Diagnosis and treatment plan for R.P.D

Lecture: 1 د. محمد رياض

The purpose of dental treatment is to respond to a patient's needs, both the needs perceived by the patient and those demonstrated through a clinical examination and patient interview. This includes four distinct processes:

1- Understanding the patient's desires or chief complaints regarding their condition (including its history) through a systematic interview process .

2- Ascertaining the patient's dental needs through a diagnostic clinical examination.

3- Developing a treatment plan that reflect the best management of the desires and needs (with influences unique to their medical condition or oral environment).

4- Appropriately sequenced execution of the treatment with planned follow up.

The objectives of prosthodontic treatment:

1- The elimination of disease.

2- The preservation, restoration and maintenance of the health of the remaining teeth and oral tissues (which will enhance the removable partial denture design).

3- The selected replacement of lost teeth for the purpose of restoration of function in a manner that ensures optimum stability and comfort in an esthetically pleasing manner.

Diagnosis and treatment planning for oral rehabilitation of partially edentulous mouths must take into consideration the following:

1- Control of caries and periodontal disease.

2- Restoration of individual teeth.

3- Provision of harmonious occlusal relationships.

4- The replacement of missing teeth by fixed (using natural teeth and/or implants) or removable prosthesis. The dentist should follow a sequence that includes:

The dentist 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 experiences.

4- Patient expectations.

Oral examination:

A complete oral examination should precede any treatment decision . It should include a visual and digital evaluation of the teeth and surrounding tissue with **mouth mirror, periodontal probe and tweezer**. The teeth, periodontium and residual ridges can be explored by instrumentation and visual means. History and diagnosis charts (case sheet) should be filled out at this time. Visual examination will detect many of the signs of dental disease. Consideration of caries susceptibility is of primary importance. The number of restored teeth present, signs of recurrent caries and evidence of decalcification should be noted

The number of teeth remaining, the location of the edentulous areas, and the quality of the residual ridge will have a definitive bearing on the proportionate amount of support that the RPD will receive from the teeth and the edentulous ridges. Tissue contours may appear to present a well-formed edentulous residual ridges, 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 RPD cannot be supported adequately by tissue that is 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. Correlate any radiographic examination with the clinical findings to perform the final treatment plan which includes: surgical treatment, operative treatment, endodontic treatment, periodontal treatment and occlusal correction which very important step for final successful result.

The treatment plan for the removable partial denture, which is often the final step in a lengthy sequence of treatment should allow abutment teeth and other areas in the mouth to be properly prepared to support, stabilize and retain the removable partial denture (RPD). This means that diagnostic casts for designing and planning RPD treatment, must be made before definitive treatment is undertaken.

The diagnostic cast:

A diagnostic cast should be an accurate reproduction of all the potential features that aid diagnosis. these include:

1- the teeth locations, contours and occlusal plane relationship.

2- the residual ridge contour, size and mucosal consistency.

3- the oral anatomy delineating the prosthesis **extensions** (vestibules, retromolar pads, pterygomaxillary notch, hard and/or soft palatal junction, floor of the mouth and frenum).

After gathering together all the relevant information, the practitioner should perform:

1-survey

2-Design procedure.

3-Finally proper treatment plan should be performed and presented to the patient.

Periodontal consideration:

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 periodontal pockets. The ideal periodontal condition is a disease-free periodontium with adequate attached mucosa in regions at or adjacent to RPD component parts that cross the gingival margins to best resist the mechanical challenges posed because of function and use.

(Inadequate diagnosis and improper treatment plan may result in failure of removable partial denture).

Patient's psychology:

This is an important factor in dental treatment and it influences the difficulty of dental clinical treatment as well as the success or failure of treatment outcomes through the psychological cooperation with the patients.

Patients could be classified psychologically into four major categories:

1-Philosiphical patient :

these are mentally well adjusted and easy going. So they are the easiest to treat. These patients accept the responsibilities for having lost their teeth, also they understand that they have a role in maintaining their dental health and can be adjusted to any prosthesis that is reasonably designed and constructed. Finally it can be mentioned that these patient do not present a problems for the dentist.

2-Exacting patient :

these are precise in everything they do, they are immaculate in dress and appearance ,their nature is to be satisfied only by perfection. They are asking every step in details .so

do not promise these patients that they will wear a prosthesis without any inconvenience. These patient have high expectations and are difficult to treat. They require undivided attention, efforts and patience. The greatest advantage of these patients is when they are satisfied ,they become enthusiastic support of the dentist and valuable assets to dental practice .

3-Hystrical patient:

Theses patient must be recognized before any dental treatment in order to avoid highly unpleasant experience for both patient and dentist. These patients are extremely apprehensive. They tend to complain without justification. They do not accept responsibilities for any of their dental problems. Patient who are debilitating systemically or having psychiatric therapy are often included within this category.so adjunctive medical and psychiatric therapies may be useful with these patient .Finally unless the attitude of these patients are changed ,the probability of successful dental treatment is minimal.

4-Indifferent patient :

Also these patient present significant problems for the dentist. They are characterized by lacking of motivation or concern about existing oral condition .they tend to ignore instructions and tend to uncooperative .they may exhibit little concern about appearance and function .so unless these patient are taught to be appreciable about the importance of replacing their missing teeth and maintaining oral health ,the prognosis for dental treatment is poor.

Differential diagnosis: Fixed or removable partial denture?

Tooth-Bounded edentulous regions (Unilateral edentulous space):

Generally, any unilateral edentulous space bounded by teeth suitable for use as abutments should be restored with a fixed partial denture cemented to one or more abutment teeth at either end. The length of the span and the periodontal support of the abutment teeth will determine the required number of abutments. Unilateral tooth loss is sometimes inappropriately treated using a unilateral removable partial denture in place of a fixed partial denture. This type of prosthesis does not benefit from cross-arch stabilization and places excessive stress on abutment teeth. Possibly more importantly, there is a significant risk for aspiration if such a prosthesis is dislodged during use. For these reasons, use of the unilateral RPD is strongly discouraged.

There are two specific contraindications for the use of unilateral fixed restorations:

1- Long edentulous span with abutment teeth that would not be able to withstand the trauma of nonaxial occlusal forces.

2- Abutment teeth that exhibit reduced periodontal support because of periodontal disease that would benefit from cross-arch stabilization.

In either situation a bilateral removable restoration can be used more effectively to replace the missing teeth.

To replace unilaterally missing molars with a RPD necessitates use of a distal extension prosthesis.

Indications for removable partial denture (RPD):

1- Distal extension situations:

Replacement of missing posterior teeth is often best accomplished with a RPD, especially when implant treatment is not feasible for the patient. The exception to this includes situations of replacement of unilaterally missing molars (shortened dental arch) in which the replacement of missing second (and third) molars is either inadvisable or unnecessary or in which unilateral replacement of a missing first molar can be accomplished by means of a multiple- abutment cantilevered fixed restoration or an implant-supported prosthesis. A cantilever fixed prosthesis is most applicable if the second molar is to be ignored, then only first molar occlusion need be supplied by using a cantilever- type fixed partial denture.

2- After recent extractions:

Tissue changes are inevitable following extractions, the replacement of teeth after recent extractions often cannot be accomplished satisfactorily with a fixed restoration. When relining will be required later or when a fixed restoration using natural teeth or implants will be constructed later, a temporary RPD can be used. If an all-resin denture is used rather than a cast framework RPD, the immediate cost to the patient is much less, and the resin denture lends itself best to future temporary modifications.

3-Long span:

A long 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. However, in the absence of cross- arch stabilization, the torque and leverage would be excessive on

the two abutment teeth. Instead, a removable denture that derives retention, support and stabilization from abutment teeth on the opposite side of the arch is indicated as the logical means of replacing the missing teeth. The fixed partial denture on a long span edentulous space may require many abutment teeth to be prepared.

4- Need for effect of bilateral stabilization :

In a mouth weakened by periodontal disease, a fixed restoration may jeopardize the future of the involved abutment teeth unless the multiple –abutment splinting effect is used. The RPD on the other hand, may act as a periodontal splint through its effective cross-arch stabilizing of teeth weakened by periodontal disease .A RPD for a CLIII arch is better supported and stabilized when a modification space on the opposite side of the arch is present, it will provide better cross-arch stabilization and a simpler design for the RPD. A fixed partial denture need not be used to restore such an edentulous area because its inclusion may simplify the design of the RPD.

5- *Excessive loss of residual bone:*

The pontic of a fixed partial denture must be correctly related to the residual ridge and in such a manner that the contact with the mucosa is minimal. Whenever excessive resorption has occurred, teeth supported by a denture base may be arranged in a more acceptable bucco-lingual position than is possible with a fixed partial denture.

6- Unusually sound abutment teeth:

Sometimes the reasoning for making a removable restoration is the desire to see sound teeth preserved in their natural state and not prepared for restorations. If this decision is made because it is felt that no tooth modification is necessary for RPD, then the prosthesis will lack tooth derived stability and support. When this condition exists, the dentist should not hesitate to reshape and modify existing enamel surfaces to provide proximal guiding planes, occlusal rest areas, optimum retentive areas and surfaces on which nonretentive stabilizing components may be placed.

7- Abutments with guarded prognosis:

If the prognosis of the abutment tooth is questionable, or if it becomes unfavorable during treatment, it might be possible to compensate for its impending loss by a change in denture design. The questionable or condemned tooth or teeth may then be included in the original design, and if subsequently lost, the RPD can be modified or remade. Most RPD designs do not lend themselves well to later addition, although this eventuality should be considered in the design of the denture.

8- Economic considerations:

Ultimately, the choice of treatment must meet the economic limitations and personal desires of the patent. Economics should not be the sole criterion in arriving at a method of treatment. When for economic reasons, complete treatment is out of the question and yet replacement of missing teeth is indicated, the restorative procedures dictated by these considerations must be described clearly to the patient as a compromise and not representative of the best that modern dentistry has to offer. A prosthesis that is made to satisfy economic considerations alone may provide only limited success and result in more costly treatment in the future.

PROSTHODONTIC

المرحلة الرابعة
د.محمد رياض

Lec: 1

Preparation of mouth for RPD

Preparation of mouth for RPD is a fundamental to successful RPD service. It is an important procedure since it prescribes that the prosthesis must not only replace what is missing , but must also preserve the remaining tissue and structure that will enhance the partial denture.
The steps for RPD construction are:

1- Diagnosis and treatment plane.
2- Preparation of mouth for RPD.
3- Impression procedure for RPD.
4- Occlusal relationship for RPD.
5- Trial stage.
6- Initial placement, adjustment and servicing of RPD.

Mouth preparation includes procedures in three categories:
1- Oral surgical preparation.
2- Periodontal preparation of abutment teeth.
3- Preparation of abutment teeth.

The objectives of mouth preparation:

1- To return the mouth to optimum health.
2- To eliminate any condition that would be detrimental to the success of the partial denture.

All mouth preparation must be completed before the final impression procedures; oral surgical and periodontal procedures should precede abutment tooth preparation and should be completed far enough in advance to allow for a good healing period.

Oral surgical preparation:

The longer the time between surgery and impression procedure, the more complete healing and consequently the more stable denture bearing area, the most common oral conditions or changes in which surgical intervention indicated are:

1-Extraction:

Planned extractions should occur early in the treatment regimen, but not before a careful and thorough evaluation of each remaining tooth in the dental arch. 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 over all treatment plan.

2-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 evidence of associated pathology.
Residual roots adjacent to abutment teeth may contribute to the progression of periodontal pockets and compromise the result from subsequent periodontal therapy.

3-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.

4-Malposed teeth:

The loss of individual teeth or group of teeth may lead to extrusion,mesial drifting, or combinations of malpositioning of remaining teeth. In most instances the alveolar bone supporting extruded teeth will be carried occlusaly 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 orthodontic appliance or for other reasons. In such a situation individual tooth or group of teeth and their supporting alveolar bone can be surgically repositioned. This type of surgery can be accomplished in an out patient setting and should be given serious consideration.

5-Cyst and odontogenic tumor:

It is necessary to take panoramic radiographs to survey the jaws for unsuspected pathology. If a suspicious area is noticed, then a periapical film should be taken to confirm the presence of any lesion. The dentist should confirm that diagnosis through appropriate consultation and if necessary biopsy the area and submit the biopsy to pathologist.

6-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.

7-Hyperplastic tissue:

Hyperplastic tissues are seen in the form of fibrous tuberosity, soft flabby ridges, folds of redundant tissue in the vestibule or floor of the mouth and in the palatal papillomatosis. All these forms of excess tissues should be removed to provide a firm base for the denture. Hyperplastic tissue can be removed with any preferred combination of scalpel, curette, electro surgery, or laser. Surgical tent should be considered so that the period of healing will be more comfortable.

8- Muscle attachment and freni:

As a result of the loss of the 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 enhanced through repositioning of attachment especially mylohyoid muscle, however repositioning of genioglossus muscle is more difficult to reposition. The maxillary labial and lingual frenia are the most common source of frenum interference with denture design.

9- 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.

10- Polyps, papillomas, and Traumatic Hemangiomas:

All abnormal soft tissue lesions should be excised and submitted for pathological examination before the fabrication of the RPD, even if those conditions were there for a long period of time, still the prosthesis may add new or additional stimulation to the area which may produce discomfort or even malignant drainages.

11- Hyperkeratosis, erythroplasia, and ulceration:

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

biopsy of areas larger than 5 mm should be done, and if areas over 2 cm multiple biopsies should be taken. The lesions should be removed and healing completed before RPD is fabricated.

12- Dentofacial deformity:

Patients with a dentofacial deformity may have multiple missing teeth. Correction of the jaw deformity can simplify the dental rehabilitation. Surgical corrections can be made in horizontal, sagital 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.

13- Osseointegrated devices:

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

14- 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 provides increase in ridge width and height and also provides a matrix for new bone formation. It is also non resorbable.

Conditioning of abused and irritated tissues:

Many partial denture patients may require conditioning of the supporting tissue in the edentulous area before the final impression. Those who need treatment are those who have the following symptoms:

1- Inflammation and irritation of the mucosa covering the denture-bearing area.
2- Distortion of the normal anatomical structures, such as incisive papillae, the rogue and the retro molar pads.
3- A burning sensation in the residual ridge area, the tongue, the cheeks and the lips.

These conditions are usually associated with ill-fitting or poorly occluded RPD. However, Nutritional deficiencies, endocrine imbalances, sever health problems and bruxism must be considered also. So these conditions should be treated before relining or making a new RPD.

The treatment procedure includes good home care by:

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

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.
Maximum benefit from using tissue conditioning material may be obtained by:

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

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

Periodontal preparation:

The periodontal preparation follows or is performed simultaneously with the oral surgical procedures. It should be completed before restoration procedures, because the success of this restoration depends on the health and integrity of the supporting structures 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 surgery, periodontal treatment, endodontic treatment and tissue conditioning of the involved arch, the abutment teeth may be prepared to provide support, stabilization, reciprocation and retention of the RPD.

PROSTHODONTICS

Lec: 3 **د.محمد رياض**

المرحله الرايعه

Impression Materials and Procedure for R.P.D

Most impression materials used in prosthetic dentistry could be classified as follows:

A-Rigid materials:

1- Impression plaster.
2- Metallic oxide paste.

B- Thermoplastic materials:

1- Modeling plastic.
2- Impression wax and resin.

C- Elastic materials:

1- Hydrocolloid:

a- Reversible hydrocolloid (Agar-Agar).
b- Irreversible hydrocolloid (Alginate).

2- Elastomers:

a- Mercaptan rubber base impression material.
b- Silicon impression material:
1) Condensation reaction silicon.
2) Addition reaction silicon.
c- Polyether impression.

A- Rigid Materials:

Those that get to a rigid consistency. They cannot be removed from the mouth without fracture in spite of the fact that these materials may be capable of recording tooth and tissue details accurately.

1- Impression plaster.

This material with introduction of elastic impression material has been completely replaced by elastic impression material.

2- Metallic oxide paste.

It is usually some form of zinc oxide eugenol combination, those are not used as primary impression materials and should not be used for impression that include the remaining natural teeth, they are also not to be used in stock impression tray.

Metallic oxide paste can be used as:

-secondary impression material for complete denture and for extension base edentulous ridge areas of RPD.
-it can be used with custom acrylic impression tray (special tray) which has been properly designed and attached to the partial denture framework.
-Also it can be used as impression for relining distal extension denture bases.

B- Thermoplastic materials: are those that become plastic at higher temperature and they resume their original form when temperature has been lowered. They cannot record minute details accurately because they undergo distortion during withdrawal from tooth and / or tissue undercuts.

1- Modeling plastic:

The most commonly used modeling plastic is the red material in cake form and the green stick form for use in border molding impression material. It is generally used only as a mean of building up the underside of the special tray before recording the tissue with some secondary impression material
.

2-impression wax and resin:

It is used in recording the edentulous area; also, it may be use d to correct the borders of impression made of more rigid materials

c- Elastic materials: are those that remain in an elastic flexible stat after they have been removed from the mouth. They are the only ones that can be

withdrawn from tooth and tissue undercuts without permanent distortion, forming the most suitable impression materials for recording the irregular contours of oral both hard and soft tissues. The elastic impression materials are most generally used for making impressions of partially edentulous arches, for cases of immediate dentures, fixed partial dentures, and crowns, and that is when tooth and tissue undercuts and surface details must be recoded with accuracy, where the introduction of hydrocolloids as impression materials was a long step forward in dentistry. These materials (elastic) permit the making of a one piece impression which does not require the use of a separating medium and an extremely accurate material if properly handled following instructions.

1- Hydrocolloid:

a- Reversible Hydrocolloid: (Agar-Agar)

1) It is fluid at high temperature and gel on reduction in temperature.
2) It is used as impression material for fixed restoration.
3) It demonstrates acceptable accuracy when properly used.
4) The border control of impression made with these materials is difficult.

b- Irreversible Hydrocolloid (alginate):

1) It is used for making diagnostic cast, orthodontic cast and master cast for RPD.
2) This material has low strength provide less surface details than other materials.
3) Dimensionally unstable, it can be used in the presence of moisture and it is hydrophilic.
4) Has good taste and odor and not toxic.

2- Elastomers:

a- Mercaptan rubber base impression materials

1) It can be used for RPD impression and especially used for altered cast impression.
2) The accuracy of Mercaptan rubber base impression exceeds that of properly made irreversible hydrocolloid impression, beside that the impression with the hydrocolloid impression materials need certain precaution that must be taken to avoid distortion of the impression.

3) Other advantages over hydrocolloid impression materials are that the surface of an artificial stone poured against them is of a smoother and harder than one poured against hydrocolloid material.

The difference between the two types of hydrocolloids (Agar and alginate) is:

A) Agar changes from the gel to a solution by application of heat. This could be reversed or converted to gel form by a reduction in temperature, such a physical change is reversible.

B) Alginate become a gel through a chemical reaction as a result of mixing the alginate powder with water, here such a physical change is irreversible.

Disadvantages of Agar:

1- It must be introduced into the mouth while warm enough to become a solution to be converted into an elastic gel on cooling. Thus there's an ever-present danger of burring the oral or mouth tissues.

2- It requires warming and tempering equipment, thermo-plastically controlled necessating the use of water –jacketed impression trays for cooling.

Note: All hydrocolloids are dimensionally stable for only a brief period after removal from the mouth.

Alginate impression material:

The present alginate (irreversible hydrocolloid impression material) was developed as a substitute for the agar impression material when its supply became scarce during World War II. This material is based on a natural substance extracted from certain brown seaweed. The substance is called (alginic acid).The general use of alginate far exceeds that of other impression materials available today. The principal factors responsible for the success of this type of impression material are that: it is easy to manipulate, comfortable for the patient and relatively inexpensive since it does not require elaborate equipment. Most alginate impression materials are not capable of reproducing the finer details that are observed in impressions with other elastomeric impression materials. Nevertheless, alginate

materials are sufficiently accurate that they can be used for making impressions for removable partial dentures.

Biocompatibility:

No known chemical or allergic reactions are associated with hydrocolloid impressions. But inhaling fine airborne particles from alginate impression material can cause silicosis and pulmonary hypersensitivity, therefore dustless alginate is preferred to minimize this risk.

Composition:

1- **Soluble alginates:** The chief active ingredient of the alginate impression material is one of the soluble alginates such as sodium, potassium or triethanolamine alginate. When the soluble alginates are mixed with water, they form a solution quite readily.
2- **Diatomaceous earth:** is to act as a filler to increase the strength and stiffness of the alginate gel, to produce a smooth texture, and to ensure the formation of a firm gel surface that is not tacky. It also aids in forming the solution by dispersing the alginate powder particles in the water.
3- **Zinc oxide:** also acts as filler and has some influence on the physical properties and setting time of the gel.
4- **Calcium sulfate dihydrate:** is generally used as the reactor.
5- **Sodium phosphate:** is added as a retarder to control the setting time.
6- **Fluoride:** such as potassium titanium fluoride, is added as an accelerator for the setting of the stone to be poured in the impression to ensure a hard and dense cast surface.

