to release under function. Occlusal rest is connected to lingual bar by minor connector, which contacts small mesiolingual prepared guiding plane.

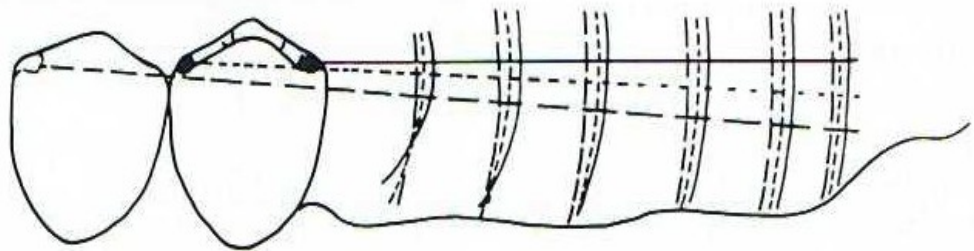
#### **6. Total occlusal load applied,**

- Patients with distal extension removable partial dentures generally orient the food bolus over natural teeth rather than prosthetic teeth, because of: 1- ) the more stable nature of the natural dentition. 2- ) The proprioceptive feedback they provide for chewing, and 3-) the possible nociceptive feedback from the supporting mucosa.
- This has an effect on the direction and magnitude of the occlusal load to the removable partial denture, and thus on the load transferred to the abutments.
- The support from the residual ridge should be optimized and shared appropriately with the remaining natural dentition.
- 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** that act on the removable partial dentures and lessens the stress on the abutment teeth and supporting tissue.



**Figure 16-6** If rotation of distal extension base occurs around nearest rest; as rest is moved anteriorly, more of residual ridge will be used to resist rotation. Compare vertical arcs of long-dash broken line with arcs of solid line. (See also Figure 10-4.)

- **ANATOMIC FORM IMPRESSION**

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

\* With the removable partial denture in position in the dental arch, 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.

\* A removable partial denture fabricated from a one-stage impression, which only records the anatomic form of basal seat tissue, places more of the masticatory load on the abutment teeth and that part of the bone that underlies the distal end of the extension base.

### ***METHODS FOR OBTAINING FUNCTIONAL SUPPORT FOR THE DISTAL EXTENSION BASE***

The objective of any functional impression technique is to provide maximum support for the removable partial denture bases.

- This allows for 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 tissueward movement of the distal extension base is unpreventable and dependent on the six factors listed previously, it 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. The functional Form of the residual ridge. Therefore some secondary or corrected impression method must be used.
- Methods for obtaining functional support for either should satisfy the two requirements for providing adequate support to the distal extension removable partial denture base. These are (1) that it records and relates the supporting soft tissue under some loading and (2) that it distributes the load over as large an area as possible.

### **Selective Tissue Placement Impression Method**

- Soft tissue that covers basal seat areas may be placed, displaced, or recorded in their resting or anatomical form. Placed and displaced tissue differs in the degree of alteration from their resting form and in their physiological reaction to the amount of displacement. For example, the palatal tissue in the vicinity of the vibrating line can be slightly displaced to develop a posterior palatal seal for the maxillary complete denture and will remain in a healthy state for extended periods. On the other hand, this tissue develops an immediate inflammatory response when it has been overly displaced in developing the posterior palatal seal.
- Oral tissues that have been overly displaced or distorted attempt to regain their anatomic form. When they are not permitted to do this by the denture bases, the tissues become inflamed and their physiological functions become impaired, accompanied by bone resorption. Tissues that are minimally displaced (placed) by impression procedures for

definitive border control respond favorably to the additional pressures placed on them by the resultant denture bases if these pressures are intermittent rather than continuous.

- ***The selective tissue placement impression method*** is based on these ***clinical observations***:

- \* The histological nature of tissue that covers the residual alveolar bone.

- \* The nature of the residual ridge bone.

- \* And its positional relationship to the direction of stresses that will be placed on it.

It is further believed that by use of specially designed individual trays for impressions, denture bases can be developed that will use those portions of the residual ridge that can withstand additional stress and at the same time relieve the tissue of the residual ridge that cannot withstand functional loading and remain healthy.

4<sup>th</sup>

## **Anatomy and physiology as related to dental prosthesis**

In order to construct a prosthesis a dentist require an understanding and a thorough knowledge of the anatomy and physiology of the supporting structures to assure successful results.

### **Osteology**

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.

It is quite essential to have knowledge of the tissues that support the maxillary and the mandibular dentures. These tissues also help the dentures in obtaining their retention and stability. 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 mucous membrane that lines the oral cavity varies in character in different zones and denture border depends on the function of the different zones. The sub-mucosa, which is a connective tissue, attaches the mucosa to the underlying structures. The submucosa varies in composition depending on whether the mucosa is firmly or loosely attached to the bony structure and whether there is muscle tissue between itself and the underlying bone. The blood vessels present in the submucosa supply blood to the edentulous foundation and the nerves innervate it.

### **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.

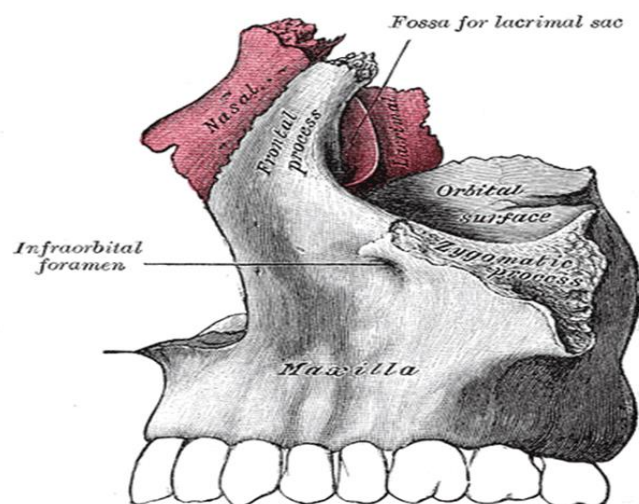
## **STRUCTURES RELATED TO THE MAXILLARY AND MANDIBULAR DENTURE EDENTULOUS FOUNDATION**

These structures can be divided into two categories:

1. Supporting structures: These are the structures that support the denture
2. Border limiting structures: These are the structures that limit the border extent of the denture (maxillary and mandibular denture).

### **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.



### **Supporting Structures in the Maxillary Edentulous Foundation**

1. Zygomatico-alveolar crest (malar process).
2. Alveolar process
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.

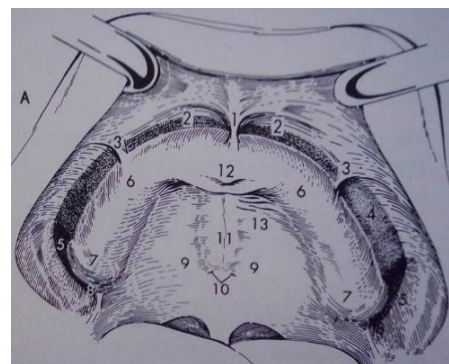
### **Zygomatico-alveolar crest (malar process):**

This is located opposite the 1st molar region some denture require relief over this area to prevent soreness and aid in retention especially in sever resorbed ridge.



### **Alveolar process:**

It arises from the lower surface of the maxilla. It consists of two parallel plates of cortical bone which unite behind the last molar to form the tuberosity. The part of the alveolar process that remain after loss of teeth is called the residual alveolar ridge. The maxillary ridge act as a secondary stress bearing area. The slopes of the ridges do help in the stability of the denture during function. Hence, some of the stress does get transmitted through the slopes.