Formula for the powder component of an alginate impression material:

Component	Function	Weight percentage
Potassium alginate	Soluble alginate	15
Diatomaceous earth	Filler particles	60
Zinc oxide	Filler particles	4
Calcium sulfate dihydrate	Reactor	16
Sodium phosphate	Retarder	2
Potassium titanium fluoride	Accelerator	3

Step by step procedure for Making a Hydrocolloid Impression:

1) Select a suitable, sterilized and sanitary rim-lock or perforated impression tray that is large enough to provide 4-5mm border thickness of the impression materials.

2) Build up the palatal portion of the maxillary or upper tray with wax or modeling compound thus ensuring an ever distribution of the impression material from slumping away from the palatal surfaces. If gelation occurs near to the tissues while the deeper portions are still fluid, a distorted impression of the palate may result which cannot be detected in the finished impression, this may result in the major connector of finished casting not being in contact with the underlying tissues, a maxillary tray has got to be extended posterior to include the tuberosities and the vibrating line region of the palate.

3) The lingual flange of the mandibular trays has got to be lengthened with wax in the retromylohyoid area or to be extended posteriorly, also wax

may need to be added inside the dislolingual flange to prevent the tissues of the floor of the mouth from rising inside the tray.

4) The patient should be placed in an upright position with the involved arch nearly parallel to the floor.

5) The first step of manipulation is to prepare a proper mixture of water and powder (alginate), the measured amount of water about (70 F) should be added into a clean, dry rubber mixing bowl of about (600mml) capacity.

6) The measured powder is sifted into the premeasured water that has already been poured into the rubber bowel. The powder is incorporated into the water by carefully mixing with a metal or plastic spatula that is sufficiently flexible to adapt well to the wall of the mixing bowl. The water is added first to wet the mixing bowl and to ensure complete wetting of powder particles. If the powder is placed first in the mixing bowl, penetration of the water to the bottom of the bowl is inhibited and greater mixing time may be required to ensure a homogeneous mixture. Care should be taken to avoid incorporating air into the mixture. A vigorous figure-8 motion is best, with the mixture being swiped or stropped against the sides of the rubber –mixing bowl with intermittent rotations (180˚) of the spatula to press out air bubbles. All of the powder must be dissolved. Such a procedure (mixing time) should be accomplished within 45 sec to 1min. The result should be a smooth, creamy mixture that does not readily drip off the spatula when it is raised from the bowl. Clean equipment is important because many of the problems and related failures are attributed to dirty or contaminated mixing or handling devices. Contaminants such as small amounts of

gypsum left in the bowl from a previous mixture of plaster or stone can accelerate the set. It is best to use separate bowls for mixing alginate and stone.

Controlling the setting time: In the clinical setting, it is tempting to alter the setting time by changing the water/powder ratio or the mixing time. The clinician, however, can safely influence the setting time by altering the temperature of the water. It is evident that the higher the temperature, the shorter is the setting time (1 min reduction in setting time occurs for each 10˚ C of temperature increase). The temperature of the mixing water should be controlled carefully within a degree or two of a standard temperature (usually 20˚ C) so that a constant and reliable setting time can be obtained. In hot weather, special precautions should be taken to provide cool water for mixing so that premature gelation does not occur. It may even be necessary to precool the mixing bowl and spatula, especially when small amounts of impression material are to be mixed. The patient should rinse his mouth with cool water to dominate the excess saliva while the impression material is being mixed and loaded into the tray.

7) During placement of the material in the tray, try to avoid any entrapping of air. The first layer of the material should lock into the tray perforations thus preventing any possible dislodgement during gelation.

8) Quickly rub some of the remaining impression material after loading the tray into some critical areas with your finger such as the rest preparation, abutment teeth, the distolingual surface near the retromolar pad in the

lower arch, when an upper impression is being made, placing some of this materials in the highest aspect of the palate and over the rugae area.

9) Using a mouth mirror or with your index finger try to retract the cheek away from your side, as the tray is being rotated into the mouth from near side.

10) Seating the tray should be from the side away from you first, next on the anterior area, during which the lip is being retracted and then on the near side making sure that the lip is dropping naturally over the tray.

11) Don't ever seat the tray too deeply thus leaving a room for the material thickness that is necessary for the occlusal and incisal surfaces.

12) Try to hold the tray without any movement, immobile and stable for about 3min with light finger pressure over the left or right premolar areas, here the patient should be introduced an avoiding any movement during gelation, thus avoiding internal stresses which may arise in the finished impression, never let the patient or the assistant to hold the tray instead of you in position; some movement of the tray is inevitable during the transfer and at the critical time of gelation, movement will Produce an inaccurate impression. Don't remove the impression from the mouth till the impression material has completely set. The alginate impression should not be removed from the mouth for at least 3 minutes after gelation has occurred, it has been shown that if the impression is held for 6 to7 minutes after gelation rather than 3 minutes, significant distortion may result.

13) Releasing the surface tension, to remove the impression with a quick action in the line along the long access of the teeth, thus avoiding tearing

or any other distortion. Usually the alginate impression does not adhere to the oral tissues as strongly as do some of the non-aqueous elastomers, so it is easier to remove the alginate impression rapidly. However, it is always best to avoid torqueing or twisting the impression in an effort to remove it quickly. Specifically, the handle should be used minimally during breaking of the air seal (suction) or removing the tray from the teeth.

14) Rinse the impression free of saliva with slurry water, after the impression is rinsed thoroughly, the disinfectant can be sprayed liberally on the exposed surface. The impression is then wrapped immediately in a disinfectant-soaked paper towel and placed in a sealed plastic bag for 10 minute. Finally the wrapped impression is removed from the bag, unwrapped, rinsed, and shaken to remove excess water. The impression is then poured with the stone of choice. Since the alginate impression must be poured within a short time after removal from the mouth, the disinfection procedure should be relatively rapid to prevent dimensional change. A cast should be poured immediately into the hydrocolloid impression to avoid dimensional changes and syneresis when pouring is delayed for one reason or another, where it should not exceed 15 minutes.

Note: Alginate impression materials are hydrophilic, so moist tissue surfaces are not a problem.

Precautions to be observed in the handling of hydrocolloids:

1- An impression should not be exposed to air, because these materials rapidly lose water which will result in shrinkage and dimensional changes.

2- Such impression should not be immersed in water because they will imbibe water with an accompanying swelling and dimensional changes.

3- Impressions should be placed in a humid atmosphere or wrapped with a damp cloth until pouring into a cast thus preventing dehydration; this pouring should be within 15 min after removal from the mouth.

4- The exudates from hydrocolloid, has got a retarding effect on the chemical reaction of gypsum products resulting sometimes in a chalky cast surface. This can be prevented by:

A) Pouring the cast immediately.

B) First immersing the impression in a solution of accelerator (accelerator for gypsum product setting) such as 2% solution of potassium sulfate (K_2SO_4) for 5-10 min, before the cast is poured.

Step by step Procedure for Making a Stone Cast from a Hydrocolloid Impression:

1- The measured dental stone at hand, pour the measure of water into a mixing bowel and adding the measure of stone, spatulate thoroughly for 1min; where mechanical spatulation is preferred.

2- The hydrocolloid impression material may require a (fixing solution), such a procedure should be made before pouring the cast, remove the damp cloth or the impression from the fixing solution, gently shake-out any moisture, holding the impression over the vibrator with the impression side up, and only the handle of the tray contacting the vibrator,

the impression material may not be placed in contact with the vibrator because of possible distortion.

3- With small spatula add the material to the distal area away from you. Allow this material to be vibrated around the arch from tooth to tooth towards the anterior part of the impression; continue to add more material, thus avoiding any air entrapment. The weight of the casting material causing any excess water to be pushed around the arch and to be expelled ultimately at the opposite end of the impression, discard this fluid material, after filling the impression of all the teeth, continue to add stone in larger portions until impression is completely filled.

4- The filled impression should be placed on a support jig where the base of the cast is to be completed with the same stone mix. The base should be 16-18mm at its thinnest portion and should be extended beyond the borders of the impression so as to record buccal, labial and lingual borders in the finished cast.

5- As soon as the cast has been formed with sufficient body, trim the gross excess (from the sides of the cast with a wet paper towel) until the initial set of the stone has taken place, thus the impression is prevented from losing water through evaporation which may in turn deprive the cast material of sufficient water cast for crystallization. Chalky cast surface around the teeth are often the result of the hydrocolloids acting as a sponge and robbing the cast material of its necessary water for crystallization.

6- After the cast and impression have been placed in the humid atmosphere and for about 30min; separate the impression from the cast. These 30 min, are just enough for the initial setting.

7- Clean the impression immediately while the impression material is still elastic.

8- The trimming of the cast should be postponed until the final setting occurred.

Possible Causes of an inaccurate cast of a Dental Arch:

1- Distortion of the hydrocolloid impression.

a) By partial dislodgement from tray.

b) By shrinking caused by dehydration.

c) By expansion caused by imbibitions, this occurs towards the teeth and result in an undersized cast.

2- A ratio of water to powder that is too high, while this may not cause volumetric changes in the size of the cast, resulting in a weak cast.

3- Improper mixing, resulting in a weak cast or cast with a chalky surface.

4- Trapping of air, either in the mix or in pouring, because of insufficient vibration.

5- Soft or chalky cast surface resulting from retarding action of the hydrocolloid or the absorption of necessary water for crystallization by the dehydrating hydrocolloid.

6- Premature separation of the cast from the impression.

7- Failure to separate cast from the impression for an extended period of time.

The mucinous exudate has got a retarding effect on any gypsum material resulting in a soft (easily abraded) or chalky cast surface. It's developed due to **syneresis.**

PROSTHODONTICS

Lec: 4

دمحمد رياض المرحله الرابعه

Occlusal relationship for RPD:

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

The establishment of the satisfactory occlusion for the partial denture patient should include the following:

1- An analysis of the existing occlusion.

2- The correction of the existing occlusal disharmony.

3- The recording of the centric relation or adjusted centric relation.

4- The recording of eccentric jaw relation for functional eccentric occlusion.

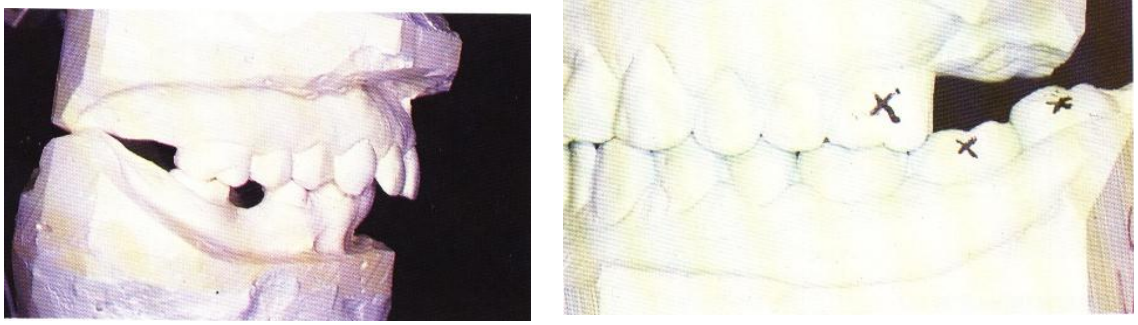
5- The correction of occlusal discrepancies created in processing the denture.

Methods for Establishing Occlusal Relationships:

The recording of occlusal relationship for the partially edentulous arch may vary from the simple opposition of opposing casts by occluding sufficient remaining natural teeth to the recording of jaw relations in the same manner as for a completely edentulous patient.

1- Direct opposition of casts:

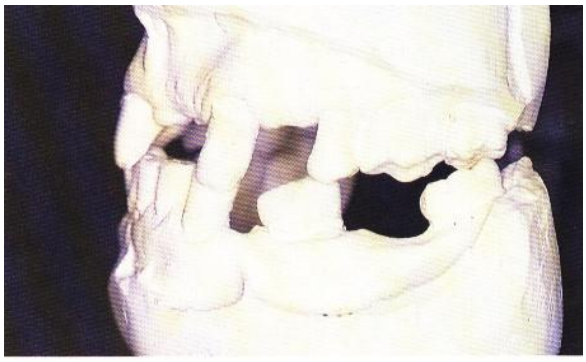
This is used when there are sufficient teeth remaining in contact to make the existing jaw relationship obvious and when only a few teeth are to be replaced on short denture bases; in this method opposing casts may be occluded by hand. The occluded casts are held in position with wire nails attached with sticky wax to the bases of the casts until they are securely mounted on the articulator, (see figure-1-).



(Figure-1-)

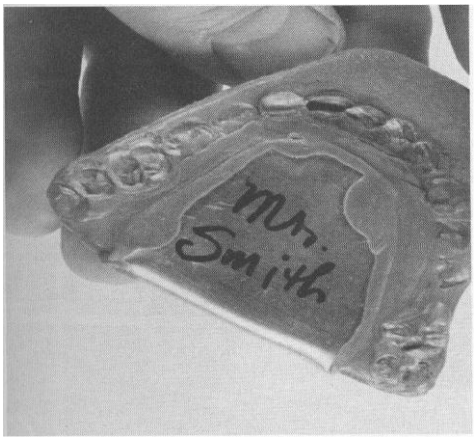
2- Inter-occlusal record with posterior teeth remaining:

This second method is a modification of the first one, is used when sufficient teeth remain to support the partial denture (kennady class III) but the relation of opposing teeth does not permit the according of casts by hand, see (figure-2-).



(Figure-2-)

In such situation jaw relations must be established as for fixed restorations using some type of interocclusal record. The least accurate is the interocclusal wax record, see (figure-3-).

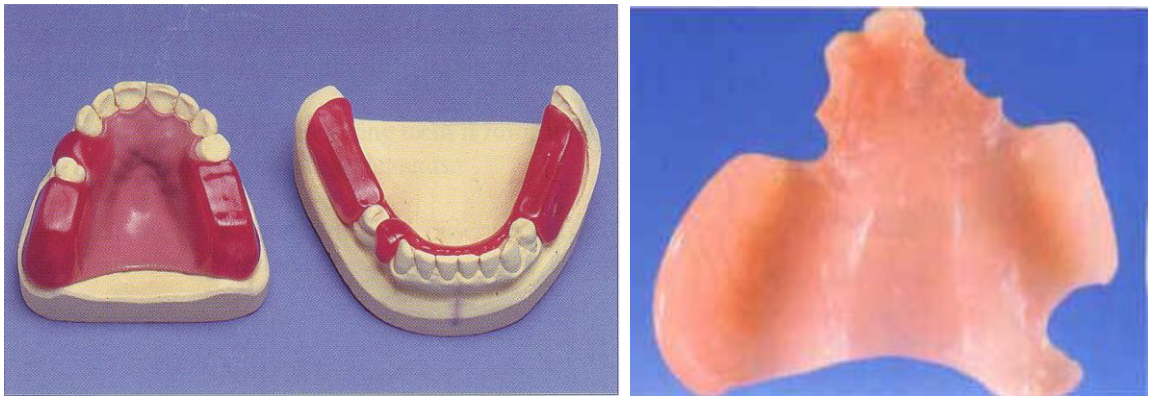


(Figure-3-)

A definite procedure for making interocclusal wax record: a uniformly softened, reinforced wafer of impression wax is placed between the teeth and the patient is guided to close in centric relation. Correct closure should have been rehearsed before placement of the wax so that the patient will not hesitate or deviate in closing. The wax is removed and chilled immediately in room temperature water and should be replaced again to correct the distortion from chilling, all excess wax is removed with a sharp knife; all wax contacting mucosal surface should be trimmed free of contact, the wax record is then corrected with an impression paste that is hard enough, first the opposing teeth and patient's lips and dentist fingers are lightly coated with petroleum jelly, the impression paste is then mixed and applied to both sides of the metal reinforced wax record, it is quickly placed and the patient is assisted with closing guided by the previous wax record. The corrected wax record is removed and inspected, any excess is removed.

3- Occlusal relation using occlusion rims on record bases:

A third method is used when one or more distal extension areas present, when a tooth bounded edentulous space is large, or when opposing teeth do not meat. In these instances occlusion rims on accurate jaw relation record bases must be used, see (figure-4-A). Accurate bases are used to help support the occlusal relationship, see (figure-4-B). Shellac bases may be adapted to the casts and then corrected with eugenole paste. Record bases also may be made entirely of auto polymerizing resin. Those materials used in dough form lack sufficient accuracy for this purpose unless they are corrected by relining.



A (Figure-4-) B

Methods for Recording Centric Relation on Record Bases:

There are many ways by which centric relation may be recorded when record bases are used the least accurate is the use of softened wax occlusion rims. Modeling plastic occlusion rims may be uniformly softened by flaming and tempering, resulting in a generally acceptable occusal record, this method is time proved and accurate, when wax occlusion rims are used they should be reduced in height until just out of occlusion, see (figure-5-A).

A (Figure-5-) B

A single stop is then added to maintain its terminal position while a jaw relation record is made in some uniformly soft material which sets to a hard state like quick-setting impression plaster, bite registration paste or auto polymerizing resin may be used, with any of these materials opposing teeth must be lubricated to facilitate easy separation, see (figure-5-B). Whatever the recording medium it must permit normal closure into centric relation without resistance and must be transferable with accuracy to the casts for mounting purposes. Some mention must be made of the ridge on which the record bases are formed, if the prosthesis is to be tooth supported or a distal extension base is to be made on the anatomic ridge form, the bases will be made to fit that form of the residual ridge, but if a distal extension basis to be supported by the functional form of the residual ridge it is necessary that the recording of jaw relations be deferred until the master cast has been corrected to that functional form. Record bases must be as nearly identical to those of the finished prosthesis. Jaw relation record bases are useless unless they are made on the same cast to which the denture will be processed or duplicate.

4- Jaw relation records made entirety on occlusion rims

The forth method is used when no occusal contact exists between the remaining natural teeth such as when an opposing maxillary complete denture is to be made concurrently with a mandibular partial denature, see(figure-6-A).

A (Figure-6-) B

It may also be used in those rare situations in which the few remaining teeth do not occlude and will not influence eccentric jaw movements, jaw relation records are made entirely on occlusion rims when either arch has only anterior teeth present, see (figure-6-B). In any of these situations jaw relation records are made entirely on occlusion rims. The occlusion rims must be supported by accurate jaw relation record bases. Here the choice of method for recording jaw relations is much the same as that for complete dentures. As with complete denture fabrication, the use of a face bow, the choice of articulator, the choice of method for recording jaw relations and the use of eccentric positional records are optional based on the training ability and desires of the individual dentist.

5- Establishing occlusion by recording of occlusal pathways:

This fifth method involves the registration of the occusal relation by occusal pathways and the use of an occluding template rather than a cast of the opposing arch. A functional occusal record is used and the teeth that are set are modified to accept every recorded eccentric jaw movement. This is different from a static jaw relation record when it's used with or without eccentric articulatory movement, where the artificial teeth are arranged to occlude according to a specific concept of occlusion.

Establishing jaw relation for a mandibular RPD opposing a maxillary complete Denture:-

The maxillary denture may already be present or it may be made concurrently with the opposing partial denture, the establishment of jaw relations in this situation may be accomplished by one of several previously outlined methods.

If an existing maxillary complete denture is satisfactory and the occusal plane is oriented to an acceptable anatomic, functional and esthetic position then the complete denture need not be replaced and the opposing arch is treated as an intact arch as though natural teeth were present. A face-bow transfer is made of that arch and the cast mounted on the articulator in the usual manner. Maxilla- mandibular relation may be recorded on accurate record bases attached to the mandibular RPD framework using one of the recording mediums previously outlined. Centric relation is thus recorded and transferred to the articulator. Eccentric records can then be made to program the articulator. Too often one sees a maxillary denture with posterior teeth arranged close to the residual ridge without regard for the interarch

relationship and with an occusal plane that is too low. Usually, however, a new maxillary denture must be made concurrently with the mandibular RPD, and jaw relations may be established in one of two ways:

1- If the mandibular RPD will be tooth supported, or if there is lower fixed PD, the mandibular arch is completely restored first and jaw relations are established as they would be to a full complement of opposing teeth. Thus the maxillary C.D. is made to occlude with an intact arch.

2- The mandibular RPD may have one or more distal extension bases. The situation then requires that the occlusion be established on both dentures simultaneously.

After making final impressions, which include the corrected mandibular cast impression to establish optimal support for the basis of the P.D. (the denture framework must be made previously), the maxillary occlusion rim is contoured, occlusal vertical relation with the remaining lower teeth is established, and a face bow transfer of the maxillary arch is made. The maxilla-mandibular relations may be recorded by anyone of the several methods previously outlined and the articulator mounting completed. Occlusion may be established as for complete dentures, taking care to establish a favorable tooth - to- ridge relationship in both arches, an optimum occlusal plane and cuspal harmony between all occluding teeth. After try-in both dentures may be processed concurrently and remounted for occusal correction, or the RPD may be processed first. After the dentures are completed and remounted, the teeth- still in wax on the complete denture- are adjusted to any discrepancies occurring.

PROSTHODONTICS

Lec: 5

دمحمد رياض المرحله الرابعه

Factors affecting support in Free end extension RPD:-

In a tooth- supported removable partial denture, a metal base or the framework that supports an acrylic resin base is connected to and is part of a rigid framework that permits the direct transfer of occlusal forces to the abutment teeth through the occlusel rests. Even though the denture base of a tooth-supported (Kennedy Class III) Partial denture supports the supplied teeth; the residual ridge beneath the base is not called on to aid in the support of the removable partial denture. Regardless of the length of the edentulous spans, if the framework is rigid, the abutment teeth are sound enough to carry the additional load, and the occlusal rests are properly formed, support comes entirely from the abutment teeth at either end of that span.

Distal Extension Removable Partial Denture:-

The distal extension removable Partial denture does not have the advantage of total tooth support, because one or more bases are extension covering the residual ridge distal to the last abutment. It therefore is dependent on the residual ridge for a portion of its support.

Factors influencing the support of a distal extension base:

Support from the residual ridge becomes more important as the distance from the last abutment increase and will depend on the following several factors:-

1) Contour and quality of the residual ridge.

2) Extent of residual ridge coverage by the denture base.

3) Type and accuracy of the impression registration.

4) Accuracy of the fit of the denture base.

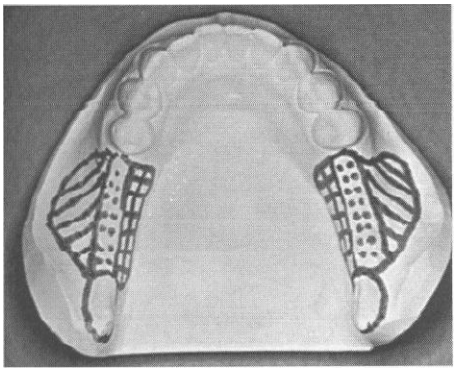
5) Design of the Partial denture framework.

6) Total occlusal load applied.

1) Contour and quality of the residual ridge:-

The ideal residual ridge to support a denture base would consist of cortical bone that covers relatively dense cancellous bone, a broad flat crest with high vertical slopes, and covered by firm, dense, fibrous connective tissue. Such a residual ridge would optimally support vertical and horizontal stress placed on it by denture bases. Unfortunately this idea is seldom encountered. Easily displaceable tissue will not adequately support a denture base, and tissues that are interposed between a sharp bony residual ridge and a denture base will not remain in a healthy state. Not only must the nature the bone of the residual ridge be considered in developing optima support for the denture base, but also its positional relation to the direction of forces that will be placed on it.

The crest of the bony mandibular residual ridge is most often cancellous in nature. Because lining mucosa restricts both the buccal and lingual mucosa adjacent to teeth in mandible, loss of firm mucosa overlying the residual ridge is common following tooth extraction in the posterior mandible. Pressures placed on tissue overlying the crest of the mandibular residual ridge usually results in irritation of these tissues. Therefore the crest of the mandibular residual ridge cannot be a primary stress-bearing region. The buccal shelf region (bounded by the external oblique line and crest of the alveolar ridge) seen to be better suited for a primary stress-bearing role because it is covered by relatively firm, dense, fibrous connective tissue supported by cortical bone. In most instances this region bears more of a horizontal relationship to vertical forces than do other regions of the residual ridge. The slops of the residual ridge then would become the primary stress-bearing regions to resist horizontal and off-vertical forces. (Figure-A-)

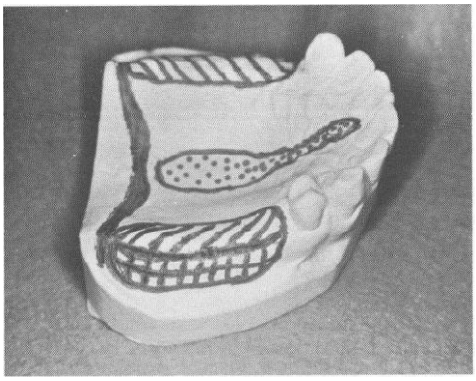


(Figure -A-)

Dotted portion outlines crest of residual ridge, which should be recorded in its anatomic form in impression procedures. Similarly retro molar pads should not be displaced by impression. Buccal shelf regions (diagonal lines) serve as primary support and therefore selected additional pressures may be placed on these regions for vertical support of

denture base. Lingual slops 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.

The immediate crest of the bone of the maxillary residual ridge may consist primarily of concellous bone. Oral tissues that overlie the maxillary residual alveolar bone are usually of firm dense nature. The crestal area of the residual ridge will become the primary stress-bearing area to vertically directed forces. Some resistance to these forces may be obtained by the immediate buccal and lingual slopes of the ridge. Palatal tissues between the medial palatal raphe and the lingual slop of the edentulous ridge posteriorly are ready displaceable and cannot be considered as primary stress-bearing sites. (Figure -B-)



(Figure -B-)

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.

2) Extent of residual ridge coverage by the denture base:-

The broader the coverage, the greater the distribution of the load which result in less load per unit area. The denture base should cover as much of the residual ridge as possible and be extended the maximum amount within the physiologic tolerance of the limiting border structures or tissues. In a series of experiments, kaires has shown that ‘’ maximum coverage of denture-bearing areas with large, wide denture bases is of the utmost importance in with standing both vertical and horizontal stresses’’.

3) Type and accuracy of the impression registration:-

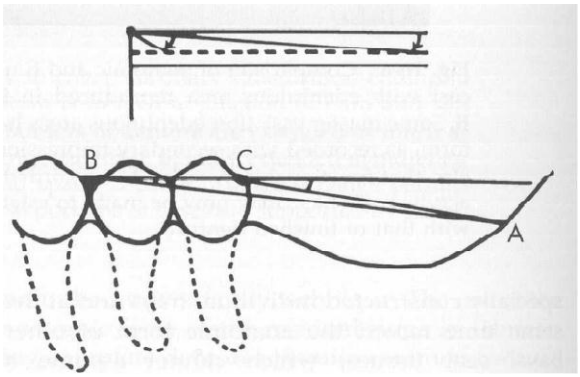
The residual ridge may be said to have tow forms: the anatomic and the functional form. The anatomic form is the surface contour of the ridge when it is not supporting an occlusal load. It is this resting form that is recorded by soft impression material such as plaster of Paris or a metallic oxide impression paste if the entire impression tray is uniformly relieved. Mclean and other recognized the need to record the tissues that support a distal extension partial denture base in their functional form or supporting state, this was called a functional impression because it recorded the ridge relation under simulated function. On the other hand, those who use the static ridge form or ridge relationship for the partial denture should seriously consider the need for some mechanical stress breaker to avoid the possible cantilever action of the distal extension base against the abutment teeth. The use of a properly prepared, individual impression tray can be a means to record the primary stress-bearing areas in a functional form and the non-stress-bearing as in an anatomic form.

4) Accuracy of the fit of the denture base:-

Support of the distal extension base is enhanced by intimacy of contact of the tissue surface of the base and the tissues that cover 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.

5) Design of the Partial denture framework:-

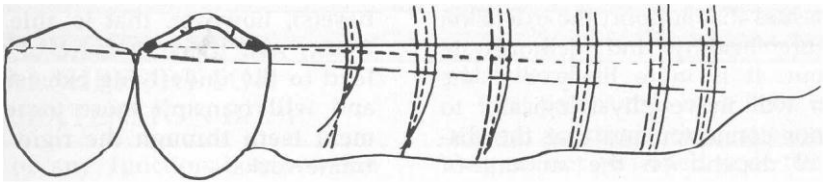
Some rotation movement of a distal extension base around posteriorly placed direct retainers is inevitable under function loading, the greatest movement takes place at the most posterior extent of the denture base, the retromolar pad region of the mandibular residual ridge and the tuberosity region of the maxillary residual ridge therefore are subjected to the greatest movement of the denture base. As the rotational axis (fulcrum line) of the denture is moved anteriorly, more of the residual ridge is used to support the denture base, thereby distributing stresses over a proportionally greater area. (Figure-C-)



(Figure -C-)

Acute dip of short denture base is compared with that of long one in upper figure. In lower figure, when point rotation is changed from C to B by losing more teeth. It can be seen that proportionally greater area of residual ridge is used to support denture base than

occurs when fulcrum line passes through C. Amount of movement is directly related to quality of tissue support. Lines AC represent length of denture base.



(Figure –D-)

(Figure –D-) If rotation of distal extension base occurs around nearest rest, as rest 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

6) Total occlusal load applied:-

The total occusal load applied is influenced by the number of supplied teeth, the width of their occlusal surfaces, and their occlusal efficiency. It was conducted that "the reduction of the size of the occlusal table reduces the vertical and the horizontal forces that act on the partial dentures and lessens the stress on the abutment teeth and supporting tissues".

PROSTHODONTICS

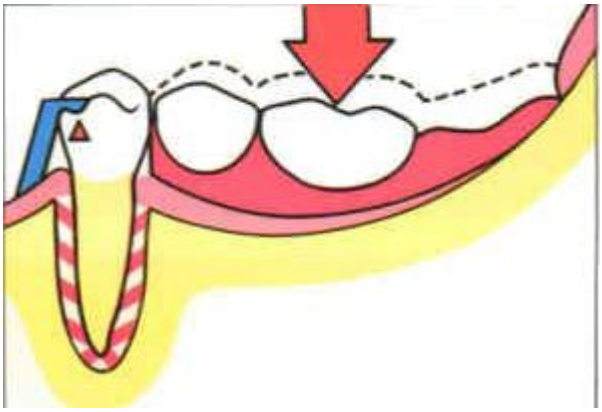
Lec: 6

المرحله الرابعه دمحمد رياض

Altered cast technique

(Corrected cast)

Definition: It is a cast made from a master cast in which the residual ridges have been recorded by means of a functional impression technique, this functional corrected impression is made for the purpose of recording the residual ridges in their functional form and recording the optimum length and width of the flanges of the denture base, the functional impression is usually made for distal extension base; where as the master cast is adequate for most tooth supported edentulous areas. Free end saddle is liable to be displaced under occlusal pressure (anteroposterior rocking around the abutment tooth which acts as a pivot), this is as a result of the displaceability of the mucosa, See **(Figure -1-)**.



(Figure -1-)

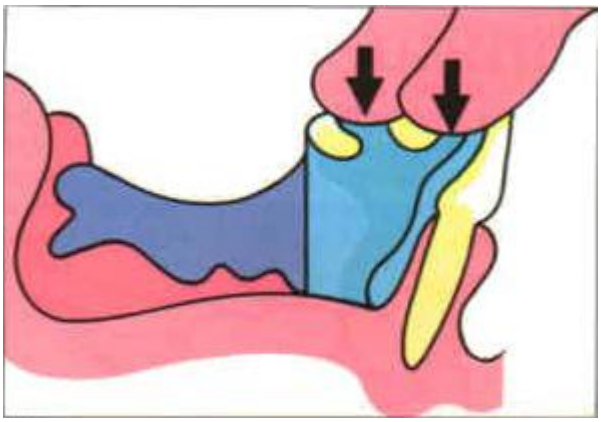
The altered cast technique is employed to prevent this by making a compressive impression of the mucosa (impression made under controlled pressure) under conditions which mimic to functional loading, the distribution of the load from the denture to the residual ridge is thus improved and the denture is more stable.

Procedure:

1- Acrylic resin tray material is added to the framework of the RPD to form a base which covers the relevant edentulous area; it must be of sufficient thickness to be rigid. At the chair side the periphery of the base is inspected for under or overextension and adjusted accordingly, any undercuts in the impression surface are removed. This surface is dried and zinc oxide impression paste or medium viscosity silicone impression material is applied, See **(Figure -2-)**.

(Figure -2-)

2- The framework is placed in the mouth and great care must be taken to ensure that it is seated on the teeth by pressure on the occlusal rests and indirect retainers only, no finger pressure is applied to the base area and the teeth are not occluded. Once the framework is fully seated, border molding is carried out, See (Figure -3-).



(Figure -3-)

3- Outline the master cast for removal of ridge areas by drawing a line approximately 1mm distal to the last abutment tooth and running from the outer edge of the cast crossing the ridge to a point approximately (5mm) lingual to the ridge.

4- Remove the residual ridge areas from the master cast and putting the mechanical retentive means into the cast with a round spiral saw, see (Figure -4-).

(Figure -4-)

5- Place the framework with its impression on the master cast and lute, it should be inspected to make certain that rests are completely seated, functional impression must not contact the cast, and this framework is securely luted to the cast using modeling plaster or sticky wax, see (Figure-4-).

6- A strip of boxing wax is adapted around the cast. A hot No.7 spatula is used to seal the wax to the cast, see (Figure -5-).

(Figure -5-)

7- A stone is poured into the boxed impression and allowed to remain for 5 minute to thoroughly wet the cast. A critical step for preventing the movement of the framework during boxing and pouring procedures.

8- Small amounts of stone are added at a time to flow into retention areas of the original cast to avoid entrapment of air.

9- When the stone is set, remove the boxing wax, see (Figure-6-).

The principle problems: The problems associated with this functional procedure are related to incorrect or incomplete seating of the framework in the mouth or on the cast. Such problems may occur when making the impression or boxing the impression and pouring the cast.Other problems may occur if the proper procedures are not followed when using plaster /pumice mixture.

(Figure-6-)

PROSTHODONTICS

Lecture: 7 د: محمد رياض

المرحله الرابعه

Initial Placement, Adjustment, and Servicing of the R.P.D:

Initial placement of the completed partial denture is the fifth of six essential phases of P.D, so service should never be scheduled between other appointments.

Patients should not be given possession of R.P.D. until:

1- Denture bases have been initially adjusted as required.

2- Occlusal discrepancies have been eliminated.

3- The patient educational procedures have been continued.

The term adjustment has two connotations, each of which must be considered separately:

First: are the adjustment to the bearing surfaces of the dentures and the occlusion made by the dentist at the time of initial placement.

Second: is the adjustment or accommodation by the patient, psychologically and biologically to the presence of a foreign body, which is to serve us a prosthetic restoration of some missing part or parts of the body, in this particular instance the oral prosthesis.

Adjustment to bearing surfaces of denture bases

Adjustment the bearing surfaces to prefect the fit of the denture to the supporting tissues should be accomplished by the use of some kind of indicator paste. The paste must be one that will be readily displaced by positive tissue contact and will not adhere to the tissues of the mouth. If commercial pressure indicating pastes are not available then a paste can be made by combining equal parts of the vegetable shortening and zinc oxide powder, the component must be thoroughly spatulated to a homogenous mixture. Rather than dismiss the patient with instructions to return when soreness develops, and then over relive the denture for a traumatized area to restore patient comfort, use a pressure indicator paste with any tissue-bearing prosthetic restoration (see figure-1-).

(Figure-1-)

The paste should be applied in a thin layer over the bearing surfaces and then both occlusal and digital pressure should be applied to the denture. The denture is then removed & inspected, any areas where the pressure has been heavy enough to displace a thin film of indicator paste should be relieved

and the procedure repeated with a new film until excessive pressure areas have been eliminated (see figure-2-).

(Figure-2-)

Pressure areas most frequently encountered as follows in MANDIBULAR ARCH:

1- The lingual slop of the mandibular ridge in the premolar area.

2- The mylohyoid ridge.

3- The border extension into the retro-mylohyoid space.

4- The distobuccal border (in the vicinity of the ascending ramus and the external oblique ridge).

In the MAXILLARY ARCH:

1- The inside of the buccal flange of the denture over the tuberocities.

2- The border of the denture lying at the molar prominence.

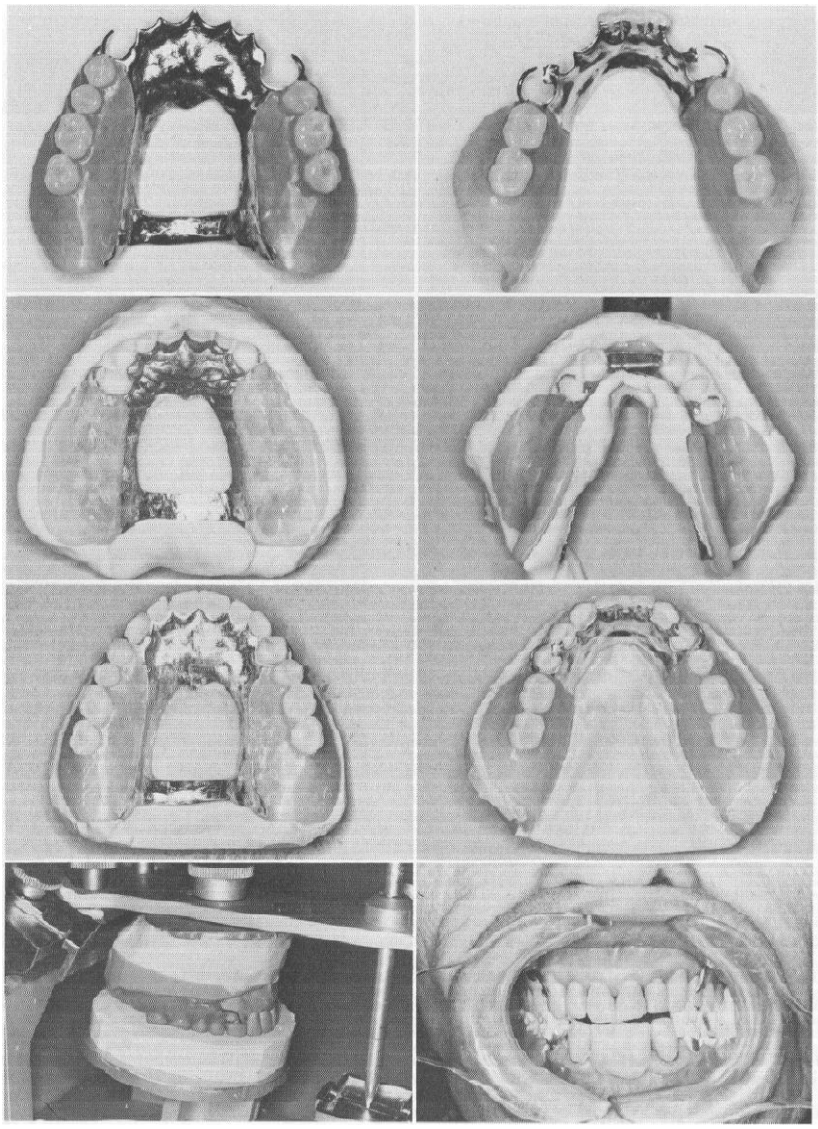
3- At theapterygomaxillary notch where the denture may impinge on the pterygomandlbular raphe or the pterygod homulous itself.

Occlusal Interference from Denture Framework

Any occlusal interference from occlusal rests and other parts of framework should have been eliminated before or during the establishment of occlusal relations. The denture framework should have been tired in the mouth before a final jaw relation is established and any such interference should have been detected and eliminated. Much of this need not exist at all if mouth preparation and the design of the denture framework are carried out with a specific treatment plan in mind. In any event occlusal interference from the framework itself should not ordinary require further adjustment at the time of the initial placement of the finished denture.

Adjustment of occlusion in harmony with natural and artificial dentition

The final step in the adjustment of the RPD at the time of initial placement is the adjustment of occlusion to harmonize with the natural occlusion in all mandibular excursions. Occlusal adjustment of tooth supported RPD may be done by any of several intra-oral methods. Occlusal adjustment of distal extension R.P.D. is accomplished more accurately by use of an articulator than by any intra-oral method. Because distal extension denture base will exhibit some movement under a closing force, intra-oral indications of occlusal discrepancies whether produced by articulating paper or disclosing waxes are difficult to interpret. Distal extension dentures positioned on remounting casts can conveniently be related to the articulator with new, non pressure interocclusal records, and the occlusion can be adjusted accurately at the appointment for initial placement of the dentures (see figure-1-) and (figure -2-).