### **The palatine processes of maxillary bone:**

They arise as horizontal plates from the body of the maxilla. The two plates unite in the mid line forming the mid palatine suture. Sometime overgrowth of bone seen in this area called torus palatinus. The hard palate resist resorption (primary stress bearing area).

The area of sutural joint (mid palatal raphe) is covered by firmly adherent mucous membrane to the underlying bone with little submucosal tissue. There is, therefore, no resiliency in this region and stress cannot be applied

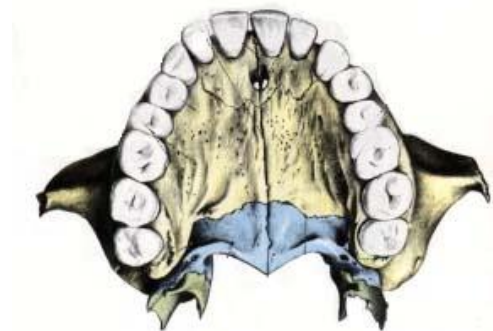
in this region. This is a stress relief area in the maxillary edentulous foundation.

**Clinical consideration:**

During final impression procedure the mid palatal raphae is relieved in order to create equilibrium between the resilient and non-resilient tissue supports.

**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 posterior palatal seal (PPS) is placed at the junction between immovable and movable parts of the soft palate.



**Posterior palatal seal area:** The soft tissue area limited posteriorly by the distal demarcation of the movable and non-movable 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.

**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.

**Incisive foramen:**

The incisive foramen is located in the palate on the median line posterior to the maxillary central incisor. In edentulous mouth it comes nearer to the crest of the ridge as resorption progress. Failure to relieve this area may result in irritation and burning sensation at the anterior part of the palate.

**Incisive Papilla**

It is a pad of fibrous connective tissue anteriorly overlying the incisive foramen. The submucosa in this region contains the nasopalatine nerves and vessels.



### 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 retained 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 2<sup>nd</sup> molar to the hamular notch. The *tuberosities* often are covered with 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 negatively affect 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:**

It is a narrow cleft of loose connective tissue, which is approximately 2 mm in extent antero-posteriorly. This structure is bounded by the maxillary tuberosity anteriorly and the pterygoid hamulus posteriorly and marks the postero-lateral limit of the upper denture. The submucosa in this region is thick and made up of loose areolar tissue. A seal can be obtained by utilizing this area as it can be displaced to a certain extent without trauma.

### ***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.



### **Cuspid eminence:**

It is a bony elevation on the residual ridge formed after extraction of the canine located over the canine root and serve as a guide for positioning of artificial canine.

### **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; and (3) the vibrating line, which extends from one hamular notch to the other across the palate.

**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. Genial tubercles.
7. Torus mandibularis.
8. External oblique ridge.

**The mandible is the movable member of the stomatognathic system. It 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.

**Buccal shelf area:** The *buccal shelf* is the area between the mandibular buccal frenum and the anterior edge of the masseter muscle. Medially it is bound by the crest of the ridge and laterally by the boney external oblique ridge and distally by the retromolar pad. The buccinators muscle fibers attach horizontally along the boney 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 alveolar ridge of the

mandible is significantly medial to the inferior border of the mandible; therefore, as the ridge resorbs, the denture-bearing surface becomes flatter and widens towards the buccal shelf. The shelf is dense cortical bone and lies at right angles to vertical occlusal forces, and is therefore a primary stress-bearing area for the denture.

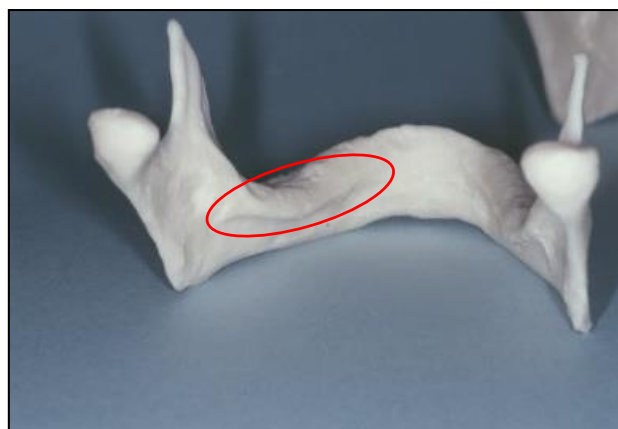


**Mental foramen:**

It is located on the lateral surface of the mandible between 1<sup>st</sup> and 2<sup>nd</sup> premolar half way between the lower border and alveolar crest. The *mental nerve* exits the *mental foramen* below the alveolar ridge, but with continued resorption of the ridge, the mental foramen can become positioned at the crest of the ridge and be compressed by the denture. This causes pain or even altered sensation in the lip (numbness in the lower lip).

**Mylohyoid ridge:**

It runs along the lingual surface of the mandible. Anteriorly the ridge lies close to the inferior border of mandible while posteriorly, it lies flush with the residual ridge. The thin mucosa over the mylohyoid ridge may get traumatized and should be relieved. The area under this ridge is an undercut.



### **Genial tubercles:**

Also called mental spines, 2- 4 in number situated on the lingual surface of the body of mandible in the mid line. They represents the muscle attachment of the genioglossus and geniohyoid muscle .it is usually seen below the crest of the ridge.

#### **Significance**

- In a severely resorbed ridge, it is seen above the residual alveolar ridge and hence, it should be relieved.
- The mucosa covering the genial tubercle is thin and tightly adherent to the underlying bone.

#### **Clinical consideration:**

It should be relieved with a spacer, failure of which leads to ulceration.

### **Mandibular tori**

Mandibular tori are lingual bilateral or unilateral prominences of cortical bone in the premolar area. But they may extend posteriorly to the molar area. Small tori may only require relief in the denture. Large tori require removal before a denture can be fabricated.

### **External oblique ridge:**

It is a ridge of dense bone extended from just above the mental foramen superiorly and distally to be continuous with the anterior border of the ramus. In most individuals it is the anatomic guide for lateral end of the buccal flange of lower denture.

### **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, non-keratinized 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 absence of long-term cortical bone resorption.

## 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**

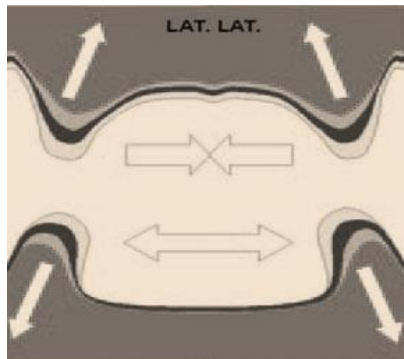
- 1° buccal shelves
- 1° retromolar pads
- 2° alveolar ridge

## Areas Requiring Relief in Final Impression

- 2° stress-bearing areas
- Palatal torus
- Median palatal raphe
- Mandibular tori
- Retromylohyoid ridge
- Undercuts or sharp bony prominence on ridges.

## The pattern of bone resorption:

The maxilla resorb upward and inward to become progressively smaller (centripetal). While the mandible resorb downward and outward to become gradually wider (centrifugal). This progressive change of the mandible and maxillae makes many edentulous patients appear to be prognathic.



Thinking Notes/ The mean denture bearing area for edentulous maxillae are 23cm<sup>2</sup> while for mandible 12cm<sup>2</sup> in contrast with 45cm<sup>2</sup> 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.

4<sup>th</sup>**Try-in of removable partial denture**

(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. A careful routine must be followed to prevent any mistakes continuing through to the finished dentures. The replacement of anterior teeth often represents an important event in the life of an individual.