(Figure-1-)

{(1) Maxillary and mandibular restorations are recovered, finished, and polished. After restorations are tried in and basal seat adjusted (2) impression is made of restoration in position in the mouth with perforated stock tray and irreversible hydrocolloid. (3) Casts are poured in impressions after undercuts in denture bases are blocked out with wax. Dentures are readily removed and replaced on mounting casts. (4) Maxillary denture and remounting cast are placed in face-bow record on mounting jig, and

maxillary cast is attached to upper arm of articulator with stone. (5) Centric relation is recorded as near vertical dimension of occlusion as possible, avoiding contact of opposing teeth. Recording medium is fast-setting impression plaster}. Now see another example below in (figure-2-):

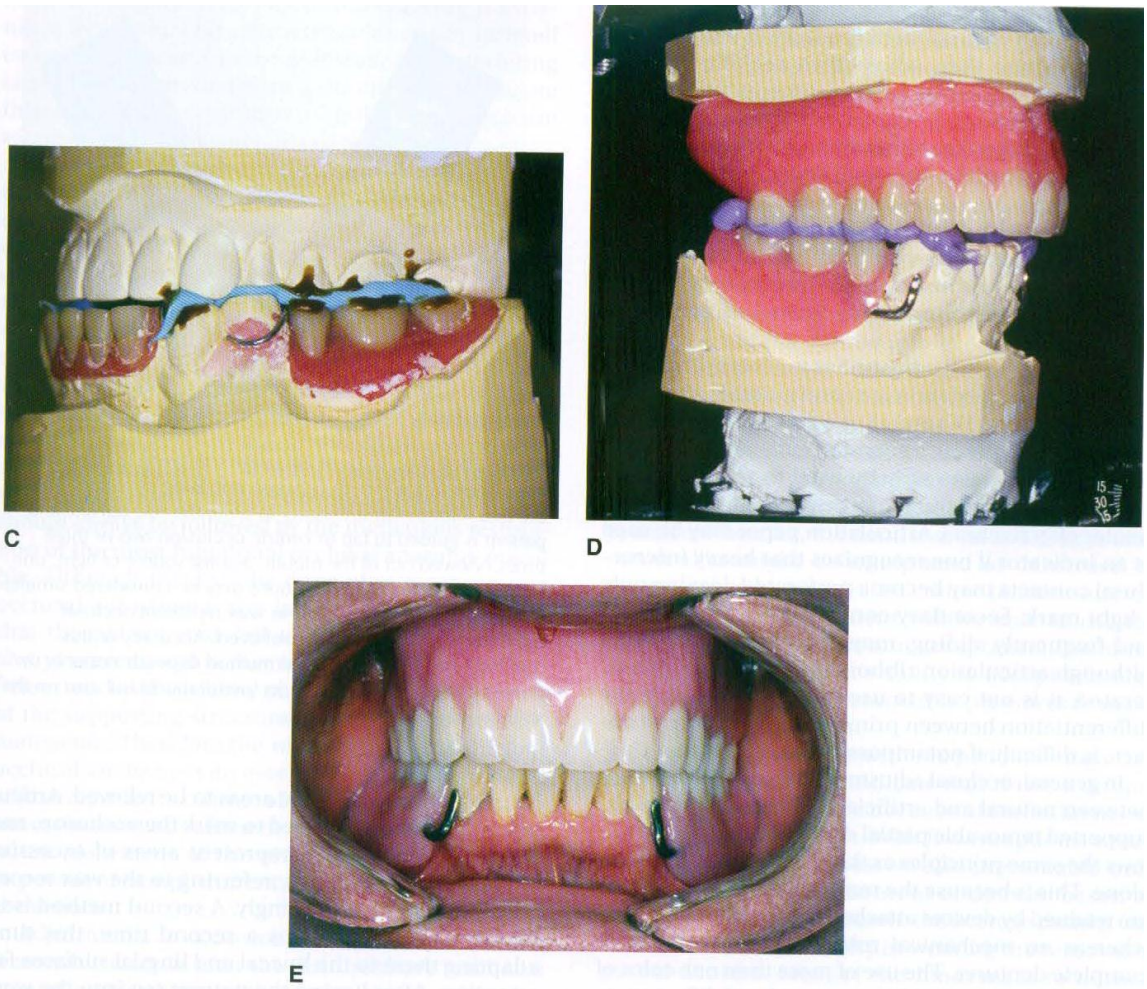


Figure 20-2 Cont'd **C,** The mounted mandibular cast and interocclusal record showing that the record was made without tooth contact. This allows the position recorded to not be influenced by the teeth, which could alter the closure path and introduce error. **D,** This example shows a maxillary complete denture, that was mounted before the patient visit by using a remount index (preserved facebow by indexing before recovery from the processed cast), and the mandibular remount cast and interocclusal record (as in **C**). The record is removed and occlusal correction accomplished to control the post-processed occlusion. Use of the completed prostheses provides the best chance to obtain an accurate and reliable inter-occlusal record given the fact that the bases are very accurate and stable. **E,** The goal of the remounting procedure is to provide the occlusal position prescribed by the arrangement of prosthesis teeth. It would be inappropriate to allow the patient to attempt to accommodate to new prostheses in which the occlusion is not optimized.

Intra-oral occlusal adjustment is accomplished by using indicator and burs. These also may be used to reduce tooth surface. The use of the more than one color of articulating paper or ribbon to record and differentiate between centric and eccentric contact is just as helpful in adjusting P.D. occlusion as natural occlusion, and this method may be used for the initial adjustment.

For final adjustment, however since one denture will be adjusted to occlude with an intact arch, the use of an occlusal wax may be necessary to establish points of excessive contact and interference. This cannot be done by articulating paper alone. An occlusal indicating wax that is adhesive on one side, which is adhesive on one side, or strips of 28 gauge casting wax or other similar soft wax, may be used. It should always be used bilaterally, with two strips folded together at the midline. Thus the patient is not as likely to deviate to one side as when wax is introduce unilaterally. For centric contacts the patient is guided to tap into the wax and then wax is removed and inspected under tranillumination for perforations. Premature contacts or excessive contacts appear as perforated areas and must be adjusted (see figure -3-).

A second method is to introduce the wax strips a second time. But this time adapting them to the buccal or lingual surface for retention. After having the patient tap into the wax, perforated areas are marked with waterproof pencil, the wax is then stripped off and the penciled areas are relived. After adjustment in centric occlusion has been completed any remaining areas of interference are then reduced, thus assuring that there's no interference during chewing stroke. Adjustment to relieve interference during chewing should be confined to buccal surfaces of mandibular teeth and lingual surfaces of maxillary teeth.

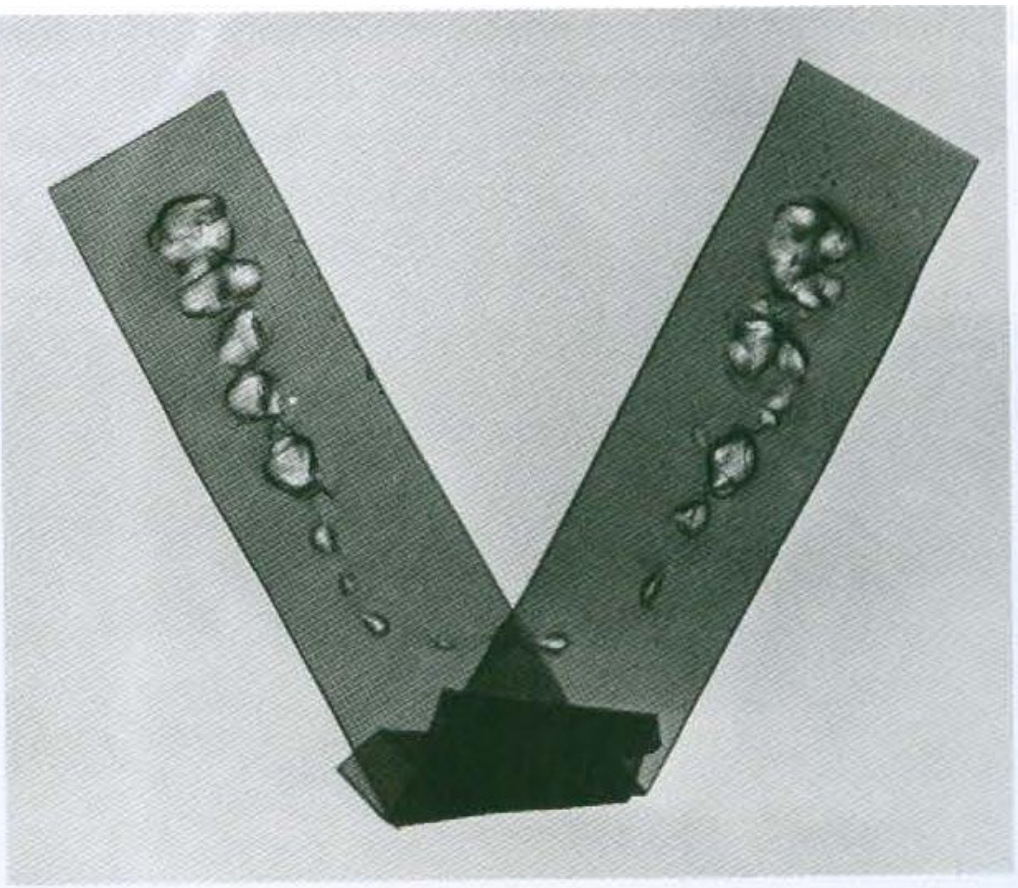


Figure 20-3 Two strips of 28-gauge soft green (casting) wax are placed in the mouth between opposing dentition. These are first folded over anteriorly to unite the two halves, and patient is guided to tap in centric occlusion two or three times. Viewed out of the mouth, against source of light, uniform contacts free of perforations may be considered simultaneous contacts. Perforations in wax represent occlusal prematurities that should be relieved. Accuracy of this method or any other intraoral method depends not only on dentist's interpretation of marks (perforations) but also on the stability of the denture bases.

(Figure-3-)

PROSTHODONTICS

Lec: 8

المرحله الرابعه دمحمد رياض

INSTRUCTIONS TO THE PATIENT:

After initial placement and adjustment of the RPD and before the patient is dismissed. The difficulties that may be encountered and the care that must be given the prosthesis and the abutment teeth must be reviewed with the patient.

The patient should be instructed in the proper placement and removal of the removable partial denture. They should demonstrate that they can place and remove the prosthesis themselves. Clasp breakage can be avoided by instructing the patient to remove the removable partial denture by the bases and not by repeated lifting of the clasp arms away from the teeth with the fingernails.

The patient should be advised that some discomfort or minor annoyance might be experienced initially. To some extent, this may be caused by the bulk of the prosthesis to which the tongue must become accustomed.

The patient must be advised of the possibility of the development of soreness despite every attempt on the part of the dentist to prevent its occurrence. Because patients vary widely in their ability to tolerate discomfort, it is best to advice every patients that needed adjustments will be made. On the other hand, the dentist should be aware that some

patients are unable to accommodate the presence of a removable prosthesis. However, the dentist must avoid any statements that may be interpreted or construed by the patients to be positive assurance tantamount to a guarantee that the patient will be able to use the prosthesis with comfort and acceptance. Too much depends on the patient's ability to accept a foreign object and to tolerate reasonable pressures to make such assurance possible.

Discussing phonetics with the patient in regard to the new dentures may indicate that this is a unique problem to be overcome because of the influence of the prosthesis on speech. With few exceptions, which usually result from excessive and preventable bulk in the denture design, contour of denture bases, or improper placement of teeth, the average patient will experience little difficulty in wearing the removable partial denture. Most of the hindrance to normal speech will disappear in a few days.

Similarly, perhaps little or nothing should be said to the patient about the possibility of gagging or the tongue's reaction to a foreign object. Most patients will experience little or no difficulty in this regard and the tongue will normally accept smooth, nonbulky contours without objection. Contours that are too thick, too bulky, or improperly placed should be avoided in the construction of the denture, but if present, these should be detected and eliminated at the time of placement of the denture; the dentist should palpate the prosthesis in the mouth and reduce excessive bulk accordingly before the patient has an opportunity to object to it. The area that most often needs thinning is the distolingual flange of the

mandibular denture. Here the denture flange should always be thinned during the finishing and polishing of the denture base. Sublingually the denture flange should be reproduced as recorded in the impression, but distal to the second molar the flange should be trimmed somewhat thinner, Then, when the denture is placed, the dentist should palpate this area to ascertain that a minimum of bulk exists that might be encountered by the side and base of the tongue if this needs further reduction . it should be done and the denture repolished before the patient is dismissed .

The patient should be advised of the need to keep the dentures and the abutment teeth meticulously clean. If cariogenic processes are to be prevented, the accumulation of debris should be avoided as much as possible, particularly around abutment teeth and beneath minor connectors, Furthermore, inflammatiom of gingival tissue is prevented by removing accumulated debris and substituting toothbrush massage for the normal stimulation of tongue and food contact with areas that will be covered by the denture framework.

The mouth and removable partial denture should be cleaned after eating and before retiring. Brushing before breakfast also may effective in the reduction of the bacterial count, which may help to lessen acid formation after eating in the caries – susceptible individual. A removable partial denture may be effectively cleaned by use of a small, soft – bristle brush. Debris may be effectively removed through the use of nonabrasive dentifrices, because they contain the essential elements for cleaning. Household cleaners and toothpastes should not be used , because they are

too abrasive for use on acrylic resin surfaces , The patient , and the elderly or the handicapped patient in particular , should be advised to clean the denture over a basin partially filled with water so that the denture impact will be less if the denture is dropped accidentally during cleaning .

In addition to brushing with a dentifrice, additional cleaning may be accomplished by use of a proprietary denture cleaning solution .The patient should be advised to soak the dentures in the solution for 15 minutes once daily , followed by a thorough brushing with a dentifrice .Although hypochlorite solutions are effective denture cleaners , they have a tendency to tarnish chromium – cobalt frameworks and should be avoided .

In some mouths the precipitation of slivary calculus on the removable partial denture necessitates taking extra measures for its removal. Thorough daily brushing of the denture will prevent deposits of calculus for many patients. However any buildup of calculus noted by the patient between scheduled recall appointments should be removed in the dental office, this can be quickly and readily accomplished with an ultrasonic cleaner.

Because many patients may dine away from home, the informed patient should provide some means of carrying out midday oral hygiene, Simply rinsing the removable partial denture and the mouth with water after eating is beneficial if brushing is not possible.

Opinion is divided on the question of whether or not a removable partial denture should be worn during sleep. Conditions should determine the

advice given the patient, although generally the tissue should be allowed to rest by removing the denture at night.

The denture should be placed in a container and covered with water to prevent its dehydration and subsequent dimensional change. About the only situation that possibly justifies wearing removable partial dentures at night is when stresses generated by bruxism would be more destructive because they would be concentrated on fewer teeth. Broader distribution of the strees load, plus the splinting effect of the removable partial denture, may make wearing the denture at night advisable. However, an individual mouth protector should be worn at night until the cause of the bruxism is eliminated.

Often the question arises whether an opposing complete denture should be worn when a removable partial denture in the other arch is out of the mouth.

The answer is that if the removable partial denture is to be removed at night, the opposing complete denture should not be left in the mouth. There is no more certain way of destroying the alveolar ridge, which supports a maxillary complete denture , than to have it occlude with a few remaining anterior mandibular teeth .

The removable partial denture patient should not be dismissed as completed without at least one subsequent appointment for evaluation of the response of oral structures to the restorations and minor adjustment if needed. This should be made at an interval of 24 hours after initial placement of the denture. It need not be a lengthy appointment but should

be made as a definite rather than a drop – in appointment. This not only gives the patient assurance that any necessary adjustments will be made and provides the dentist with an opportunity to check on the patient's acceptance of the prosthesis but also avoids giving the patient any idea that the dentist's schedule may be interrupted at will and serves to give notice that an appointment is necessary for future adjustments.

FOLLOW – UP SERVICES:

The patient must understand the sixth and final phase of removable partial denture service (periodic recall) and its rationale; patients need to understand that the support for prosthesis (Kennedy Class I and II) may change with time. Patients may experience only limited success with the treatment and and prostheses, so meticulously accomplished by the dentist, unless they return for periodic oral evaluations.

After all necessary adjustments to the removable partial denture have been made and the patient has been instructed on the proper care of the denture, they must also be advised as to the future care of the mouth to ensure health and longevity of the remaining structures. How often the dentist should examine the mouth and denture depends on the oral and physical condition of the patient. Patients who are caries susceptible or who have tendencies towards periodontal disease or alveolar atrophy

should be examined more often. Every 6 months should be the rule if conditions are normal.

The need to increase retention on clasp arms to make the denture more secure will depend on the type of clasp that has been used .Increasing retention should be accomplished by contouring the clasp arm to engage a deeper part of the retentive undercut rather than by forcing the clasp in toward the tooth. The latter creates only frictional retention which violates the principle of clasp retention. An active force, such retention contributes to tooth or restoration movement, or both, in a horizontal direction, disappearing only when either the tooth has been moved or the clasp arm returns to a passive relationship with the abutment tooth. Unfortunately, this is almost the only adjustment that can be made to a half- round cast clasp arm. On the other hand, the round wrought – wire clasp arm may be cervically adjusted and brought into a deeper part of the retentive undercut. Thus the passivity of the clasp arm in its terminal position is maintained, but retention is increased because it is forced to flex more to withdraw from the deeper undercut. The patient should be advised that the abutment tooth and the clasp will serve longer if the retention is held minimally , which is only that amount necessary to resist reasonable dislodging forces .

Development of denture rocking or looseness in the future may be the result of a change in the form of the supporting ridges rather than lack of retention.

This should be detected as early as possible after it occurs and corrected by relining or rebasing. The loss of tissue support is usually so gradual that the patient may be unable to detect the need for relining. This usually must be determined by the dentist at subsequent examinations as evidenced by rotation of the distal extension denture about the fulcrum line. If the removable partial denture is opposed by natural dentition, the loss of base support causes a loss of occlusal contact, which may be detected by having the patient close on wax or Mylar strips placed bilaterally . If however , a complete denture or distal extension removable partial denture opposes the removable partial denture , the interocclusal wax test is not dependable because posterior closure , changes in the temporomandibular joint , or migration of the opposing denture may have maintained occlusal contact. In such cases evidence of loss of ridge support is determined solely by the indirect retainer leaving its seat as the distal extension denture rotates about the fulcrum.

No assurance can be given to the patient that crowned or uncrowned abutment teeth will not decay at some future time. The patient can be assured, however, that prophylactic measures in the form of meticulous oral hygiene, coupled with routine care by the dentist, will be rewarded by greater health and longevity of the remaining teeth.

The patient should be advised that maximal service may be expected from the removable partial denture if the following rules are observed:

1- Avoid careless handling of the denture, which may lead to distortion or breakage. Damage to the removable partial denture occurs while it is out of the mouth, as a result of dropping it during cleaning, or an accident occurring when the denture is not worn. Fractured teeth, denture bases, and broken clasp arms can be repaired, but a distorted framework can rarely if ever be satisfactorily readapted or repaired.
2- Protect teeth from caries with proper oral hygiene, proper diet, and frequent dental care. The teeth will be no less susceptible to caries when a removable partial denture is being worn but may be more so because of the retention of

debris. At the same time, the remaining teeth have become all the more important because of oral rehabilitation, and abutment teeth have become even more valuable because of their importance to the success of the removable partial denture. Therefore the need for a rigid regimen of oral hygiene, diet control, and periodic clinical observation and treatment is essential to the future health of the entire mouth. Also the patient must be more conscientious about returning periodically for examination and necessary treatment at intervals stated by the dentist.

3- Prevent periodontal damage to the abutment teeth by maintaining tissue support of any distal extension bases, As a result of periodic evaluation, this can be detected and corrected by relining or whatever procedure is indicated.

4- Accept removable partial denture treatment as something that can not be considered permanent but must receive regular and continuous care by both the patient and the dentist. The obligations for maintaining caries control and for returning at stated intervals for treatment must be clearly understood along with the fact that regular charges will be made by the dentist for whatever treatment is rendered.

PROSTHODONTICS

Lec: 9

المرحله الرابعه د.محمد رياض

Relining and rebasing the removable partial denture:

Relining is resurfacing of the tissue of a denture base with new material to make it fit the underlying tissue more accurately, it is indicated when tissue changes is minimum. *Rebasing* is the replacement of the entire denture base with new material, the artificial teeth may need to be replaced in a rebase procedure, it is indicated when tissue changes is maximum. Relining removable partial dentures is a common occurrence in many dental practices; however, rebasing is not indicated as often.

In either situation a new impression is necessary and uses the existing denture base with modifications as an impression tray for either a closed-mouth or an open-mouth impression procedure, see (figure-1-).

(Figure -1-) {Use of an existing Kennedy class I removable partial denture base as a tray during reline impression. The selective pressure impression philosophy requires space for the impression material that is greater over the ridge crest (secondary stress

bearing area) than at the buccal shelf region (primary stress bearing area). A pear shaped lab bur is used to provide general relief (0.5-1mm) of the denture base with additional relief (1mm) over the ridge crest obtained using a number 8 round straight shank lab bur. Care must be taken to assure tissue surface is relieved of all undercuts which could cause cast fracture when recovering the cast from the impression}.

One of several types of impression materials may be used, such as metallic oxide impression paste, rubber-base, silicone elastomers, tissue conditioning materials, or mouth-temperature wax. With a tooth-supported prosthesis, the impression method (open- or closed- mouth) is not as critical. In deciding between a closed –mouth and an open-mouth impression method for relining a distal extension removable partial denture, a major consideration is the resiliency of the mucosa covering the residual ridge. A firm mucosal foundation can likely accommodate either a closed-mouth functional impression technique or an open-mouth selective pressure technique. However, when the mucosa is easily displaced, the open-mouth selective pressure technique is preferable. Both techniques should guard against framework movement during the impression procedure.

Before relining or rebasing is undertaken, the oral tissue must be returned to an acceptable state of health, see (figure -2-).

(Figure-2-){Kennedy Class I mode I arch with a removable partial denture that requires relining. Tissue abuse evident at the left buccal shelf region must be corrected prior to making the reline impression. Management requires either a period of function without the prosthesis or relief of the prosthesis in the affected region along with placement of a tissue resilient liner in an effort to reduce the traumatic effect of pressure}.

RELINING TOOTH- SUPPORTED (RPD):-

Support for this restoration is derived entirely from the abutment teeth at each end of each edentulous span. This support may be effective through the use of occlusal rests. The supporting abutments prevent settling of the restoration toward the tissue of the residual ridge. Tissue changes that occur beneath tooth supported denture bases do not affect the support of the denture, and therefore relining or rebasing is usually done for reasons that include:-

(1) Unhygienic conditions and the trapping of debris between the denture base and the residual ridge.

(2) An unsightly condition that results from the space that has developed. **(3)** patient discomfort associated with lack of tissue contact that arises from open spaces between the denture base and the tissue.

Anteriorly loss of support beneath a denture base may lead to some denture movement, despite occlusal support and direct retainers located posteriorly. Rebasing would be the treatment of choice if the artificial teeth are to be replaced or rearranged, or if the denture base needs to be replaced for esthetic reasons or because it has defective.

To accomplish either relining or rebasing the original denture base must have been made of a resin material that can be relined or replaced. Commonly tooth-supported removable partial denture bases are made of metal as part of the cast framework. These generally cannot be satisfactorily relined, although they may sometimes be altered by drastic grinding to provide mechanical retention for the attachment of an entirely new resin base, or some of the new resin bonding agent may be used. Ordinarily a metal base, with its several advantages, is not used in a tooth-supported area in which early tissue changes are anticipated. A metal base should not be used after recent extractions or other surgery or for a long span when relining is anticipated to provide secondary tissue support. A distal extension metal base is ordinarily used only when a removable partial denture is made over tissue that has become conditioned to supporting a previous denture base.

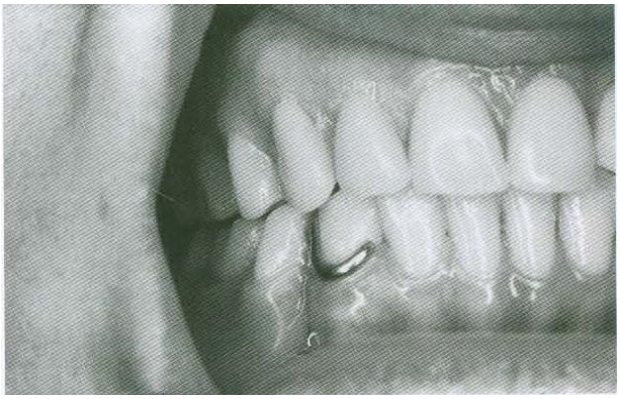
Because the tooth- supported denture base cannot be depressed beyond its terminal position with the occlusal rests seated and the teeth in occlusion, and because it cannot rotate about a fulcrum, a closed-mouth impression method is used. Virtually any impression materials may be used, provided sufficient space is allowed beneath the denture base to permit the excess material to flow to the borders-where it is either turned by the boarding tissue or, as in the palate, allowed to escape through venting holes without unduly displacing the underlying tissue. The qualities of each type of impression materials must be kept in mind when selecting the material to be used. Ordinarily an impression material is used that will record the anatomic form of the oral tissue.

RELINING DISTAL EXTENSION (RPD):-

A distal extension removable partial denture, which derives its major support from the tissue of the residual ridge, requires relining much more often than dose a tooth-supported denture.

There are two indications of the need for relining a distal extension removable partial denture base:-

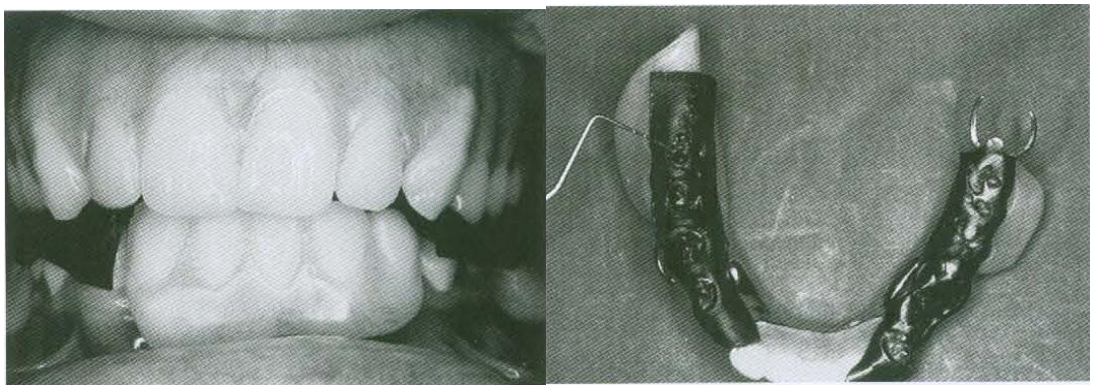
First: a loss of occlusal contact between opposing denture or between the denture and opposing natural dentition may be evident, see (Figure -3-).



(Figure-3-){Distal extension mandibular removable partial denture opposed by maxillary complete denture. There is no contact of opposing posterior teeth. Anterior teeth are in heavy contact at vertical dimension of occlusion. Unless corrected immediately, anterior portion of maxillary residual ridge is destined to undergo rapid resorption**}.**

This is determined by having the patient close on two strips of 28-gauge, soft green or blue (casting) wax or Mylar matrix strips. If occlusal contact between artificial dentition is weak or lacking while the remaining natural teeth in opposing are making firm contact, the distal extension denture needs to have occlusion reestablished on the present base by altering the occlusion,

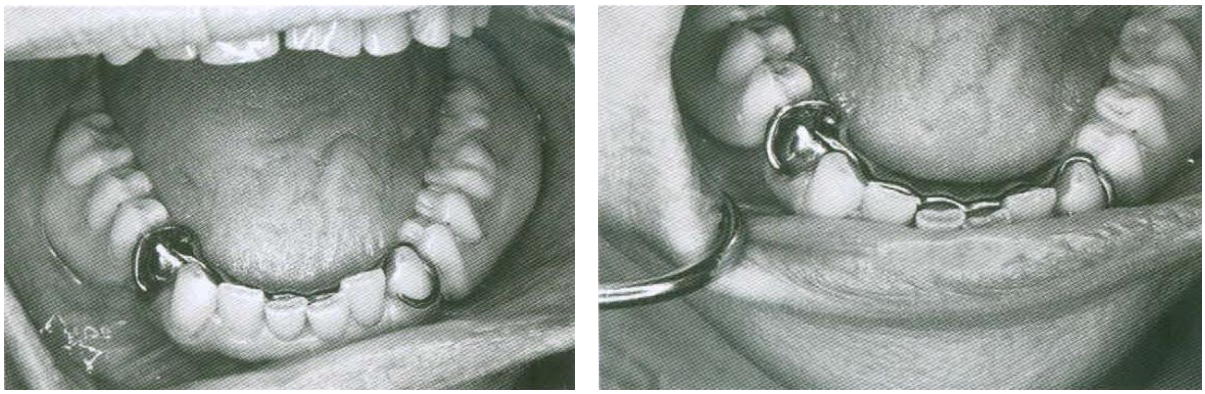
reestablishing the original position of the denture framework and base, or sometimes both. In most instances, reestablishing the original relationship of the denture is necessary, and the occlusion will automatically be reestablished, see (Figure-4-).



A **B**

(Figure -4-){ **A:** Patient with ClassII mode 2 mandibular RPD opposed by maxillary CO. Mandibular posterior teeth have been covered with strip(S) of 28-gauge soft green wax, and patient has been assisted in tapping in centric relation, **B:** Mandibular denture is removed and indentations in interposed wax strips are evaluated. Note relative absence of perforations in wax strips by opposing posterior teeth. Relining and correction of occlusal discrepancies are needed based on this record}.

Second: a loss of tissue support that causes rotation and setting of the distal extension base or bases is obvious when alternate finger pressure is applied on either side of the fulcrum line, see (Figure-5-).



A **B**

(Figure-5-) {**A:** Superior border of linguoplate major connector and rests appear to be in their planned relationships to remaining natural teeth in absence of occlusal load. **B:** Slight pressure on denture base activates direct retainers and elevates superior border of linguoplate resulting in lack of planned contact. If the linguoplate does not immediately return to its designed position when the pressure on the denture base is removed, the denture bases should be relined to reestablish adequate base support by residual ridges}.

Although checking for occlusal contact alone may be misleading, such rotation is positive proof that relining is necessary. If occlusal inadequacy is detected without any evidence of denture rotation toward the residual ridge, all that needs to be done is to reestablish occlusal contact by rearrange the teeth or by adding to the occlusal surface with resin or cast gold onlays. On the other hand, if occlusal contact is adequate but denture rotation can be demonstrated, it is usually a result of migration or extrusion of opposing teeth or a shift in position of an opposing maxillary denture, thus maintaining occlusal contact at the expense of the stability and support of that denture. This is often the situation when a maxillary complete denture opposes a removable partial denture. It is not unusual for a patient to complain of looseness of the maxillary complete denture and request

relining of that denture when actually it is removable partial denture that needs relining. Relining and thus repositioning the removable partial denture results in repositioning of the maxillary complete denture with a return of stability and retention in that denture. Therefore evidence of rotation of a distal extension removable partial denture about the fulcrum line must be the deciding factor as to whether relining needs to be done.

Rotation tissueward about the fulcrum line always results in a lifting of the indirect retainer(s). The framework of any distal extension removable partial denture must be in its original terminal position with indirect retainers fully seated during and at the end of any relining procedure. Any possibly of rotation about the fulcrum line because of occlusal influence must be prevented and therefore the framework must be held in its original terminal position during the time the impression is being mad. This all nut eliminates the use of a closed-mouth impression procedure when relining unilateral or bilateral distal extension bases.

Therefore the best way to ensure framework orientation throughout the impression procedure for a distal extension removable partial denture is with an open-mouth procedure. The denture to be relined is first relieved generously on the tissue side (see Figure-1-) and then is treated the same as the original impression base for a functional impression. The step-by-step procedure is the same, with the dentist's three fingers placed on the two principal occlusal rests and at a third point between, preferably at an indirect retainer farthest from the axis of rotation. The framework is thus returned to its original terminal position. With all tooth-supported components fully seated. The tissue beneath the distal extension base is then registered in a relationship to the original position of the denture that will ensure:-

(1) The denture framework will be returned to its intended relationship with the supporting teeth.

(2) The reestablishment of optimum tissue support for the distal extension base.

(3) The restoration of the original occlusal relationship with the opposing teeth.

Although it is true that the teeth are not allowed to come into occlusion during an open-mouth impression procedure, the original position of the denture is positively determined by its relationship with the supporting abutment teeth. Because this is the relationship on which the original occlusion was established, returning the denture to that position should bring about a return to the original occlusal relationship if two conditions are satisfied:-

***The first condition*:** is that laboratory procedures during relining must be done accurately without any increases in vertical dimension of occlusion. This is essential to any reline procedure, but it is a particular necessary with a removable partial denture because any change in occlusal vertical dimension will prevent occlusal rests from seating and will result in overloading and trauma to the underlying tissue.

The second condition: is that the opposing teeth have not extruded or migrated or that the position of an opposing denture has not become altered irreversibly. In the latter situation, some adjustment of the occlusion will be necessary, but this should be deferred until the opposing teeth or denture and the structures associated with the temporomandibular joint have had a chance to return to their original position before denture setting occurred.

METHODS OF REESTABLISHING OCCLUSION ON A RELINED REMOVABLE PARTIAL DENTURE:

Occlusion on a relined removable partial denture may be reestablished by several methods depending on whether the relining results in an increase in the vertical dimension of occlusion or in a lack of opposing occlusal contacts. In either instance, it is usually necessary to make a remounting cast for the relined removable partial denture so that the denture can be correctly related to an opposing cast or prosthesis in an articulator.

PROSTHODONTICS

Lec: 10

د. محمد رياض المرحله الرابعه

REPAIRS AND ADDITIONS TO REMOVABLE PARTIAL DENTURES

The need for repairing or adding to a removable partial denture will occasionally arise. However the frequency of this occurrence should be held to a minimum by careful diagnosis, intelligent treatment planning, adequate mouth preparations, and the carrying out of an effective removable partial denture design with proper fabrication of all component parts. Any need for repairs or additions will then be the result of unforeseen complications that arise in abutment or other teeth in the arch, breakage or distortion of the denture through accident, or careless handling by the patient rather than to faulty design or fabrication.

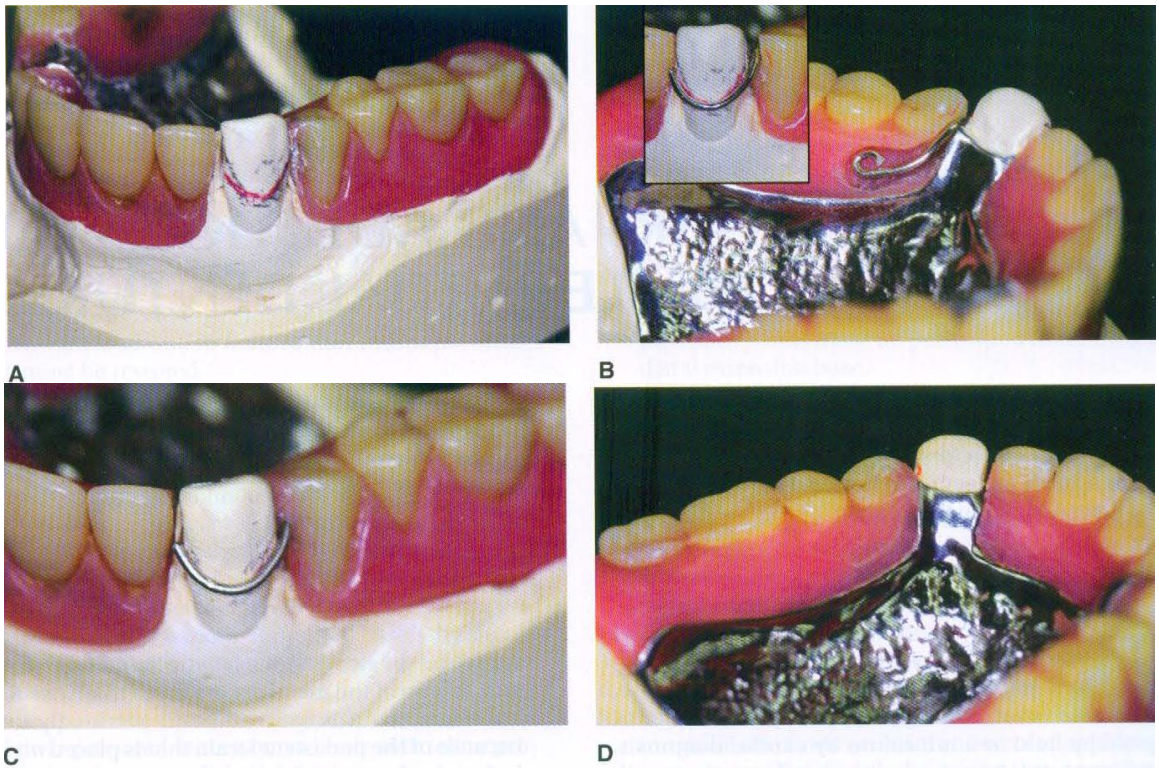
It is important that the patient should be instructed in the proper placement and removal of the prosthesis so that undue strain is not placed on clasp arms, on other parts of the denture, or on contacted abutment teeth. The patient also should be advised that care must be given to the prosthesis when it is out of the mouth and that any distortion may be irreparable. It should be made clear that there can be no guarantee against breakage or distortion from causes other than obvious structural defects.

*A- **BROKEN CLASP ARMS:***

The following are several reasons for breaking of clasp arms:

1- Breakage may result from repeated flexure into and out of too severe an undercut. If the periodontal support is greater than the fatigue limit of the clasp arm, failure of the metal occurs first. Otherwise the abutment tooth is loosened and eventually lost because of the persistent strain that is placed on it. Locating clasp arms only where an acceptable minimum of retention exists, as determined by an accurate survey of the master cast, can prevent this type of breakage.

2- Breakage may occur as a result of structural failure of the clasp arm itself. A cast clasp arm that is not properly formed or is subject to careless finishing and polishing will eventually break at its weakest point. This can be prevented by providing the appropriate taper to flexible retentive clasp arms and uniform bulk to all rigid nonretentive clasp arms. Wrought-wire clasp arms may eventually fail because of repeated flexure at the region where it exits from the resin base, see (Figure-1-).



(Figure-1-) {Fractured direct retainer on canine abutment. Reason for breakage is likely the long- term repeated flexure from movement associated with this 8 years old distal extension prosthesis. Denture must be evaluated for prospective serviceability if retainer arm is repaired. Often, patient will best be served by replacing denture with new restoration. **A:** cast produced from irreversible hydrocolloid impression, height of contour is shown in pencil with red line illustrating to lab the location of repair wire (18 gauge).**B:** Clasp adapted to designated line on canine and fitted into resin trough distal to canine and palatal to first and second premolars. Note the curvature placed at the end of the wire to prevent movement within polymerized resin. **C:** Finished and polished wire repair from the buccal and **D:** Palatal view**}.**

or at a point at which a nick or constriction occurred as a result of careless use of contouring pliers. They also may break at the point of origin from the casting as a result of excessive manipulation during initial adaptation to the tooth or subsequent readaptation. Clasp braking can best be prevented by cautioning the patient against removing the removable partial denture by sliding the clasp arm away from the tooth with the fingernails. A wrought-wire clasp arm can normally be adjusted several times over a period of years without failure. It is only when the number of adjustment is excessive that breakage is likely to occur. Wrought-wire clasp arms also may break at the point of origin because of recrystallization of the metal. This can be prevented by proper selection of wrought wire, avoiding burnout temperatures exceeding 1300°F. When wrought wire is attached to the framework by soldering, the soldering technique must avoid recrystallization of the wire. For this reason, it is best that soldering be done electrically to prevent the wrought wire form overheating. A low-fusing (1420° to 1500° F), triple-thick color-matching gold solder should be used rather than a solder that possesses a higher fusing temperature.