Although many patients identify improved function as the primary reason for seeking treatment, a sense of esthetics always remains. A patient may be dissatisfied with a prosthesis even if it meets all functional and biologic requirements. Therefore, if anterior teeth are to be replaced, an esthetic try-in is essential. 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.

An additional indication for the appointment is to verify the accuracy of jaw relation records made during the previous appointment. If there is any doubt regarding the accuracy of the articulator mounting, a try-in appointment should be scheduled.

**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. Prove the centric record and take new occlusal registration.
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.

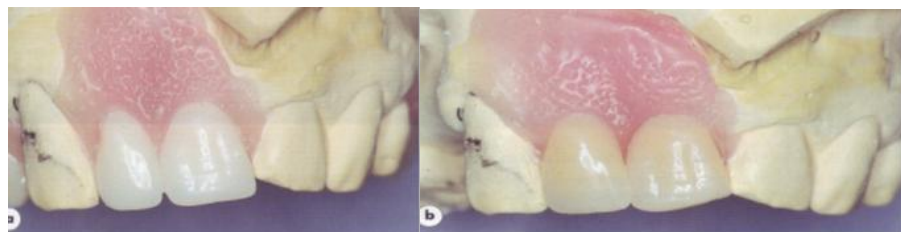
#### F. Tooth shade:

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).

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

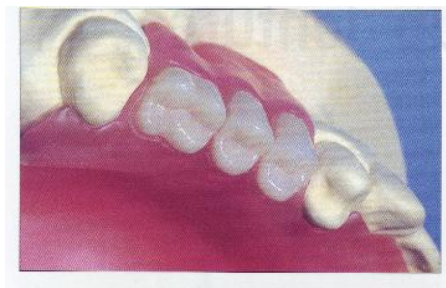
teeth tend to follow the curve formed by the lower lip when smiling. Reproduction of this relationship when positioning artificial anterior teeth can contribute significantly to a pleasing appearance.

(The incisal edges of the natural anterior teeth tend to follow the curve formed by the lower lip when smiling).



### **Denture base consideration**

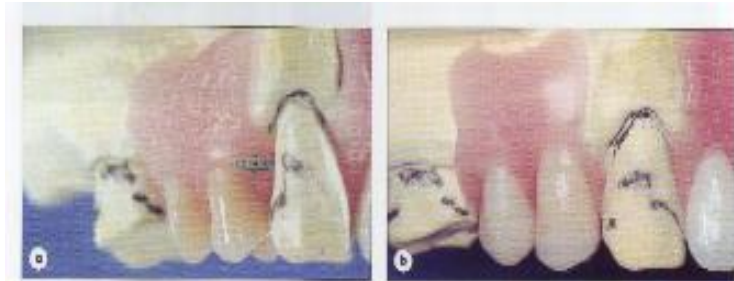
A. Wax flanges should be of a thickness and extension corresponding to the amount of bone resorption in the area so that they only replace the tissue that has been lost, restoring the former contour of the alveolar ridge. Mesial and distal borders should be thin so that the flange blends with the adjacent mucosa, thus avoiding food trapping and promoting patient comfort.



B. If 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 harmonise 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.



### **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.

### **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).**



## **Verification of Jaw Relation**

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

1. If problems were encountered during jaw relation procedures and there is any doubt regarding the accuracy of the articulator mounting.
2. If the partial denture is opposed by a complete denture.
3. If all posterior teeth in both arches are being replaced.
4. 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 operator's dominant hand is properly positioned and used to guide mandibular closure.



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. However, 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.

4<sup>th</sup>

## **Anatomy and physiology related to prosthodontics**

### **Myology**

#### **Muscles of facial expression**

The zygomaticus major , zygomaticus minor, levator labii superioris, levator labii superioris alaeque nasi, levator anguli oris, depressor anguli oris, risorius, platysma, incisivus superioris, incisivus inferioris, orbicularis oris, mentalis and buccinator muscles are responsible for the expression seen in the lower half of the face.

#### **Functions of muscles of facial expression**

1. Laughing
2. Smiling
3. Frowning
4. Their actions reflect the mood and emotional status of an individual.
5. When these muscles are relaxed, the face lacks expression.

#### **The perioral muscles of facial expression**

Why we study these muscles?

1. *The perioral muscles do not insert into bone so they need support from teeth for proper function.*
2. *Incorrect positioning of the teeth or incorrect contour of denture base can affect the normal tonicity of these muscle and can affect adversely the facial expression.*
3. *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.*

The insertion of these various muscles around the oral cavity opening is very important, where they partly insert into the connective tissue of the skin and partly into the mucous membrane of the lips.

The area which is situated laterally and slightly above the corner of the mouth known as the **muscular node or the (modiolus)** , which is a concentration of many fibers of this group of muscles. Here the labial flange of the maxillary denture should be reduced in thickness, so as not to effect the stability of the upper denture. Sometimes, the mandibular first premolar should be arranged properly on the crest of residual ridge to avoid any interference with this modiolus.

## **Mentalis muscle**

Functions related to prosthodontics

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 denture 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 actions on the vestibular fornix (fold) are similar to that of the mentalis muscles. They are small muscles, and their action alone would rarely dislodge a denture. However, their presence beneath the mucous membrane might present problems associated with flange extension and denture retention.

### ***Buccinators muscle***

It does not directly dislodge the denture because it contracts in a line parallel to the plane of occlusion.

Its fibers parallel to the plane of occlusion but run at right angle to the fiber of masseter, when masseter activated it push the buccinators muscle medially against denture border in the area of the retro molar pad, so the denture should be contoured to accommodate this interaction between these two muscles. This contour is known as ***masseter groove***.

### ***Orbicularis oris muscle***

- It is the sphincter muscle of the mouth. The upper lip is supported by the six anterior teeth and not the denture border.
- 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.
- 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.



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

- \* Elevation of the hyoid bone and the larynx and depression of the mandible.
- \* Geniohyoid and Mylohyoid may influence the lingual border of the mandibular denture.
- \* Mylohyoid muscles constitute the muscular floor of the mouth. It elevate the hyoid bone, tongue and the membranous floor of the mouth during swallowing. If the denture extend below and under the mylohyoid line, it will impinge on mylohyoid muscle, and can affect its action.

#### Mylohyoid muscle acts

1. Elevate the floor of the mouth in the first stage of deglutition.
2. Elevate the hyoid bone.
3. Depress the mandible.

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

- No particular significance in complete denture prosthodontics with respect to any influence on denture border.
- 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.

### **Muscles of mastication**

1. Masseter
2. Temporalis
3. Medial Pterygoid
4. Lateral Pterygoid

#### Functions of these muscles

- Masticatory and non-masticatory movement of the mandible.
- In complete denture, the non-masticatory movement and the contacting of the teeth during these movement are probably of more concern than the masticatory movements.
- In recording jaw relation, centric relation is obtained with aid of posterior fibers of temporalis muscles.

### **Pterygomandibular raphe**

A tendinous band lies between the pterygoid hamulus superiorly and the mandible in the area of retromolar pad inferiorly. It is the point of attachment for the buccinator muscles laterally and superior pharyngeal constrictor muscles medially.

### **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 stretched 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.

### **Why study muscle of soft palate?**

Since there is a need to determine the vibrating line which is located on soft palate.

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 parts of 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.

## **Tongue**

The tongue is a muscular structure composed of intrinsic and extrinsic muscles fibers. The intrinsic muscles originate and insert within the tongue and responsible for change in shape. While the extrinsic muscles originate in structure outside the tongue and can move the tongue as well as alter its shape.

### **Function related to prosthetic dentistry**

It is located in the floor of the mouth and is in intimate contact with the lingual flanges of mandibular denture. The denture flange must be contoured to allow the tongue to have its normal wide range of functional movement, that's why the patient should be asked to move his tongue to the left and right as well as protruding it anteriorly in muscle trimming procedure during lower impression making as well as asked to moisture his lips.

### **Muscle physiology**

The human body is very adjustable, capable of adapting to changes in the environment. By means of Sensory nerve endings the body is notified of the changes and by the **effectors**, it adjust to these changes.

The effectors of the body are the muscle and glands.

The muscle involved in denture complete function are the skeletal muscle which are controlled by CNS that passes through a synapsis, then efferent nerve will be activated which lead to muscle contraction called reflex (voluntary action).

The oral cavity has many sensory nerve fiber receptors; many of these are associated with periodontium, when teeth lost these receptors are lost.

Muscle contraction is of two types

1. Isometric contraction occur when the muscle does not shorten during contraction
2. Isotonic contraction occur when the muscle shortens, but the tension remains the same.

In the mandible both isotonic and isometric contraction occurred. Isotonic to move the mandible and isometric to brace the mandible when teeth contact.

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 mucous membrane**

Much of mucous membrane either helps support a complete denture directly or comes in contact with it intermittently.

Oral mucosa could be classified into:

1. The masticatory mucosa.
2. The lining mucosa.
3. Specialized mucosa.

The masticatory mucosa is keratinized stratified Squamous epithelium. In edentulous patients covers the crest of residual ridge (here it is firmly attached to the underlying structure), and the hard palate.

The lining mucosa is non-keratinized Stratified Squamous epithelium. It is found in the lips, cheeks, vestibule spaces and ventral surface of the tongue. Usually the lining mucosa comes into contact with the denture borders. The submucosal structure may be either tightly or loosely attached to underlying structures.

The specialized mucosa covers the dorsum of the tongue; here the mucosa is keratinized including the papillae on the upper surface of the tongue.

Oral mucosa of soft palate is stratified squamous epithelium non-keratinized. The Sub mucosa here have numerous gland supporting membrane, it is a transition between loosely and fixed type of mucosa.

### **Salivary glands and saliva**

Saliva is secreted by 3 different main 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.

On the other hand, a lack of saliva (xerostomia) cause some problems:

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 viscous in consistency (increase in mucin).

### **Functions of saliva**

1. Contain ptyalin enzyme (type of amylase enzyme) that starts digestion process 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.

**4<sup>th</sup> year Lect.****Prosthodontics****Diagnosis and Treatment plan of Complete Denture:**

It is the critical or scientific evaluation of existing conditions, which is made towards the end of the examination. Diagnosis, being a continuous procedure, is not accomplished in a short time.

Diagnosis defined as:

- 1- The act or process of deciding the nature of a diseased condition by examination.
2. The determination of the nature, location and causes of disease.

**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. Psychological factor include the willingness of the patient and their mental attitudes toward dentures, their relationship with and attitude toward the dentist and their ability to learn how to use the dentures. 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.

**1-Philosophical Patient:** The best mental attitude for denture acceptance is the philosophical type. These patients are rational, sensible, calm, and composed in difficulty situations. Their motivation is generalized as they desire dentures for the maintenance of health and appearance and feel

that having teeth replaced is a normal acceptable process. They are easy going, cooperative, well-adjusted to life and they understand and accept advice. They do not imagine or anticipate any particular difficulty.

**2-Exacting patients:-** 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 patients:**

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 and apprehensive. 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:**

A. Name: It should be asked to enter in the record. When the patient asked by his name it brings him some confidence. The name also gives an idea about the patient family and community.

B. Age:

A young patient will be more adaptable to new situation such as new denture than an older person. Problem in advancing age can be anticipated with:

1. Adaptation to the new denture.

2. Coordination.
3. Bone resorption.
4. Tissue sensitivity.
5. Healing.
6. Balanced nutrition.

C. Gender:

In general women are more difficult to please with the appearance of their denture than men. They are more aware of their face and lips than men. Males are less concerned with esthetics, they do expect comfort and function.

D. Occupation and social position:

In general the higher the social position, the more demanding the patient about esthetics. A lecturer who speaks to an audience would be concerned about speech pattern. While a musician who plays a wind instrument, will care for tooth position.

**Systemic (medical) status:**

No prosthodontic procedures should be planned until the systemic status of the patient is evaluated. It must be realized that dentistry is part of health services and that oral health is closely associated with the general health of the patient. Except in cases of accident, individual who are losing their teeth are manifesting pathological conditions because their loss may be because of systemic factors or associated with unfavorable systemic conditions. Some systemic diseases have direct relation to the denture success even though no local manifestations are apparent.

1. Debilitating diseases: Diabetes, blood dyscrasias, tuberculosis are examples. These patients 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.

*Diabetes:*

- 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 in order to avoid the tissue changes that occur due to medication during the latter part of the day.
- The duration of each appointment should be short in order to reduce the stressful condition.
- Patients with such disease may require consultation with cardiologist as some denture procedures may be contraindicated.
- Such patient must be controlled before dental treatment.

### Anaemia

- Soft tissue overlying bone becomes fragile with possibility of enhanced bone loss.
- Decrease in bearing capacity of foundation tissue.
- Decrease in healing capacity.
- Advise patient for haemogram, with main emphasis to improve blood picture through administration of haematinic principle (Vitamin B12).

3. Joint diseases: joint involvement particularly osteoarthritis present different problems. If the disease involved the temporomandibular joint, alteration in the treatment plan may be essential. In extreme conditions special impression tray and technique are often necessary because of the limited access from reduced ability to open the jaws; furthermore jaw relation records are difficult and occlusion correction must be made often because of subsequent changes in the joint. In

case of involvement of finger joints, there may be decreased ability to maintain denture hygiene and insertion.

4. **Neurological disorders:** some neurological involvement as Bell's palsy or Parkinson's requires some attention, dentist have to deal with some problem related to denture retention, maxillomandibular records and supporting musculature.

5. **Skin diseases:** many of dermatological diseases may have oral manifestations such as pemphigus. Medical support mostly needed because these 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:** Some complete denture patient with oral cancer may require radiation therapy. A waiting period should elapse before denture construction. Tissue having bronze color and loss of tonicity are not suitable for denture support. Once the denture is constructed, the tissue should be examined frequently for radio necrosis. Xerostomia can also occur due to radiotherapy. Hence, sialagogues and use of denture adhesives may have to be considered.

7. **Menopause condition:** This condition can cause glandular changes, osteoporosis, mouth burning sensation and psychological changes in the patient. These can influence treatment planning and the efficiency of the treatment with complete denture.

### **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.

An understanding of the etiology of teeth loss by a patient will help a dentist to estimate patient's appreciation of dentistry and contribute to the prognosis for prosthodontic success. Patients who lost their teeth in an accident might be much more unhappy about their edentulous state than patients who lost their teeth as a consequences of decay resulting from neglect, similarly expectation for the amount of alveolar bone remaining would be greater for the patients with a

history of rapid tooth loss from decay than for patient with a long history of progressive periodontal diseases.

Dental history include:

1. Chief complain: It should be recorded because it gives ideas about the patient psychology.

2. Expectation: The dentist should evaluate the patient expectation about denture and classify them as realistic or unrealistic.

3. Period of edentulousness: This gives information about the amount and pattern of bone resorption. The cause of tooth loss should be known (caries, periodontitis etc. -----).