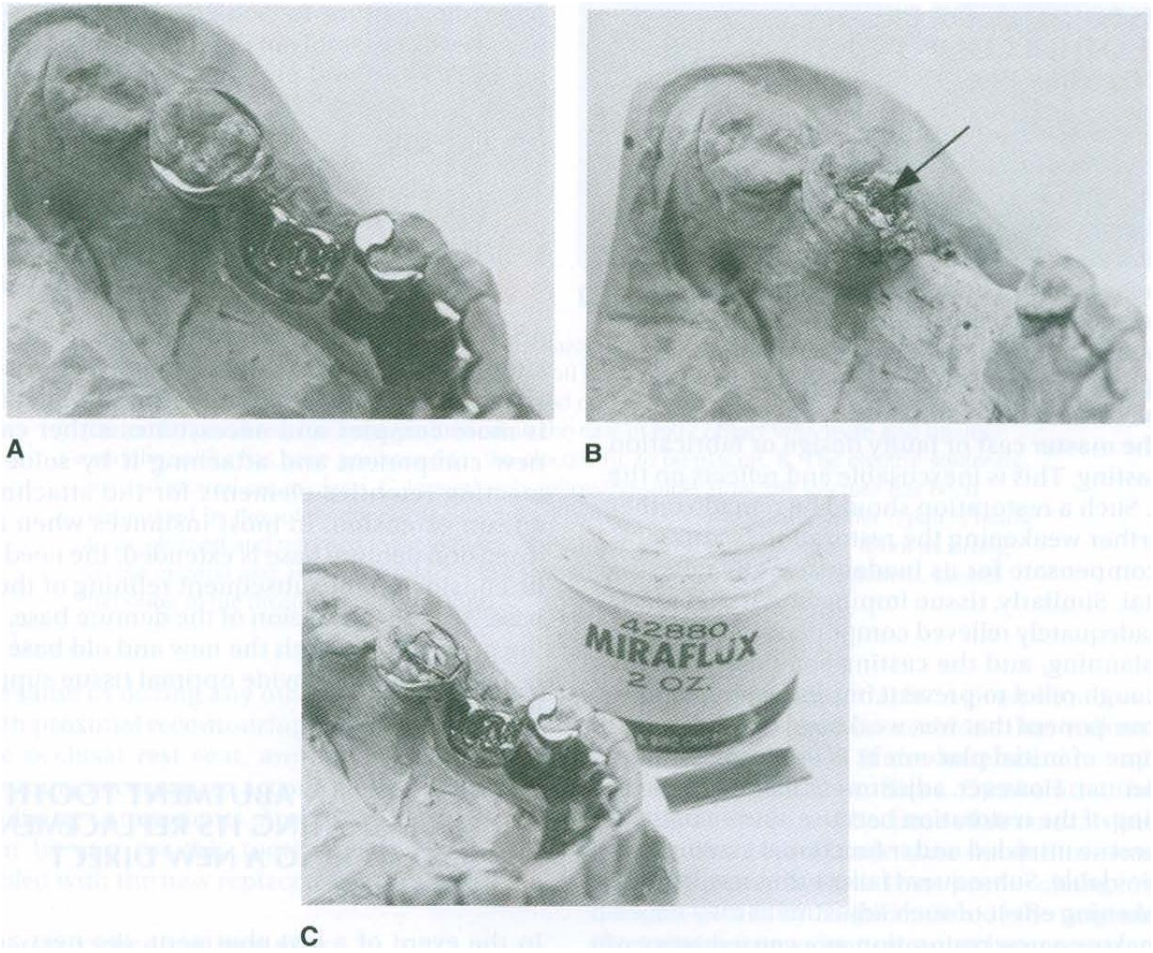
3- Breakage may occur because of careless handling by the patient. Any clasp arm will become distorted or will brake if subjected to excessive abuse by the patient. The most common cause of failure of a cast clasp arm is distortion caused by accidentally dropping the removable partial denture. A broken retentive clasp arm, regardless of its type, may be replaced with a wrought-write retentive arm embedded in a resin base, see (Figure-1-) or attached to a metal base by electric soldering. Often this avoids the necessity of fabricating an entirely new clasp arm.

B- FRUCTURED OCCLUSAL RESTS:

Breakage of an occlusal rest almost always occurs where it crosses the marginal ridge. Improperly prepared occlusal rest seats are the usual cause of such weakness; an occlusal rest that crosses a marginal ridge that was not lowered sufficiently during mouth preparations either is made too thin or is thinned by adjustment in the mouth to prevent occlusal interference. Failure of an occlusal rest rarely results from a structural defect in the metal and rarely if ever is caused by accidental distortion. Therefore the blame for such failure must often be assumed by the dentist for not having provided sufficient space for the rest during mouth preparations.

Soldering may repair broken occlusal rests. In preparation for the repair, it may be necessary to alter the rest seat of the broken rest or to relieve occlusal interferences. With the removable partial denture in its terminal position, an impression is made in irreversible hydrocolloid and then removed, with the removable partial denture remaining in the impression. The dental stone is poured into the impression and allowed to set. The removable partial denture is then removed from the cast, and platinum foil is

adapted to the rest seat and the marginal ridge and overlaps the guiding plane. The removable partial denture is returned to the cast and, with a fluoride flux, gold solder is electrically fused to the platinum foil and minor connector in sufficient bulk to form an occlusal rest, see (Figure-2-).



(Figure-2-) {**A:** Occlusal rest on molar fractured and was lost. Adequacy of present rest seat must be evaluated as well as interocclusal space available for rest before repair procedure is undertaken. **B:** Denture is removed from cast, and platinum foil (arrow) is adapted to rest seat area and over marginal ridge of abutment. **C:** Flux is applied sparingly to areas involved and solder is placed in position}.

An alternative solder to use is an industrial brazing alloy, which is higher fusing but responds excellently to electric soldering and does not tarnish, see (Figure-3-).

A **B**

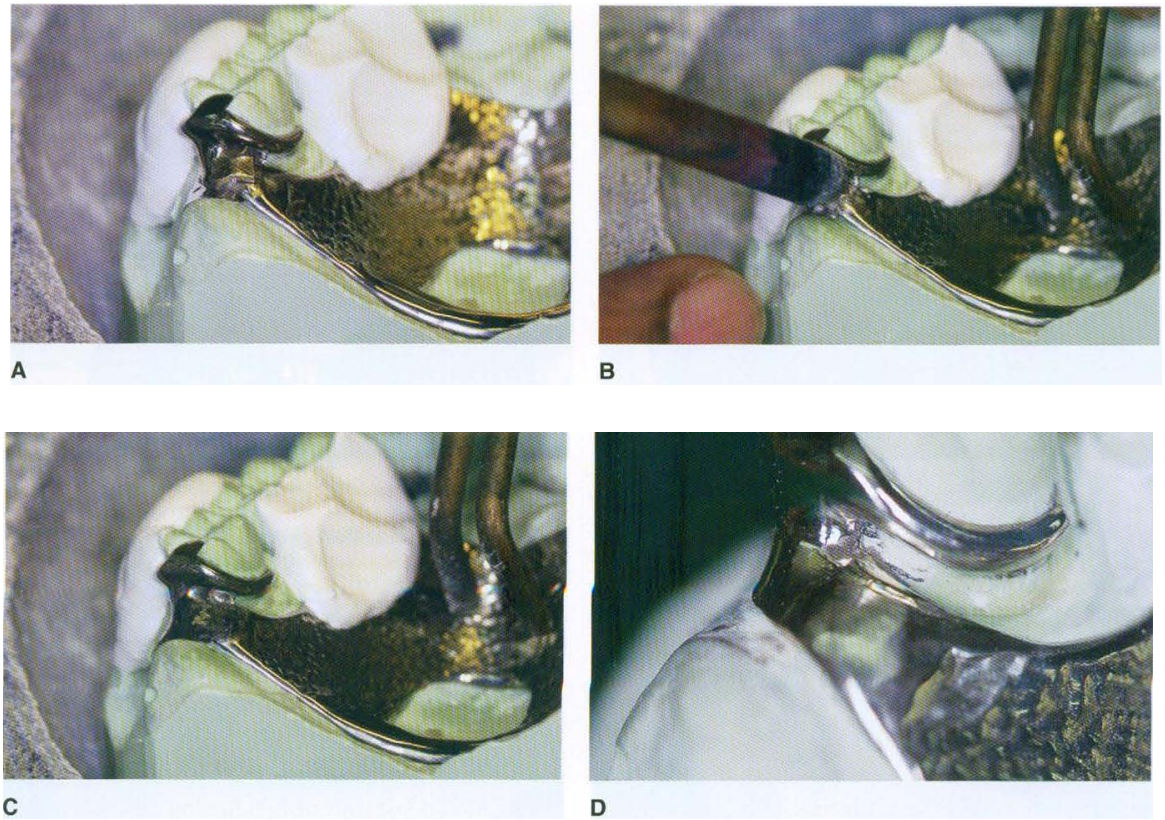
(Figure-3-) {**A:** Electrical soldering is used to repair rest. **B:** Rest is shaped to conform to rest seat outline. Framework is tried in patient's mouth for any necessary adjustment and rest is polished}.

C- DISTORTION OR BREAKAGE OF MAJOR AND MINOR CONNECTORS:

Assuming that major and minor connectors were originally made with adequate bulk, distortion usually occurs from abuse by the patient. All such components should be designed and fabricated with sufficient bulk to ensure their rigidity and permanence of form under normal circumstances.

Major and minor connectors occasionally become weakened by adjustment to prevent or eliminate tissue impingement. Such adjustment at the time of initial placement is a result of either inadequate survey of the master cast or faulty design or fabrication of the casting. This is inexcusable and reflects on the dentist. Such a restoration should be remade rather than further

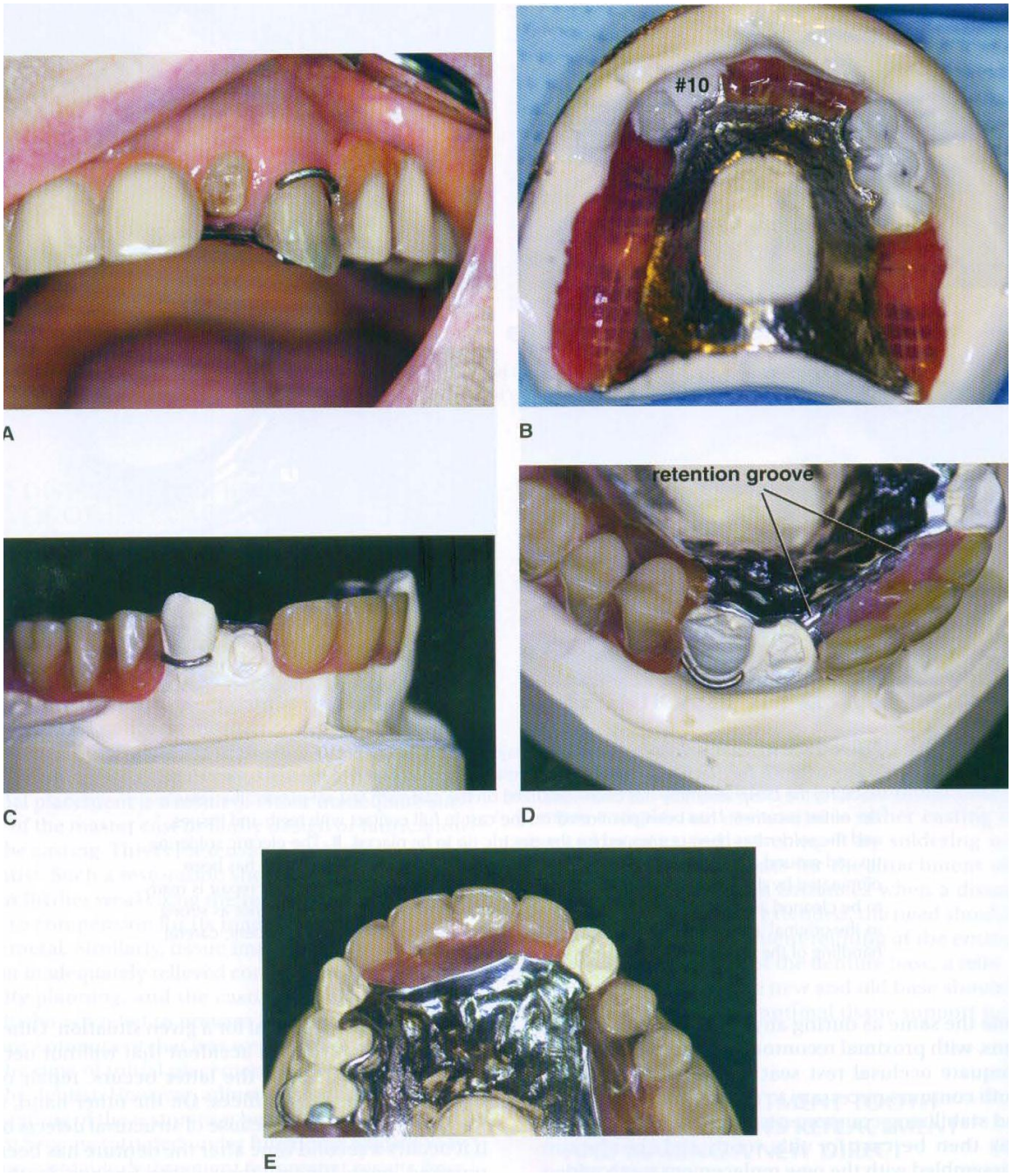
weakening the restoration by attempting to compensate for its inadequacies by relieving the metal. Similarly, tissue impingement that arises from inadequately relieved components results from faulty planning, and the casting should be remade with enough relief to prevent impingement. Failure of any component that was weakened by adjustment at the time of initial placement is the responsibility of the dentist. Commonly, repeated adjustment to a major or minor connector results in a loss of rigidity to the point that the connector can no longer function effectively. In such situations, either a new restoration must be made or that part must be replaced by casting a new section and then reassembling the denture by soldering. The cost and probable success must then be weighed against the cost of a new restoration. Generally the new restoration is advisable, see (Figure-4-).



(Figure-4-){**A:** Maxillary juncture between major and minor connector at the distal of most posterior molar has fractured. Thin platinum foil has been adapted to the cast beneath the fracture, the clasp assembly has been stabilized on the cast with fast-set plaster, the remainder of the prosthesis has been positioned on the cast in full contact with teeth and tissues, and the solder has been positioned for the electric tip to be replaced. **B:** The electric soldering tip and ground are in place **C:** Immediately following solder flow, the fracture has been eliminated by the solder connecting the tow segments **D:** The polished solder repair is ready to be cleaned and returned to the patient. The patient is told that the repair is not as strong as the original and while it is difficult to know how long it could serve the patient, careful handling of the prosthesis is mandatory}.

D- LOSS OF A TOOTH OR TEETH NOT INVOLVED IN THE SUPPORT OR RETENTION OF THE RESTORATION:

Additions to a removable partial denture are usually simply made when the bases are made of resin, see (Figure-5-). The addition of teeth to metal bases is more complex and necessitates either casting a new component and attaching it by soldering or creating retentive elements for the attachment of a resin extension. In most instances when distal extension denture base is extended, the need should be considered for subsequent relining of the entire base. After the extension of the denture base, a relining procedure of both the new and old base should be carried out to provide optimal tissue support for the restoration.



(Figure-5-){This patient presented with an asymptomatic fractured lateral incisor. **A:** Clinical presentation of fractured tooth and prosthesis. Evaluation of the prosthesis revealed it to be adequately fitting, stable and retentive. **B:** Pick-up impression of prosthesis. **C:** Cast formed from pick-up impression showing a fully seated prosthesis. **D:** Preparation of the prosthesis included mechanical means for retention (which was provided by creating a recess in the resin adjacent to the missing tooth), and creating a trough at the external finishing line to

repair an area of marginal breakdown. **E:** Finished repair that will be taken to the mouth and checked for occlusal clearance lingual to the maxillary anterior teeth}.

D- LOSS OF AN ABUTMENT TOOTH NECESSITATING ITS REPLACEMENT AND MAKING A NEW DIRECT RETAINER

In the event of a lost abutment, the next adjacent tooth is usually selected as a retaining abutment and it generally will require modification or a restoration. Any new restoration should be made to conform to the original path of placement, with proximal guiding plane, rest seat, and suitable retentive area. Other wise modifications to the existing tooth should be done the same as during any other mouth preparations, with proximal recontouring, preparation of an adequate occlusal rest seat, and any reduction in tooth contours necessary to accommodate retentive and stabilizing components. A new clasp assembly may then be cast for this tooth and the denture reassembled with the new replacement tooth added.

PROSTHODONTICS

Lecture:11 **د.محمد رياض**

Flexible dentures:

Flexible dentures will stand in a superior position in fulfilling the various patients demand for more retentive and aesthetic treatment needs. They were previously selected by few patients and clinicians, but now a day it has become an elective treatment option. Soft dentures are an excellent alternative to traditional hard-fitted dentures, when traditional dentures cause discomfort to the patient that cannot be solved through relining. Soft dentures are not the same as a soft reline for traditional dentures. Soft relines use a soft putty-like substance to separate gums from the hard acrylic in dentures. Flexible dentures use a special flexible resin that prevents them from chafing the gums, allows the wearer to chew properly. It also provides a soft base that prevents the gums from being rubbed raw. Some of the commercially available products are: Valplast, Duraflex, Flexite, Proflex, Lucitone Impak whereas valplast and lucitone are monomer free.



Advantages:

Flexible dentures have got various advantages over the traditional rigid denture bases. Translucency of the material picks up underlying tissue tones, making it almost impossible to detect in the mouth. No clasping is visible on tooth surfaces (when used in manufacturing of clear clasps), improving aesthetics. It is comfortable for the patient (thin and lightweight), so it does not fracture even if it is thrown intentionally from some height whereas patient with full acrylic partial or complete dentures often visit the dentist with broken or fractured prosthesis as these are brittle. The material is exceptionally strong and flexible which allows it to engage the undercut beneath the bony exostosis that is not possible in rigid partial dentures. Patients with maxillary tuberosity undercuts often pose challenges in denture fabrication. Flexible denture flanges for those patients can solve this problem. Complete biocompatibility is achieved because the material is free of monomer and metal, these being the principle causes of allergic reactions in conventional denture materials.

Clinicians are able to use areas of the ridge that would not be possible with conventional denture and partial techniques. Patient can wear appliances that would normally not be comfortable. Flexible dentures will not cause sore spots due to negative reaction to acrylic resins and will absorb small amounts of water to make the denture more soft tissue compatible. Flexible dentures may be used as an alternate treatment plan in rehabilitating the anomalies such as ectodermal dysplasia.

Effect on the oral mucosa: Flexible dentures exhibit viscoelastic behavior that lead to improvement in masticatory function and patients comfort compared with hard dentures .They show little effects on the mucosa of denture bearing area and little changes on the mucosa. Denture bearing area of flexible denture is healthier with less tissue changes compared with traditional acrylic denture. Flexible removable partial dentures can adapt to the shape and movement of mouth and for this reason, these are far more comfortable to wear.



Disadvantages:

Flexible dentures generally not used for long-term restorations and is intended only for provisional or temporary applications. Metal frame partial dentures remain the" standard" for long-term restorations. Flexible dentures tend to absorb the water content and will discolor often. The acrylic teeth are mechanically bonded to thermoplastic nylon. Hence the teeth can come out of the prosthesis. When comparing it with cast partial dentures the flexible dentures do not give the patients sense about hot or cold eatables as these are bad conductors. As the surface is not as hard as that of acrylic resin, the depths and the widths of marks were greater than the acrylic resins by the scratch test, thus the polished surface loses its luster by time. When grinding this prosthesis, proper ventilation, masks, and vacuum systems should be used and the procedure is sensitive technique. Extreme caution is necessary when processing to avoid skin contact with the heated sleeve, cartridge, furnace, heating bay, hot cartridge, injection insert, piston head adapter, hot flasks and heat lamps.

Flexible denture base material:

It is polyamide nylon thermoplastic material that does not sacrifice function and preserves aesthetics. It is available in the form of granules in

cartridges of varying sizes. It was first introduced by the name of valplast and flexiplast to dentistry in 1956. These are superpolyamides which belong to nylon family. Nylon is a resin derived from dicarboxylic acid, diamine, amino acid and lactams. Injection-molding technique is used for fabrication of flexible denture base prosthesis. Acrylic resin teeth do not bond chemically with flexible denture base resin. They are mechanically retained by making T shape holes (diatorics) as an undercuts (as shown below) into which denture base resin flows to retain teeth mechanically. This retention technique is known as Retento-Grip tissue bearing technique.

Flexible partial denture:

The removable partial denture can be fabricated from metal alloy, acrylic resin and thermoplastic resins. The removable cast partial denture is a definitive prosthesis which has been in use in dental profession since decades for rehabilitation of partially edentulous patients. It consists of a metal base (made up of base metal alloys, commonly with cobalt-chromium alloy), with acrylic teeth attached to it. Metal retentive clasp holds the cast partial denture in place. The metallic appearances of the clasp may be restrictive for treating the patients who are very much concerned about the aesthetics. When maxillary posterior teeth are missing and only anterior teeth are present, placement of metallic clasps on canines may not be acceptable to the patients.

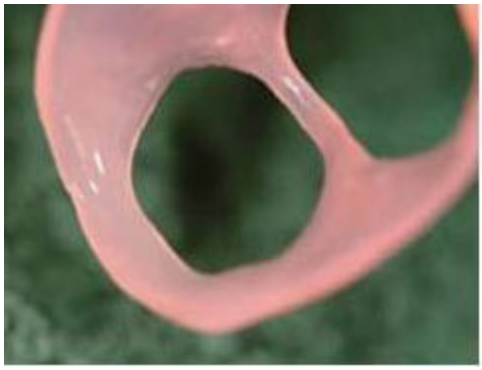
The second type of removable partial denture is all acrylic resin prosthesis, which is also known as temporary, interim removable partial denture or a “FLIPPER”. It acts as a space maintainer and is usually used to restore the function during the treatment until the definitive prosthesis is fabricated.