4. Previous dentures: The patient who keep changing dentures in a short period of time is difficult to satisfy and risky to deal with. Any existing prosthesis must be examined thoroughly in an objective manner; to condemn prosthesis on the complaint of the patient is often incorrect diagnosis. Patient oral hygiene can be reflected well by the old denture, and condition of the supported tissues also can be expected. Previous denture experience could be noted in terms of number, duration of time, information on esthetics, phonetics, mastication, retention, vertical dimension of occlusion and centric relation should be noted down. Similarly repairs that has been carried out earlier would include:

- a. Repair to a denture.
- b. Rebasing.
- c. Relining.

#### **Local oral condition ( 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.

- T.M.J: any patient gives a history of T.M.J problem must examine carefully because this type of patients may has a limitation in their jaw movements and opening.

Complaints of pain, subluxation, crepitus or a combination of two or three can be encountered. These could be encountered due to severe discrepancy of vertical dimension of occlusion, loss of teeth or loss of posterior stops, which causes the load to shift anteriorly.

#### *Examination of TMJ*

1. The bulk of index finger is placed in the external auditory meatus and equal pressure is applied while instructing the patient to open the mouth. If pain is felt, it indicates abnormal condition

2. Auscultation.

#### **Muscle tone**

- Class I: normal tissue tone and function.

- Class II: approximately normal function and tone and tactile sense have been preserved by the wearing of artificial dentures. Patients who have been wearing efficient dentures that restore the correct vertical dimension of occlusion belong to this class.

- Class III: subnormal function and tone, resulted from ill health, loss of teeth or wearing of grossly inefficient dentures.

(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).

#### **Neck palpation**

Lymphatics: The first sign of oral cancer is often a palpable lymph node.

#### **Facial examination:**

A. Facial form: This is based on outline of face as square, tapering, ovoid, and square-tapering, this helps in tooth selection.

B. Facial profile:

Class 1: Normal or straight profile.

Class 2: Retrognathic profile.

Class 3: Prognathic profile.

#### **Lips:**

Patient with short lip will expose all of the upper anterior teeth and much of the labial flange of denture base. Also patient with thin lip present problem because any slight changes in labiolingual tooth position makes an immediate change in the lip contour.

### **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. ridge 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.

### **Hard palate (shape of H.P):**

- 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.
- 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.

### **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.

### **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.

### **Post mylohyoid space (Lateral throat form)**

Class 1: deep lat 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 lat throat form.

Class 3: Shallow lat throat form in which retention of lower denture is week.

### **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).

### **Radiographic examination:**

Panoramic, cephalometric, occlusal, and periapical radiography are important because they capture retained root, unerupted teeth, cysts, tumors, foreign bodies, TMJ disorder, osteoporosis and bony pathological changes.

### **Diagnostic cast-Advantages:**

In addition to construction of the special tray, diagnostic cast is used for:

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. Displacement from the pressure of old denture more obvious in dry cast.
7. Planning of pre-prosthetic surgery.
8. 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.

**Treatment planning:**

The treatment plan: - is the process of matching possible *treatment options* with *patient needs* and *systematically arranging the treatment in order of priority* but in keeping with a logical or technically necessary sequence.

It is a consideration of all of the diagnostic findings, systemic and local which influence the surgical or any preprosthetic preparations of the mouth, impression making, maxillomandibular relations, occlusion, form and material of the artificial teeth, and instructions in the use and care of dentures.

**Why Treatment plan?**

To specifically state the treatment that will address a particular patient's need; this treatment must state in a logical sequences and care.

**Prognosis:**

It is the opinion and judgement given in advance of treatment of completely edentulous patient. Denture prognosis is a judgment or opinion of the prospects for success or otherwise in the fabrication and usefulness of the dentures.



**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.

**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. Match the patient expectation with reality of treatment potential.
3. Explain nature, use, and shortcomings of prostheses.
4. Identify alternative treatment and their consequences.



## Vertical jaw relation

Lect Prosthodontics

M.Sc. Ali Saad

**Maxillomandibular relationship record:** a registration of any positional relationship of the mandible relative to the maxillae; these records may be made at any vertical, horizontal, or lateral orientation.

**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.

**Vertical jaw relation can be recorded in two positions:**

- 1- Vertical dimension at rest position
- 2- Vertical dimension at occlusion

**Rest vertical dimension (physiologic rest position):** The distance between two selected anatomic or marked points (usually one on the tip of the nose and the other on the chin) when an individual is resting comfortably in an upright 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).

**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*'. The free-way space exists only at rest. 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**. Once the vertical dimension at occlusion is recorded, it should be verified with the vertical dimension at rest (the vertical dimension at occlusion should always be 2 -4 mm lesser than the vertical dimension at rest). The denture is fabricated in vertical dimension at occlusion so that the freeway space is formed at rest.

This relation is easiest to record but is very critical. Errors in vertical dimension are the first to produce severe discomfort in the temporomandibular joint, the muscles of mastication and the joint will be strained.

### **Factors Affecting Vertical Jaw Relation**

#### **1-Teeth**

These act as occlusal vertical stops and establish the relationship of the mandible to the maxilla in a vertical direction in dentulous patients.

#### **2- Musculature**

The opening and closing muscles tend to be in a state of minimal tonic contraction. This determines the vertical jaw relation. Muscles that produce elevation of the mandible (closing muscles) and gravity also help to control the tonic balance that maintains the physiologic rest position.

### **Importance of Vertical Jaw Relation**

1. Functional roles include: mastication, respiration, deglutition, phonetics.
2. Psychological role.
3. Esthetic role.
4. Comfortable role by maintenance health of tissue, mucosa, bones, muscles and (temporomandibular joint).

### **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. Inability to open the mouth widely.
8. Loss of biting power.
9. Difficulty in swallowing.
10. 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. Presence of excessive wrinkles & folds in corner of mouth which may lead to angular cheilitis.

3. loss of biting power & decreased chewing ability
4. muscular fatigue & pain in T.M.J region
5. cheek biting
6. Neuralgia or other features.
7. Decreased volume or cubical space of the oral cavity.

### **Vertical Dimension at Rest**

It is defined as, “*The length of the face when the mandible is in rest position.* This position is influenced by the muscles of mastication, muscles involved in speech, deglutition and breathing. It is essential to record the vertical dimension at rest as it acts as a reference point during recording the vertical dimension at occlusion.

VD at rest = VD at occlusion + free-way space.

The vertical dimension at rest should be recorded at the physiological rest position of the mandible. In patients with prolonged loss, the mandible shifts to a habitual rest position.

The complete denture should not be fabricated using the habitual rest position. Hence the physiological rest position should be determined in these patients before recording vertical jaw relation. When functional movements (swallowing, wetting the lips) are performed, the mandible comes to the physiological rest position before going to the habitual rest position. The physiological rest position is influenced by a number of factors and the following considerations are to be remembered while recording it:

- Presence of any neuromuscular disease in the patient can influence the rest position.
- The patient cannot maintain the physiological rest position for an indefinite period of time. Hence, it should be recorded quickly.
- Incorrect measurement of the rest position can lead to faulty recording of the vertical dimension at occlusion and can lead to injury to the supporting structures and the temporomandibular joint.

**Methods of recording V.D.R:** V.D.R is measured usually on the face by a ruler between two selected points marked by indelible marker or a triangle of adhesive tape above & below the mouth mostly on the nose & chin. The following methods are used for recording rest vertical dimension:

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.*

### **1-Facial measurements after swallowing & relaxing:**

The patient should sit or stand upright with the head erect with the eyes looking straight ahead, ask the patient to swallow and wipe his lips with his tongue, relax his facial muscles and drop his shoulder. Then measure the V.D.R & repeat until getting a consistent measurement.

### **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.
- The distance between the two reference points is recorded and compared to the measurement recorded by the swallowing method.
- This method relies on patient's perception of relaxation, and will vary for each individual. Hence, at least one additional method should be carried out to confirm these readings.

### **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. If both these distances are equal, the jaws are considered at rest. Its accuracy is questionable in patients with facial asymmetry.

### **4. Phonetics**

There are two methods by which the rest position can be recorded with the help of speech. In the first method the patient is asked to repeatedly pronounce the letter 'm', a certain number of times and the distance between the two reference points is measured immediately after the patient stops. In the second method the dentist keeps talking to the patient

and he measures the distance between the reference points immediately after the patient stops talking.

### **Vertical Dimension at Occlusion**

It is the vertical dimension of face when the teeth or occlusal rims are in contact in centric occlusion.

#### **Methods of Measuring:**

Vertical relation of occlusion are roughly grouped under *mechanical methods* and *Physiological methods*.

#### 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.

### **1. Mechanical methods: including**

#### **A) Ridge relation**

##### ✓ **Distance of incisive papilla from the mandibular incisors:**

The incisive papilla is used to measure the patient's vertical relation since it is a stable landmark and is changed little by resorption of residual alveolar ridge. The distance of the incisive papilla from the incisal edge of the mandibular incisors is about 4 mm in the natural dentition. The incisal edge of the maxillary central incisor is an average of 6 mm below the incisive papilla. So the average vertical overlap of the opposing central incisor is about 2 mm. These measurements must be occur in trial dentures on the articulator but they don't appear to be relevant in sever ridge resorption.

##### ✓ **Parallelism of ridges**

The mandible is parallel to the maxilla only at occlusion. This factor can be used to determine the vertical dimension at occlusion. The mandible of the patient is adjusted to be parallel to the maxilla. This position associated with a 5° opening of the jaw in the temporomandibular joint

gives a correct amount of jaw separation. This method cannot be taken as a standard in patients who had periodontal disease and in patients who lost their teeth at different periods of time.

## **B) Pre-extraction records**

1. **Profile photographs:** Profile photos are made and enlarged to life size. The photographs should be made with the teeth in maximum occlusion. Measurements of anatomical landmarks on the photograph are compared with measurements on the face, using the same landmarks. These measurements can be reevaluated during the try-in appointment.

Disadvantage:

- The angulation of the photograph might differ with the patient's posture.

### **2. Articulated casts**

When the patient is dentulous, the maxillary and mandibular casts are mounted in centric relation in articulator. After extraction the edentulous casts are articulated in a separate articulator. The inter-arch distance between the edentulous casts is compared with that of the articulated dentulous casts. This method is valuable with patients whose ridges are not sacrificed during removal of teeth or resorbed during a long waiting period for denture construction.

### **3. Facial measurements**

Two points are marked on the upper and lower halves of the face before extraction. The vertical dimension is measured at occlusion and recorded. This measurement is used after extraction. The distance between the marks can be measured by recording the distance from the chin to the base of the nose using dividers (or) calipers before teeth are extracted.

## **C) Measurements of former dentures**

Patient's existing denture is a valuable pre-extraction record. 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 vertical dimension at occlusion.

## **2. Physiological methods:**

Including edentulous patient with no pre-extraction record:

*a. Power point (maximum force):* as suggested by Boos, the theory based on that when teeth come into contact, maximum force or power point measured by bi-meter is exerted when this contact occurs at the correct V.D.O. A bimeter is attached to the mandibular record base. This bimeter has a dial, which shows the amount of pressure acting on it.



***b. Using Wax Occlusal Rims***

A tentative vertical dimension is measured with occlusal rims and the casts are articulated in a tentative centric relation. A tracing device can be attached to the occlusal rims for a graphic tracing. The facial expression and aesthetics are used for the final value.

***c. Physiological rest position:*** a suggested method is to have the patient relaxed when the wax occlusion rims are in place, with the trunk upright & the head unsupported. 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, if it is more than 4mm, the V.D.O may be considered too small & vice versa so the bite rims should be adjusted until the dentist satisfied with interocclusal space with patient comfort & speech & esthetic considerations. This method is not an exact guide when used with other methods; it will determine relation of mandible to maxillae.

***d. Phonetics & esthetics:*** it consists of 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 may have been established. If the anterior teeth click together when these sounds are made the V.D.O is probably too great.

Esthetics also is affected by vertical relation of mandible to maxillae like skin tone, contour & support of the lips by anteroposterior positions of the teeth. In decreased V.D.O, the lips are not correctly supported & will be more nearly vertical than when supported by natural teeth.

The Esthetic guide to the correct V.D.O is to select teeth that are the same size as the natural teeth & to estimate the amount of tissue lost from the alveolar ridges.

***e. Swallowing threshold:*** the theory when a person swallows, the teeth come together with a very light contact at the beginning of the swallowing cycle. On this base, a record of the jaws relation at this point is used as V.D.O. the technique involving building a cone of soft wax on the lower denture base in such a way that it contacts the upper occlusion rim when the jaws are open too wide, then the flow of saliva stimulated by a piece of candy with repeated action of swallowing will gradually reduce the height of the wax cone to allow the mandible to reach the level of V.D.O.

**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.

A further assessment and confirmation of this tentative determination will occur later at the try-in appointment, when teeth are set in the wax trial dentures and the VDO is verified in the mouth. At that time, these methods can again be used to confirm the VDO before completion of the dentures.

4<sup>th</sup> Grade

# Prosthodontics

## Preparation of the Mouth to Receive a RPD

Evaluation of a patient's existing intraoral conditions for a removable partial denture prosthesis is an essential part of treatment planning.

The patient needs may be divided into the primary disciplines of dentistry: Surgery, Periodontics, Endodontics, Prosthodontics, and Orthodontics.

Surgically, the teeth, bone, and soft tissues should be evaluated to determine the need for surgical intervention.

Surgical considerations include:

- (1) Structurally compromised teeth that may require extraction,
- (2) Malposition or supraerupted teeth that may require extraction,
- (3) Enlarged tuberosity that may require soft - or hard - tissue reduction,
- (4) Exostoses and tori that may require removal or alveoloplasty, and
- (5) Displaceable tissue, hyperplastic tissue, or an epulis that may require excision.

The periodontal status of the patient should be evaluated with regard to periodontal disease and plaque control. Periodontal disease control should be initiated when appropriate prior to the initiation of the definitive prosthodontic treatment.

As part of the evaluation process of the remaining teeth, a decision should be made with regard to the appropriateness of salvaging teeth through the use of endodontics. For example, an extruded or supraerupted tooth may be saved from extraction through endodontic therapy, reduction of the occlusal surface to realign the tooth into the proper plane of occlusion, and a crown.

Evaluate the mouth from a prosthodontic perspective, including caries detection and identifying defective restorations, structurally compromised teeth, occlusal plane discrepancies, malocclusion, and need for modification. Occasionally teeth may need to have crowns placed to correct these problems. In addition, during the surveying process of treatment planning for removable partial denture design, teeth should be evaluated for

acceptable crown contours, and the need for enameloplasty to correct tooth contours, create rest seats, and develop guide planes.

Tooth modification may be both subtractive as well as additive.

In addition to the tooth modification discussed above, surveyed crowns may be fabricated from gold and metal ceramic materials that have the desired modifications incorporated in them.

Preparation of mouth for RPD. It forms the second phase of treatment, the term of mouth preparation includes all procedure done to modify the existing oral condition of the patient to facilitate proper placement and functioning of the prosthesis.