The flexible partial denture aesthetically has several advantages over the other two types of partial dentures. There is no metal/wire clasps used in FRPDs. Instead of metal clasps, it has thin finger like extensions which extended into undercuts and act as clasps. The clasps of flexible removable partial denture are extensions of denture base into undercut areas and they are also made up of flexible thermoplastic material with

excellent esthetics, which can be adjusted by dipping the clasp area in boiling water and then bending with the plier in or out to increase or decrease the retention.

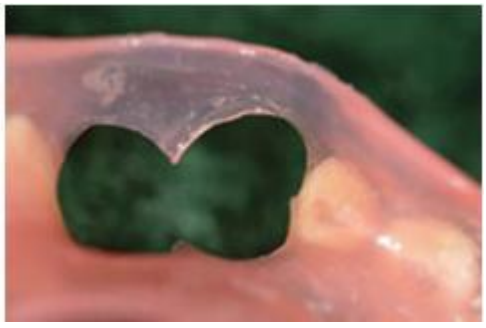
<u>Different clasp designs are used:</u>

Main clasp



Circumferential clasp

Combination clasp (of main clasp and circumferential clasp)



Continuous circumferential clasp

Metal rest and resin clasp

Metal rests and resin clasps

Partial dentures with resin clasp and metal framework

It is also an option for cosmetic improvement of teeth that appear elongated due to recession of gums and also for patients who are allergic to acrylic.

The insertion technique for FRPD:

If FRPD is treated the same as cast RPD or as acrylic RPD during insertion and adjustment there is high a chance that the prosthesis will fail. The insertion technique for FRPDs is a bit different**.** Immediately prior to inserting the appliance in patient's mouth, immerse it in very hot tap water. Leave it in the water for about 1 minute, remove it and allow cooling to the point where it will be tolerated by the patient. Gently insert it in the mouth. The hot water permits a smooth initial insertion and good adaptation with the natural tissues in the mouth. If the patient senses any discomfort because of tightness of a clasp, the clasp may be loosened slightly by immersing that area of the partial in hot water and bending the clasp outward. If a clasp requires tightening, bend clasp inward.

The adjustment for FRPD:

If any reduction is needed due to persistent irritation, the FRPD must be handled differently than acrylic. It is recommended to use green mounted stones. Use a delicate touch with the hand piece rotating between 20,000 and 25,000 rpm in rapid repetitive motion. Then it is smoothened and

polished with rubber wheel. The resin will melt if there is prolonged contact with a bur or wheel, so continuously move the instrument over the surface.

Using green mounted stone to trim

Valplast adjustment kit

Special instructions for flexible denture wearer:

The patient should be instructed to practice good oral hygiene and clean prosthesis regularly after every meal, in order to maintain appearance and cleanliness of the prosthesis because it is prone to staining by various ingredients of food, tea and coffee if it is not polished properly and cleaned by the patient regularly. The prosthesis should be removed during the brushing of the natural teeth, to avoid the scratching of the prosthesis.

To help your flexible partial denture to look and feel like new, please follow these simple instructions:

1- Always rinse your flexible partial under running hot tap water for approximately 20 to 30 seconds before wearing it. The small flexible clasps will get hard and could break if this is not done.
2- Do not wear your partial to bed. Remove at night and keep it in water when not being worn to keep it hydrated.
3- Rinse your appliance after eating to remove food particles.
4- Always remove your flexible partial denture to brush your teeth. Toothpaste is great for your teeth but not for your partial. Brushing your partial with toothpaste may remove the polish and roughen the surface over time. Use a gentle soap and your toothbrush to clean your new partial.
5- Bring your partial to your dentist for ultrasonically dental cleaning. Loose particles can be removed with the use of a sonic denture cleaner. Ultrasonic cleansing devices don't replace brushing but they do help to make your overall cleaning efforts more effective.

Prosthodontics

Lec: 11

Complete Denture

Diagnosis and Treatment plan

د. محمد رياض

Diagnosis: is evaluation of the existing condition, more specifically; it requires identifying, and make judgments about departures from normal .It is:

1- The act or process of deciding the nature of a diseased condition by examination.
2-A careful investigation of the facts to determine the nature of a thing
3- The determination of the nature, location and causes of disease.

Diagnosis in complete denture is a continuing process and is not accomplished in a short time. The dentist should be the first to recognize the problem and be ready to change the treatment plan to meet the new findings.

The factors in these findings will be governed by:

1- Patient's mental attitude.
2- Patient's systemic status.
3- Past dental history.
4- Local oral conditions.

Mental Attitude (Psychological factor):

The success of dental prosthesis is related to many factors, includes functional, biological, technical, esthetic, and psychological. Psychological factors include the preparedness 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.

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:-These patients are evidence little if any concern; they are apathetic and uninterested and lack motivation, they pay no attention to instructions, not cooperate, mostly blame dentist for poor dental health. they do not care to their self image, they manage to survive without dentures, 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:-those patients are excitable, apprehensive, and emotionally unstable and hypertensive. They are neglectful of their oral health and unwilling to try to adapt to wearing dentures. Additional professional help is required prior to and during treatment, 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.

Social information:

- It is necessary as a first step of all patients is the establishment of their identity. Personal information as a name, address, telephone, work and hours of work might help the dentist in the primary estimation of the dental health and prognosis.
-Social setting can help to understand the patient's expectation and their dental status developed.
-Social information may clarify some habits specifically those might contribute of their present conditions and those might help ensure success or failure for the treatment.

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 lose may be as a result 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.

-Debilitating diseases: like diabetes, tuberculosis, or blood diseases should be under medical care.These patients requires extra instructions in oral hygiene, also frequent recall appointments should be arranged because the supporting bone may be affected to keep the denture bases adapted and the occlusion corrected.

- Cardiovascular diseases: patients with such disease may require consultation with cardiologist as some denture procedures may be contraindicated. Short appointments with premedications may be preferable. Such patient must be controlled before dental treatment.

-Joint diseases: joint involvement particularly osteoarthritis present different problems. If the disease involved the tempromandibular 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.

-***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.

-***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.

Other conditions as ***congenital diseases, endocrine, malignancy menopause, psychological, nutritional deficiencies infectious diseases*** may require disease understanding to prepare for successful work.

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 patent's appreciation of dentistry and contribute to the prognosis for prosthodontic success . Patients were 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 experiences*** may be the source of both good and bad habits. Patients may reveal instances of traumatic experiences dating to their first visit to the dentist. Experiences with previous prosthodontic restorations are important in determining patient tolerance, tissue tolerance, and esthetic acceptability; what patient expect from dentures.

-***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.

- ***Patient education*** in dental health is revealed as they discuss their dental treatment.

-Although it is important to strive to raise the quality of care to match the highest of ***patient's expectations***, also is appropriate to lower patent's expectations through education about denture wearing.

Local factors:

Unfortunately, local factors are the only ones considered by many dentists, however it is not enough to make a cursory examination and note the presence and absence of teeth.

Local factors that are considered to afford the ideal environment for complete dentures are:

1-Broad square ridges devoid of undercuts and bony abnormalities.
2- Definite cuspid eminences and alveolar tubercles, broad palate with uniform depth of vault in the maxillary arch.
3-Broad buccal shelves and firm retromolar pads in mandibular arch.
4- A definite vestibular fornix devoid of muscle attachments.
5- Frenum attachments high in maxillary and low in mandibular arches.
6- A clearly defined and well developed lingual sulcus.
7-A lateral throat from that allows suitable extension into the retromylohyoid space.
8- A firm mucosal covering over the denture bearing area.
9-Mucous membrane in the vestibular fornix and floor of the mouth, which is loosely movable attached for denture seal.
10- A gradually slopping palate with a passive reflection at the junction of the hard and soft palate.
11- A tongue normal in size, position and function.
12- A normally related maxilla to mandible.
13-Good muscle tone and coordination in the mandibular movement.
14- Adequate inter-ridge space for the favorable placement of teeth.
15-Saliva is suitable in viscosity and quantity.
16- Hard and soft palate tissues devoid of any signs of pathological disorder.

Evaluation of the local factors would help in the selection of the type of impression to be made, impression materials, method of making maxillomandibular relations, occlusion, and even selection of teeth.

Deviations from these ideal conditions are more often; this does not mean inability to do proper, successful dentures. Any deviations should be noted in the diagnosis so appropriate procedures and modifications can be incorporated in the treatment plan.

The local factors usually evaluated during clinical examinations. . **Examination** must divided into:

- **extra oral** which must exam the orofacial and oral surrounding structures as muscles, T.M.J, symmetry of the face , lips, cheeks.
- **Intra oral** examination must include ridge form(square,round or V-shape) - mucous membrane (healthy firm, flabby, ulcerated, inflamed or normal or any other variations).

Tongue position, size and function.
Ridge if it is flat or not and the palate height (high, shallow, medium),
saliva, presence of retained roots and tori or bony enlargement and sharpness.
Mostly clinical examination precedes radiographic examination.

Diagnostic casts:

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

-The diagnostic casts may reveal new information or confirm that which has already been observed intraorally.

- The cast allows for an evaluation of the anatomy and relationships in the absence of patient.

-The mounting of casts on articulator allows for a dynamic evaluation of the inter arch relations

-The dentist will be looking at each size and symmetry, interarch space, arch concentricity, anteroposterior jaw relationship, and lateral jaw relationships, especially posteriorly where an occlusal crossbite might be indicated.

- Measurement and determination of other structures will assist in making decision on pre-prosthetic surgery.

-Undercuts may be observed unaided, or their significance can be determined more precisely with the aid of dental surveyor.

- Education and explanation of some treatment steps would be easier by using diagnostic casts in some occasions.

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.

-The process requires ***a broad knowledge of treatment possibilities*** and detailed knowledge of patient needs determined by careful diagnosis otherwise the patient will be places in jeopardy of receiving inadequate or inappropriate treatment. Treatment does not terminate with the construction and delivery of a complete denture and the patient should be so advised.

Treatment planning must have ***a parallel process of developing diagnosis***; it is driven by the diagnosis but must take ***other factors*** such as ***prognosis, patient health and attitude*** into account.The patient must be informed about the time required for the procedure and expense. Limitation of the denture must be outlined for the patient with any expected problems.

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.

- Treatment plan is ***a problem solving techniques***; it involve careful analysis of the problem, breaking to components, as possible, generating a list of possible component solutions are implemented; some believed that it is mental exercise; but written a list may assist thinking.

PROGNOSIS BASED UPON

-Bearing surface anatomy, tongue position and floor of mouth posture
-Neuromuscular control
-Denture history
-Psychological classification

Prosthodontics is the most creative segment of segment of dentistry. It is intelligent use of modern techniques and materials justifies the expectation of patient with poor dental health and history and inadequate knowledge of dentistry today.
Educating patients is part of dentist's responsibility for providing dental care. Diagnosing the needs for education is an important as diagnosing the need for prosthesis.

PROSTHODONTICS

Lec:

دمحمد رياض المرحله الرابعه

Pre- Prosthodontic Surgery:

The pre-prosthodontic surgery: is the surgical preparation of the mouth to have residual ridge and mucosal covering free of disease and to be with sufficient quantity and quality to give adequate stability and retention to the denture. The prognosis for successful complete denture service is in direct proportion to the proper preparation of the support.

These procedures should be performed by a surgean thoroughly familiar with the requirement of good stability and retention. Result that are surqically acceptable are not always the best suited prosthodontically . The tearm approach is advocated for those patients.

Pre-Operative Examination:

1- The medical status should be reviewed.
2- Past and present therapies and allergic responses to medication are recoded.
3- Roentogenogrephic study is required.
4- Patient cooperation, attitude of patient must be evaluated.

Most of those patients are aged and it's not enough that their families desire the treatment , The patient himself must understand the procedure , and he must be willing to carry out the instructions in the use and care of the dentures . Patients should participate in the discussion about treatment.Expectations of the patient from the denture should be discussed, if he expects performance like the natural teeth, education is indicated.A complete understanding and acceptance of the limitations of denture performance must be accomplished before treatment.

Medical History should be carefully reviewed, the patient physical status should be evaluated, and the surgical procedures may be compromised by the physical limitation of the patient, many systemic conditions contraindicate the use of dentures and others must be controlled before denture construction. The clinical examination includes the assessment of soft and hard tissues; also we use the radiographic examination which includes:

1- periapical and occlusal X- Rays .

2- Orthopantomograph (OPG)

3- Computerized Topographic Scanning (C.T. Scan).

Q/ What are the characters of ideal edentulous ridge?

1- Provide adequate bony support.
2- Should be covered by normal attached soft tissue.
3- No bony projections or undercuts.
4- No sharp ridges.
5- Adequate buccal and lingual sulcus.
6- No tissue hyperplasia.
7- The muscle fibers and frenum shouldn't interfere with the prosthesis.
8- No neoplastic lesion.
9- Satisfactory relation ship between the maxillary and mandibular ridges.

Pre- Prosthodontic Surgery can be divided into :

A- Soft Tissue Pre – prosthodontic Surgery :

1- Abused tissue: wearing of old denture for many years resulting in distended tissue, so usually impression should not be taken for the complete denture construction until the tissue is restored to the normal condition .

So we ask the patient to :

a- Leave his old denture for a period before taking the impression (48 hours).
b- In case the patient can't leave his denture, (for esthetic factor), we can use a tissue conditioning material before taking the impression.

2- Denture Stomatitis : treatment of this condition depends on the case :

- Occlusal error
- Ill fitting denture.
- Poor oral and denture hygiene.
- Habit of wearing the denture continuously.

3- Papillary Hyperplasia : Granular type of palatal inflammation , and usually related to patient having an old denture due to a relatively large space (2-3 mm) between the palatal mucosa and the fitting surface of the denture .

Note: normal relieve is 0.02 mm

If the hyperplasia is recent, it can be reversible, but, if it is a long standing condition so it requires:

- Surgery
- Scrubbing the area by electrosurgery
- Use the pressure method on the hyperplastic tissue .

4- Denture Hyperplasia : [Epulis Fissuratum]

A benign lesion which is present clinically as excessive tissue proliferation associated with overextension of denture borders or ill- fitting denture. The technique of removal of this tissue is either massage of the mucosa and removes the cause and lastly we think about surgery.

5- Hypermobile or Flobby Ridge : Usually seen in the upper anterior region with six lower anterior teeth articulates with the upper complete denture .

Treatment:

1- Mucostatic Impression Technique.
2- Surgery: but surgical reduction doesn't always produce result due to lack of the underlying bone.
3- Alveoloplasty: produce adequate sulcus depth to improve the stability and retention.
4- Ridge Augmentation: This is characterized by replacing the bone by pieces of bone from the ribs or hip or by using calcium hydroxide injections.

6- Dentulous Tuberosity: Means the presence of excessive tissue in the region of maxillary tuberosity that interferes with the construction of maxillary or mandibular complete denture, this is due to extraction of the lower antagonizing teeth early.This excessive tissue proliferation may be fibrous or bony . so we have to take x-ray .In case we have excess fibrous tissue we can do incision , while if we have bony tissue , mucoperiosteal flap and remove the excess bone by hand piece or any rotatory device .

7- Frenum Attachment : sometimes , the extension of the denture base flange may be prevented by the bands of muscle fibers or high frenum attachment to the crest of the residual ridge , this lead to displacement of the denture during function .

Treatment:

Frenoctomy or frenoplasty .

B- Hard Tissue pre- prosthodontic Surgery:

1- Removal of retained roots and impacted teeth.

2- Alveolectomy and alveoloplasty for smoothing and reshaping ridge abnormalities.

3- Management of maxillary and mandibular torus .

4- Removal of bony undercuts .

5- Mylohyoid ridge .

6- Enlarged bony tuberosity .

1- Torus palatinus :

Bony exostoses present in 25 % of population with female predilection (12 female : 1 male) , it's composed entirely of cortical bone and sometime cancellous bone .

Indication for removal:

a - Extremely large torus which full the palatal vault.

b- Torus extended to the posterior palatal seal.

c- Deep bony undercut.

d- If the torus interfere with the function or speech or deglutition

e- Psychological consideration (cancer phobia)

Treatment:

Reflcet a mucoperiosteal flap and then use a rotatory bur or ronger to remove the torur , and you must take care not to perforate the palate to the nasal cavity or maxillary sinus .

2- Torus Mandibularis :

It's less frequent affect 8 % of the population with **male** = **female** It might be single or multiple or lobulated .

Indication for removal :

When it cause undercut or affect the extension of the denture flange , but there's a possibility of artery damage leading to hemorrhage .

3- Mylohyaid Ridge:

Painful denture irritation.

Treatment:

Mucoperiosteal flap

4- Lacke of denture Bearing Area :-

When the teeth are extracted ,this lead to atrophy and resorption of the jaw bone, so in this case we can do:-

Vestibuloplasty:- which is a surgical displacement of the unattached mucosa and muscle attachment from the alveolar crest and repositioning them deeper in the sulces , this resulting in greater flange extension and

support and also will enhance the support , stability , and retention This type of surgery requires enough residual bone to extend the sulcus , so in case of sever resorption of the body of the mandible , this Rx is not suitable , so we either do :

1- **Mucosa advancement:** of normal health mucosa to linedand extended sulcus (no flap), but relapse reported in 20 % of cases depth.
2- **Secondary epithelialization:** this technique involve opical positioned flap sutured to the periosteum at a predetermined depth then the exposed tissue will reepithelialize deepening of the sulcus.
3- **Epithelial grafting:** This technique is similar to secondary epithelialization, but the denuded area is covered by a graft tissue from donor epithelium (skin or palatal mucosa).

Disadvantage of skin grafting:

Lack of retentive properties of the denture and contain hair follicles

Disadvantage of buccal mucosa:

Very thick and lack abrasion resistance.

Ridge Augmentation: Reconstruction of atrophic ridge (maxillary or mandibular) With interpositional autogenously bony graft which is usually from the area of rib bone and usually the upper border of the mandible is included this case .

Implant: Also regarded as a preprosthodontic.

Prosthodontics
Complete Denture
Complete Denture Impressions

Lec 12

A complete denture impression :- is a negative registration of the entire denture bearing ,stabilizing, and border seal areas present in the edentulous mouth. The impression should record all the potential denture- bearing surfaces available, this surface is identified if the biological considerations of impression making are understood correctly.

Objectives of impression:

Complete denture impression procedures must strive for five primary objectives :

1- ***Preservation: -***

Preservation of the remaining residual ridge is physiologically accepted that with the loss of the stimulation of the natural teeth the alveolar ridge will atrophy or resorb. Prosthodontist should keep in mind the effect of impression material and technique on the denture base and the effect of the denture base on the continued health of both the soft and hard tissues of the jaws.

2- ***Support:-***

Maximum coverage provides the "snow shape" effect, which distributes applied forces over as wide an area as possible. This helps in preservation, stability, and retention.

3- ***Stability:-***

It is the resistance to the dislodgement by functional, horizontal or rotational stresses. Close adaptation to the undistorted mucosa is most important. Stability, or the resistance to the horizontal movement decrease with the loss of vertical height of the ridges or with the increase in the flabby movable tissues.

4- Esthetics:-

Border thickness should be varied with the need of each patient in accordance with the extend of residual ridge loss. The vestibular fornix should be filled, but not overfilled, to restore facial contour.

5- Retention:-

It is the resistance to dislodgement away from tissue foundation area. It is too often given more considerations than is necessary. It should be readily seen that if the other objectives achieved, retention will be adequate.

Factors affecting retention are:

1. ***Atmospheric pressure:*** It depends on peripheral seal. To insure this seal, denture borders should extend into, but not to the extent to damage, movable tissue.
2. ***Adhesion:-*** is the attraction of saliva to the denture.

3. ***Cohesion:-*** is the attraction of molecules of saliva to each other.
4. ***Mechanical locks:-*** these locks of undercuts prove to be intolerable to the patient. The soft tissue is subjected to damage during the insertion and removal of the denture.
5. ***Muscle control and patient tolerance:-*** Dentures are often be retained in the mouth because of the adaptability of the muscles of the lips, tongue, and cheeks and patient tolerance.

Impression Technique:-

Many techniques in impression making are used and discarded. Different concepts relative to position of the supporting soft tissues when they are recorded in the impression. It is not implied that one technique will produce satisfactory results, as there are many approaches to a desirable end product. There are many classification that used to classify impression techniques:

1. ***Classifications according to mouth opening:***

A. ***Open mouth technique:*** in which the impression is made while the mouth is opened. The border molding mostly is made by the dentist and the tissues are recorded in rest. It is preferable by many dentist because it allow for good view of the mouth and control.

B. ***Closed mouth technique:*** in which the impression is made while the mouth is closed. The border molding mostly is made by the patient under the control of the dentist and the tissues are recorded in function. Disadvantages of this technique is restriction of the tongue movement which might lead to overextension lingually.

2. ***Classification according to the pressure applied:***

A. ***Mucostatic (Non Pressure) technique:*** Mucostatic theory based on Pascal' law sets out to record the mucosa in its static (supported by the underlying basal seat) unstrained form. This is possible only if the impression material is watery and virtually requires no pressure to place it against tissues. The limitation of this concept is the displacement of the denture under functional load.

B. ***Mucocompressive (Pressure) technique:*** The muco-compressive theory claims to record the tissues in their functional/ supporting form so as to achieve stability in occlusal function. Some dentist believed that this concept is not encouraging since the seeks to subject the tissues to a continuous pressure which is conductive to resorptive changes in basal tissues. In addition to this, displaced tissues tend to displace the denture in their attempt to return to their original form.

C. ***Minimal pressure theory:***It is a compromise between the previous two techniques. It advocates application of minimal possible pressure which is

supposed to be little more than the weight of free flowing material. No clinical way that can be determine or measure how much minimal pressure to be applied.

D. ***Selective pressure theory:-*** It is the most accepted theory. The idea is to vary the pressure over the denture seat depending on the displaceability of the supporting tissues due to its anatomy and hence transferring the load over to the selected areas of the seat e.g. buccal shelves areas in the lower arch. The tray used for this technique must be extended to maximum coverage but within the tissues tolerance with light pressure or intimate contact with movable, loosely attached tissues in the vestibules.

Impression Trays

Is a devise that is used to carry, and control impression material while making an impression, trays used for complete denture construction are metal non perforated, some times perforated type may be used depending on the impression material used. The tray is the most important part of the impression making procedure.

- If it is too large, it will distort the tissues around the borders of the impression away from the bone (over extended of the sulcus).
- If it is too small, the border tissue will collapse inward onto the residual ridge which will distort the accurate recording of the border extension and prevent the proper support of the lips by the denture flanges(under extension).
- Tray borders must allow for border control of the movable tissues and enough space must be provided between the tissue and the tray for the impression material to record the denture bearing area with minimal or selected area displacement.
- Because each mouth is different, the impression procedure in C.D. construction involve making a preliminary impression in a stock tray and poured with a plaster and the resulting cast used to construct a custom tray which is used to make the final impression.

To achieve a successful impression, the following concepts should be adhered to, irrespective of the selected technique:

1- The tissues of the mouth must be healthy.
2- The impression should extend to include all of the basal seat with in the limits of the health and functions of the supporting and limiting tissues.
3- The border must be in harmony with the anatomical and physiological limitations of the oral structures.
4- A physiological type of border –molding procedure should be performed by the dentist, or by the patient under the guidance of the dentist.
5- Proper space for the selected impression material should be provided within the impression tray.
6- Selective pressure should be placed on the basal seat during the making of the impression.

7- The impression must be removed from the mouth without damage to the mucous membrane of the residual ridges.
8- A guiding mechanism should be provided for correct positioning of the impression tray in the mouth.
9- The tray and the impression material should be made of dimensionally stable materials.
10- The external shape of the impression must be similar to the external form of the complete denture.

Primary impression:-

* Stock trays are usually used to make primary impression, these trays are either metal or plastic, perforated or not.
* It is important to make accurate primary impression, otherwise unsatisfactory primary impression result in unsatisfactory special tray this will lead to more effort and time to have an accurate final impression.
* Even correctly selected stock tray that fit the denture bearing area perfectly will not exclude the use of custom tray.
* The material used for primary impression making must give enough bulk and can compensate the deficiencies of the stock tray.
* The recommended material is impression compound although high viscosity alginate may be preferable by some dentist in spite of its limitation.
* Impression compound can molded easily accepted and tolerated by the patient, enough stability, sticks to the tray without the need to mechanical or chemical means, no need for separating medium during pouring.

Final impression

Making accurate final impression for complete denture is multistage.
*The major requirements for final impression of complete denture is to develop peripheral contours to accommodate normal muscular function and to achieve peripheral adaptation and seal without allowing air penetration between the impression or final denture base and the mucous membrane.
* Special tray usually used for final impression making which is constructed on the primary cast. It must be made from adjustable material so any overextended areas can be corrected (cold cure acrylic mostly used).
* Flanges of the tray must be less than the depth of the vestibule about 2mm allowing a space for the material.
* The material used for border recording is compound stick; it has a good flow that records the details very well and gives good peripheral seal.
* During the impression procedure muscle zone record can be achieved either by the patient or the dentist or both depending on the impression technique.

* All the borders (labial and buccal) must be molded in the same way as in the primary impression.
* Final impression material must have good flow and proper details recording, zinic oxide eugenol past among preferable final impression materials, petroleum cream or gel can help to prevent material stick to skin.
* During lower impression making (primary or final), the labial flange is molded by lifting the lower lip outward, upward and inward, buccal flange is molded by pulling the cheek upward and inward, buccal frenum is molded by lifting the cheek outward, upward, inward, backward and forward to simulate the movement of the frenum.
* The lingual flange is molded by asking the patient to protrude the tongue to determine the length of the lingual flange and its distal end. Then ask the patient to push the tongue against the front part of the palate to determine lingual flange thickness in the anterior part and help the dentist determine the length and slope of the lingual flange in the molar region.
* Molding of the flanges in the upper impression making, elevate the upper lip and extend it out, downward, and inward, shape the buccal frenum, posterior palatal seal area is determined by asking the patient to say short (ah).

PROSTHODONTICS

Lec: 15

المرحله الرابعه دمحمد رياض

Impression of the complete denture:

Impression: - it is a negative impression of the edentulous area that poured with plaster or stone and produces a primary cast or master cast.

The advantages of making primary impression and having primary cast (study cast):

1- To see the problems associated with that kind of ridges (undercuts in the premaxilla , buccally to tuberosity and lingual vestibule in the lower arch) .
2- To show the patient the problems associated with his future denture.
3- To see the laboratory difficulties and how to overcome these problems.
4- To indicate the difficulties that will face the dentist during making the final impression.
5- To eliminate the undercuts and for proper extension of the borders (mucobuccal fold) as posterior palatal seal area and the area buccally to tuberosity.
6- To construct a special tray (individual tray or custom tray).
7- Also in some cases to choose the final impression material that will be suitable for that case after seeing the ridge, the mucosa…….

Why do we make primary impression with impression compound not with alginate or heavy body?

1- It gives good details.
2- Bulky material and will reach to the undercuts like premaxill and buccally to tuberosity.
3- Dimensional stability.
4- If it is used properly it will not be harmful to the tissues (It is softened at 60- 65 C and hard at mouth temperature), it is thermoplastic material.
5- If there is a small deficiency, it can be prepared by adding small amount of the material.
6- If it is not used properly, we will face difficulties in making final impression.

What are the types of the tock trays?

1- Stainless steal trays
2- Aluminum trays
3- Plastic trays

What are the objectives of making final impression for complete denture patients?

1- Support
2- Stability
3- Retention
4- Improve esthetics
5- Function (Mastication) with the physiological and biological limits of the oral tissues.

The special tray:

When the primary impression is completed, it is poured to get the study cast on which a special tray is constructed. Before starting the construction of the special tray certain lines must be determined:

1- Mucobuccal fold line that is drowning by holding the pen perpendicular to the cast and passing it through the sulcus.

2- The second line is 1-2 mm above the first line and it represents the final extension of the special tray.

Special Tray: - it is a device that is constructed or specified for specific patient on the study cast to carry and confine the final impression material in order to make the final impression, it is also called custom tray or individual tray.

The properties of the special tray:

1- It gives correct adaptation to tissue.

2- It gives equal and adequate amount of space between the tissue and tray and thus give uniform space for the impression material, the uniform thickness of the impression material leads to equal pressure on the tissues of the denture bearing areas like giving a thickness of 1-2 mm in the whole area while the stock tray give about 10mm so shrinkage or deformation will occur .

3- It should be rigid and strong to resist heat, insertion and border molding that is mean to withstand manipulation (resist heat and pressure).

4- Adjustable: that means you can add or remove from the tray.

5- Comfortable: no injury or pain during insertion or removal from the patient's mouth. (That's obtained by well roundening of the flanges and good polishing).

Materials used for construction of the special tray:

1- Shellac base plate (not common) leads to fracture easily.

2- Cold cure acrylic (most common). Strong and adjustable.

3- Impression compound (in certain technique).very hard and difficult in manipulation.

4- Wax (in certain technique) Flexible.

The Spacer: one layer two or three of molding wax depends on the technique and the quality of tissue. Made of molding wax adapt on the study cast to have space between inner surface of the special tray and the tissue.

1- According to the Technique :

A- Mucobuccal impression technique: The end of the spacer ended with the end of the tray and this space will provide a pathway for escapement of the material (here we use impression plaster as impression material).

B- Pressure impression technique (mucofunctional): The end of the tray is in contact with the tissue (that is no spacer is used only a layer of cold

mold seal is painted), here zinc – oxide eugenol is used as impression material.

C- Selective pressure impression technique: thick tray can exert pressure on the buccal shelf area (here we use silicon or rubber base impression material).

Correction of the special tray:

A/ In Lab : This is done in the lab by providing a smooth , well rounded , polished and cleaned wax before insertion in patient's mouth , and (the spacer) should remain inside the tray as it affects the form and determine a correct extension .

B/ In the Clinic (inside the patient's mouth):

a. Upper Special tray:

The correction of the anterior region under visual examination; insert the tray inside patient's mouth and by visual judgement of the frenum position, mark it on the tray and trim it. So the labial frenum and the flange should be checked, also the buccal frenum either by visual or hand examination to determine if there's an over extension is present and should be corrected, and we should also check the height of the flange and its thickness. Finally you should have the end passed the fovea palatinae by 3-4 mm.

Fovea palatinae: openings of salivary glands one on each side of the median palatine line.

The border molding: The tracing should be from outside on the buccal flange in all areas except posteriorly (in the palatal seal area) to provide a better seal. And if you put tracing on the anterior region from the inner aspect, this will lead to different positioning of the tray. And at the end of the border molding the special tray should be retentive and stable (at rest and function). The stability is poor when the special tray fall down during rest and function (movement), (do another muscle molding).

b. Lower special tray:

Also the labial frenum is checked by visual judgment, the buccal frenum also by visual or hand or by pencil to mark insufficient room by insertion of tray and reflection of lip.

- Buccal Flange Area (buccinator muscle): The disto – buccal area is checked to adjust the length of special tray in the buccal region so we ask the patient to open a small opening, when the special tray move or go upward, thus on over extension is present and the movement done by the buccinator muscle as the over extension present on it.
- Wide Opening (check masseter muscle): So when the special tray move up, this mean there's an over extension in the disto-buccal region: and the action of dislodgement of the masseter muscle is indirect.
- Very Wide Opening: By this opening we can find the pterygomandibular raphe and when the special tray go upward so there's an over extension in this area.

- Mylohyoid Region : Ask the patient to move his tongue to the left , so if there's an over extension so movement will occur on the right side as the mylohyoid muscle will elevated .
- Reteromylohyoid region: Ask the patient to move his tongue as far as he can in the lateral direction and if there's an overextension, this will lead to special tray dislodgement.
- Lingual Frenum: Ask the patient to put the tip of his tongue in the posterior part of the palate so if there's an overextension or insufficient space for the frenum, this will lead to special tray dislodgement .

The border molding: The border molding is either one step or step by step. Also done by the tracing wax on the lingual and then the buccal surface and it's more difficult than that of the upper , but the most important point is that the direction of the extension of lingual flange should be medially to provide some sort of seal with the tongue and floor of the mouth .

The extension of the flange in the molar region : this is very important as the anatomy of the mylohyoid muscle is important as the direction of this muscle in the posterior area is oblique , while in the anterior region is in horizontal direction , so we should do relief in the posterior region (mylohyoid line) .

Correct Border Molding: Correct the adaptation to check, lip and tongue as the area is limited for the lower special tray and to have a good retention will be limited too, so we should use the stability effect of oral and facial muscles and by moving the tongue in several directions, and at the end we should have a retentive and stable special tray. So the step by step border molding , starting by heating and applying of tracing wax to the border of the special

tray and as following : right labial flange , left labial flange , right buccal flange, then left buccal flange.

One step border molding: (time consuming & if the patient in hurry)

Sometimes we use different materials but a rubber impression material is used to cover the whole border of special tray (with certain materials)

Then we insert it and do border molding by pulling the lip and cheek downward & backward with rotational movement (for the upper) and upward & backward movement with rotational movement also (for the lower).

The advantages of one step border molding:

1- Its one step: that means procedure is carried out at the same time.
2- Less possibility of error if placed correctly

The disadvantages:

- It's difficult and need well trained dentist.

Procedure for making final impression:-

Before starting the procedure, you should be sure that the special tray is retentive and stable and have enough space for the impression material. The most widely used material is Zinc Oxide Euginole to which a close fit special tray is needed and does not need a retention mean , but if rubber base is used then a retention mean is needed which is either an adhesive material or perforated special tray. As for Zn O/E The mixing is done according to manufacturer recommendation by using equal lengths and small amount (about 5-6 cm) and the mixing is done on the oil resisting pad or

mixing slab paper and when we obtain a homogenous mixture , this give an indication of correct mixing , also the mixing time is important and should follow the manufacturer instructions .

Then we paint the tray and insert it in oblique direction by reflecting the cheek , then centralize the tray and seat it with reasonable pressure and then do border molding (upward , downward , forward and backward for the upper & downward , upward , forward and backward for the lower) . Also ask the patient to open his moth widely and move his mandible to the right and left, why? Because the mandible has effect on the disto buccal part by the coronoid in order to get uniform thickness of the flange.

After setting of the material we remove it by breaking the seal and remove it and examine it for any deterioration, deformation, the flange area, room for frenum, length and width of impression.

This step is important and we should do border molding to the lingual flange by moving the tongue from side to side and put it in the posterior part of the palate and also to protrude if forward and in lateral direction.

The protrusion of tongue in forward and in lateral direction is to do border molding in the molar region in myohyoid and retromylohyoid area , and the placement of tongue in the palatal part is to provide sufficient room for the lingual frenum .

Then after removal we should inspect the special tray and impression.

Notes:

A- Zn O/E and Impression plaster can't be used when some undercuts are present , also it's unwise to use it in a patient with dry mouth (as it will stick to the dry surfaces). Removal of the material by alcohol from patient mouth surface. So we either use rubber base or silicon impression material, if rubber base is to be used, the spacer should be kept until border molding is finished, and then removed before final impression is made, if plaster of paris is used, then the tray should be spaced all around.

B- In case of plaster of paris is used, there's no need for border molding (because it's a bulky material and gives us the thickness) .

C- We said the extension of the lingual flange is the most important and this extension is limited by several easily displaceable structure , so in order to have a proper extension care should be taken for the following:

1- The anterior part of the lingual flange (the lingual frenum area) by asking the patient to touch the posterior part of the palate after adding tracing wax (tracing stick compound).

2- The molar region , by which the extension is determined by the myohyoid muscle, so ask the patient to protrude his tongue and the floor will raised and the extension will be determined and some area of the compressible tissue will allow slight horizontal extension that will not interfere with the muscle function so providing some sort of peripheral seal .

3- The retromylohyoid space , here the extension is determined by the superior constrictor muscle by asking the patient to protrude his tongue

laterally and the importance of this area is that it provides retention and stability for the denture , and in case of severe resorption of the lower R.R. then the only area that give retention is this area .

D- The extension of the buccal flange is important and determined by buccinator muscle.

5- For old patients with severe resorption, we can do some sort of over extension because of the limited movement of the tongue and should not interfere with muscle action (remains within the physiological limit of health and function).

E-The (1-2 mm.) shortness of the flange of special tray will be rebuilt with tracing compound.

F- The patient should rinse his mouth thoroughly before impression is made to remove food debris and excessive saliva and clean it.

Lec: 8

Prosthodontics
((Maxillo-mandibular relation))

- **Maxillo-mandibular relationship record**: It is a registration of any positional relationship of the mandible relative to the maxillae .These records may be at any vertical, horizontal, or lateral orientation.
- **Types of jaw relation :**
  - **A- Vertical relation**
    - 1- Vertical relation of occlusion.
    - 2- Vertical relation of rest postion.
  - **B- Horizontal relation :**
    - 1- centirc jaw relation
    - 2- Eccentric jaw relation → lateral jaw relation
      → Protrusive relation

(Vertical jaw relation)

- **Vertical dimension:** The distance between two selected points, one on a fixed and one on a movable member. In general vertical measurements of face could be recorded between any two arbitrary selected points which are usually located one above the mouth at the tip of nose and the other below the mouth at the tip of chin in the mid line region.
- **Rest position (physiological rest position):** It is a postural position of mandible when an individual is resting comfortably in an upright position and the associated muscles are in a state of minimal contractual activity.
- **Rest vertical.dimension:** The distance measured when the mandible is in the rest postion.
- **Occlusal vertical dimension:** The distance measured between two points when the occluding members are in contact. (Occluding teeth or occlusal rims are in contact).
- **Inter occlusal distance (free way space):** The distance between the occluding surface of the maxillary and mandibular teeth, when the mandible is in its physiological rest position.
- **The difference** between the R.V.D (Rest vertical dimension) and O.V.D (occlusal vertical dimension) is the inter occlusal distance or free way space and equal 2-4 mm.
  RVD – OVD = Inter occlusal distance (2-4 mm).
- **Vertical dimension of speech:** The distance measured when the occluding members are in their closest proximity during speech.

((Importance of vertical dimension))

1- Functional roles include :

a-Mastication b- Respiration c- Deglutition d- Phonetics.

2- Psychological role.

3- Esthetic role.

4- Comfortable role by maintenance health of tissue, mucosa, bone, muscles and T.M.J (tempro-mandibular joint).

(Consequences of incorrect vertical dimension)

A- Increased vertical dimension.

1- Interference with speech.
2- Sensation of bulk (bulky denture).
3- Premature contact of upper and lower teeth.
4- Instability of dentures due to their excessive height.
5- Acclerated resorption of residual alveolar ridge.
6- Loss of biting power.
7- Clicking of teeth in speech and mastication.
8- Muscular fatigue.
9- Separated upper and lower lip with poor esthetics.
10-Apparent in ability to open mouth widely.
11-Inharmonious facial proportion.
12-Excessive display of artificial teeth and gum.

B- Decreased vertical dimension.

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

(Methods of recording vertical relation)

A- Methods of recording rest vertical dimension:

1- **Facial measurements:** Instruct the patient to sit upright and relax, then ask the patient to wipe his lips with his tongue, to swallow and to drop his shoulders. When the mandible drops to rest position measure between the points of reference (nose and chin).

2- **Tactile sensation:** Instruct the patient to stand erect and open the jaws wide until strain is felt in the muscles. When this opening

becomes uncomfortable ask him to close slowly until the jaws reach a comfortable relaxed position. Measure the distance between the reference points and compare with the measurements made after swallowing.

3- **Phonetics:** The patient is asked to repeatedly pronounce the letter "m" a certain number of times. When the lips touch, ask him to stop all jaw movement. At this time measure between the two reference points.

4- **Facial expression:** The experienced dentist may notice the relaxed facial expression when the patient's jaws are at rest. In normally related jaws the upper and lower lips should have a slight contact in a single plane. Also the skin around the eyes and chin should be relaxed. It should not be stretched, shiny or excessively wrinkled.

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

6- **Electro – myographic method:** It is a special device that measures the tone of the masticatory muscles, when the tone is at its least, this means these muscles are in rest position and the jaws are at rest position.

B- Methods of recording occlusal vertical dimension :

1- **Pre-extraction records:** These records are made before the patient extracts all opposing teeth and loses his occlusal vertical dimention, these records are:

a- profile photographs: These photograph are made and enlarged to life size. They should be taken in maximum occlusion, and then measurements of anatomical landmarks on the photograph are compared with the same landmarks on the face. These measurements can be compared when the artificial teeth are tried in.

b- Profile silhouettes: A reproduction of the profile in silhouettes can be cut out in cardboard or contoured in wire. These can be repositioned on the face after vertical dimension is established at initial recording (occlusion rims) or when the artificial teeth are tried in.

c- Radiographs: cephalometric profile radiographs and radiographs of the condyles in the fossae are used to determine the vertical jaw relation but their use is limited due to the inaccuracy of the technique.

d- Articulated casts: when the patient is dentulous, a maxillary and mandibular casts are made and mounted in centric relation on an

articulator. After the teeth have removed and the edentulous casts have been mounted on the articulator, the inter arch meansurements are compared.

e- **