Preparation of mouth for RPD include two parts

1. Preprosthetic mouth preparation: - done to remove any hindrance into the prosthetic treatment. Also done along with diagnosis and treatment planning.
2. Preprosthetic mouth preparation: is done to facilitate prosthetic treatment and done after partial denture design.

#### PREPROSTHETIC PROCEDURES

- a. Relief of pain & infection.
- b. Oral surgical procedures.
- c. Conditioning of abused & irritated tissue
- d. Periodontal therapy.
- e. Correction of occlusal plane.
- f. Orthodontic correction.
- g. Splinting weakened teeth.
- h. Reshaping teeth.
- i. Preparation of rest and guiding planes

**The Relief of pain & infection**, the following condition should be treated in this phase of mouth preparation:

- Potential emergency condition like acute pain, abscess etc.
- Carious teeth with pain and discomfort.
- Asymptomatic teeth with deep carious lesions are excavated and filled with an intermediate restorative materials.

- Gingival disease like ANUG, AHGS, Gingival abscess etc.
- Calculus and plaque accumulation should be removed and preventive dental hygiene programs should be initiated and mentioned.

### **Oral surgical preparation.**

The longer the time between surgery and impression procedure, the more complete the healing and consequently the more stable the denture bearing area. A variety of oral surgical technique can prove beneficial to the clinician in preparing the patient for pre prosthetic replacements.

*The most common oral condition or changes in which surgical intervention indicated are:*

- Extraction of teeth with poor prognosis
- Removal of residual roots.
- Extraction of impacted teeth :All impacted teeth should be considered for removal .this applies equally to the impaction in edentulous area ,as well as to those adjacent to abutment teeth
- Severely mal posed teeth the loss of individual teeth or group of teeth may lead to extrusion, mesial drifting, or combinations of mal positioning of remaining teeth. In most instances the alveolar bone supporting extruded teeth will be carried occlusally as the tooth continues to erupt. Orthodontics may be useful in correction many occlusal discrepancies. But for some patients, such treatment may not be practical because of lack of teeth for anchorage of the orthodontics appliance or for other reasons. In such a situation individual teeth or groups of teeth and their supporting alveolar bone can be surgically repositioned. This type of surgery can be accomplished in an outpatient setting and should be given serious consideration.

## ***EXTRACTION OF TEETH***

- ❖ Planned extractions should occur early.
- ❖ Each tooth must be evaluated concerning its strategic importance and its potential contribution to the success of the RPD.
- ❖ The extraction of non-strategic teeth that would present complications or those whose presence may be detrimental to the design of the partial denture is a necessary part of the overall treatment plan.

### **Removal of Residual roots**

- Generally, all retained roots or root fragments should be removed .This is particularly true if they are in close proximity to the tissue surface or if there is evidence of associated pathology.
- Residual roots adjacent to abutment teeth may contribute to the progression of periodontal pockets and compromise the result from sub sequent periodontal therapy

### **Indication for extraction:-**

- a. Where teeth can complicate /compromise the treatment.
- b. Orthodontic treatment cannot correct mal alignment.
- c. When teeth interfere with placement of a major connector.



## ***Cyst and odontogenic tumor.***

The diagnosis may appear obvious from clinical and radiographic examinations the dentist should confirm that diagnosis through appropriate consultation and if necessary biopsy the area and submit the biopsy to pathologist.

## ***Exostosis and tori.***

Ordinarily the mucosa covering bony protuberance (Exostosis and tori) is extremely thin and friable. Patients' denture components in proximity to this type of tissue may cause irritation and chronic ulceration. Although



modification of denture design can, at time, accommodate for exostosis more frequently this result in additional stress to the supporting elements and compromised function. Surgical removal of tori bony exostosis can be done.

## ***Hyperplasic tissue.***

Hyperplasic tissues are seen in the form of fibrous tuberosity, soft tissue, fold of redundant tissue in the vestibule or floor of the mouth and palatal pappilomatosis. All these forms of excess tissue should be removed surgically .Always some form of surgical stent considered for these patients so that the period of healing will be more comfortable.



### ***Muscle attachment and freni***

As a result of the loss of alveolar bone height, muscle attachments may insert in or near the alveolar crest. The mylohyoid, buccinators, mentalis and genioglossus muscle are those most likely to introduce problem of this nature beside that the attachments of the muscles themselves, the mentalis and genioglossus muscles occasionally produce bony protuberance at their attachment that may also interfere with partial denture design. The comfort and function of the RPD can be enhanced through repositioning of attachment especially mylohyoid muscle however repositioning of genioglossus muscle is more difficult to reposition. The maxillary labial and lingual freni are more probably to most frequent source of frequent interference with denture design.

### ***Bony spine and Knife edge ridge***

Sharp bony spicules should be removed and knife like crest gently rounded. These procedures should be carried out with minimum bone loss if, however, the correction of a knife edge alveolar crest results in insufficient ridge support for the denture base, the dentist should restore the vestibular deepening for correction of the deficiency polyps, papillomas and All abnormal soft tissue lesions should be excised and submitted for pathologic examination before the fabrication of RPD.



### ***Hyperkeratosis, erythroplasia and ulceration***

All abnormal white, red, or ulcerative lesions should be investigated regardless of their relationship to proposed denture base framework.

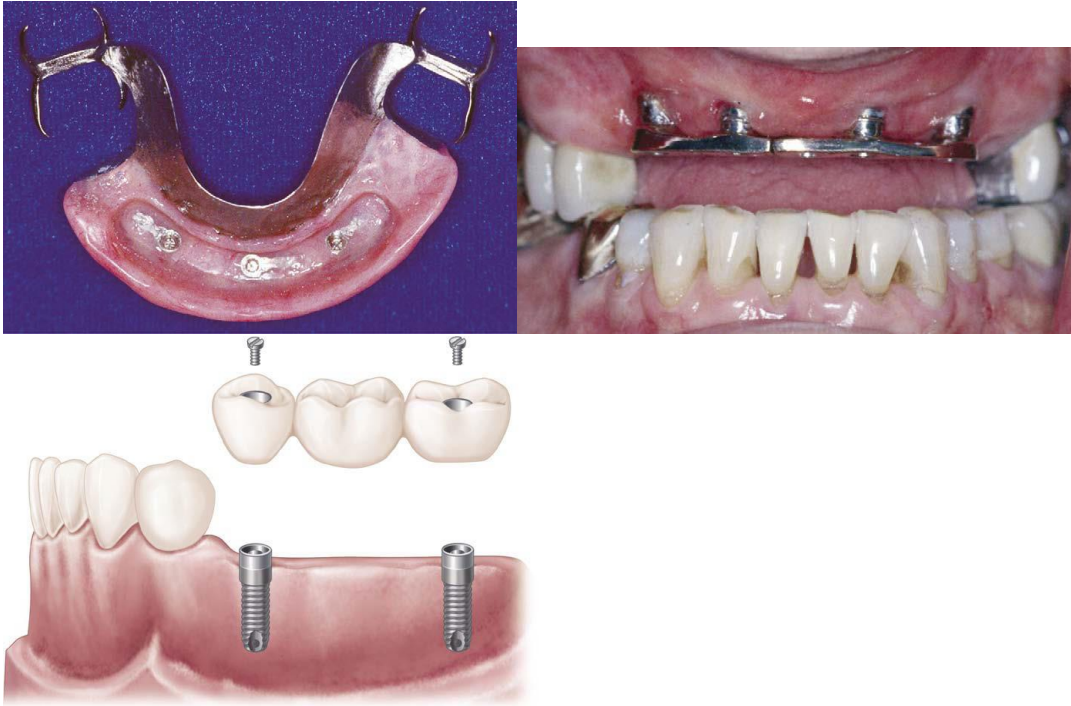
### ***Dentofacial-deformity***

A patient with Dentofacial deformity may have multiple missing teeth. Correction of the jaw deformity can simplify the dental rehabilitation. Surgical correction can be made in horizontal, sagittal or facial planes.

Mandible and maxilla may be positioned anteriorly or posteriorly, and their relationship to the facial planes may be surgically altered to achieve improved appearance. Replacement of missing teeth and development of a harmonious occlusion are very difficult in treating those patients

### ***Osseo integrated devices***

A number of implant device for replacement of teeth have been introduced. Titanium implant was designed to provide a direct titanium-to bone interface(Osseo integrated).The implant are placed using clean &controlled oral surgical procedure and are allowed to heal before surgical exposure and fabrication of a dental prosthesis.



### ***Augmentation of alveolar bone***

Hydroxyl appetite has been used as a material for augmentation of deficient alveolar bone, this material display a lack of toxicity and demonstrates no inflammatory or foreign body responses. This material provide increase in ridge width and height and also provide a matrix for new bone formation .it also non resorbable.

### ***Conditioning of abused and irritated tissues***

Should be treated before impression making → the tissue contour may change according to tissue healing.

### **Causes**

- a. ill-fitting dentures,
- b. nutritional disturbances,
- c. Diabetes
- d. Blood dyscrasia.

## Symptoms

- Inflammation and irritation of soft tissues in the denture bearing areas.
- Distortion of normal anatomical structures like incisive papillae, rugae, and retromolar pads.
- Burning sensation in the residual ridge, tongue, cheeks and lips

**These conditions are usually associated with ill-fitting or poorly occluded RPD. So these conditions should be treated before relining or making a new RPD.**



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 directions.

The conditioning procedure should be repeated until the supporting tissue display an undistorted and healthy appearance

### **Uses of tissue conditioning material**

These are elastopolymers that continue to flow for extended period of time permitting distorted tissue to rebound and assume their normal form, these materials apparently have a smoothing effect on irritated mucosa and because they are soft, occlusal forces are probably more evenly distributed

### **Periodontal preparation**

This procedure is over formed simultaneously with the oral surgical procedure It should completed before restorative procedure, because the success of this restoration depend on the health and integrity of the supporting structure of the remaining teeth .therefore ,the periodontal health of the teeth especially the abutments must be evaluated and corrective measures taken before RPD construction

### **Abutment teeth preparation**

After several steps of mouth preparation of RPD construction (surgery, periodontal treatment, endodontic and tissue conditioning). The abutment teeth may be prepared to provide support, stabilization. Reciprocation and retention for RPD.

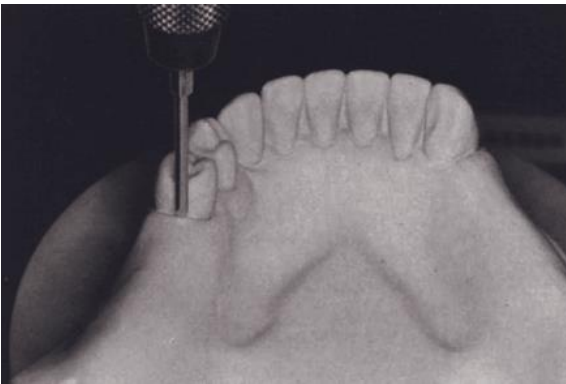
### **Classification of abutment teeth preparation**

- Those abutment teeth that require only minor modification to their coronal portion.

- Those that are to have restoration other than crowns.
- Those that are to have crowns.

**The sequences of abutment tooth preparation on sound enamel or existing restoration are as follow:-**

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



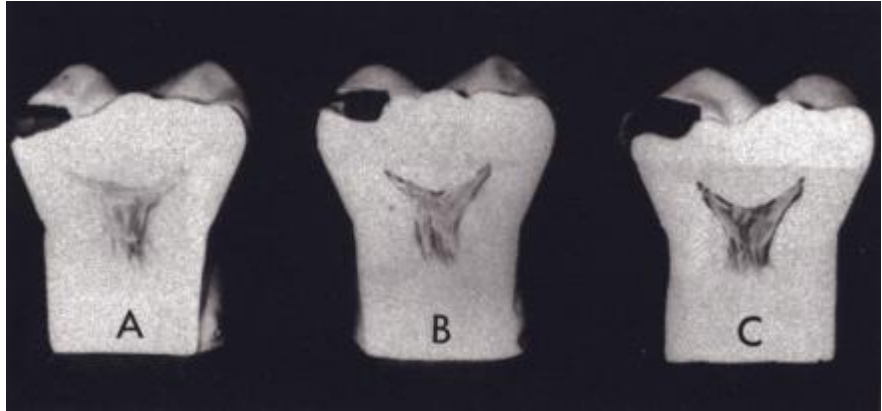
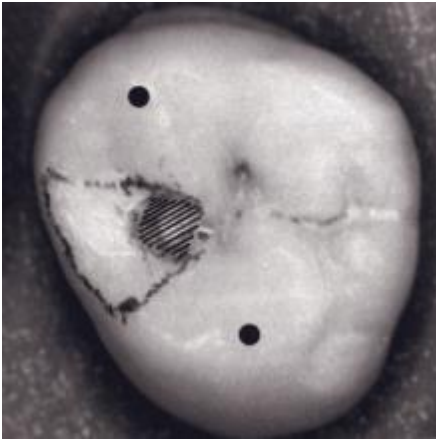
- tooth contours should be modified, lowering the height of contours so that:
  - The origin of circumferential clasp arm may be placed well below the occlusal surface, preferably at the junction of the middle and gingival thirds.
  - The retentive clasp terminals may be placed in the gingival third of the crown for better esthetic and better mechanical advantages.
  - Reciprocal clasp arm may be placed on and above a height of contour that is no higher than the cervical portion of the middle third of the crown. After alterations of axial contours are accomplished and before rest seat preparation are instituted, an impression of the arch should be made in an irreversible hydrocolloid and a cast poured in a fast setting stone. This cast can be returned to the surveyor to determine the adequacy of axial alterations before proceeding with rest seat preparation. If axial surface require additional axial recontouring. it

can be performed during the same appointment and without compromise.

- Occlusal rest areas should be prepared that will direct the occlusal force along the long axis of the abatement
- crown of the abatement teeth.

**The procedure of rest seat preparation on sound enamel surface:-**

- Round bur No.8 used to lower the marginal ridge and established the out line of the rest seat.
- Round bur No.6 used to slightly deepen the floor of the rest seat of the rest seat inside this lowered marginal ridge. This provides for an occlusal rest that satisfied the requirements that the rest be placed so that any occlusal force will be directed axially and that there will be the least possible interference to occlusion with the opposing teeth.
- The floor of the rest seat should incline toward 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 stand above the occlusal surface of the abutment tooth as little as possible and above interface with opposing teeth. Simultaneously sufficient bulk must be provided to prevent a weakness in the occlusal rest at the marginal ridge. The marginal ridge must be lowered and yet not be deepest part of the rest preparation. To permit occlusal stress to be directed toward the center of the abutment tooth, the angle formed by the floor occlusal rest with the minor connector should be less than 90 degree. In other ward the floor of the occlusal rest should incline slightly from the lowered marginal ridge toward the center of the tooth



a



b

The cingulum rest seat preparation requires a prominent cingulum. The preparation is a chevron or inverted " V " - shape mesiodistally (a), and a concave " V " - shape buccolingually (b).

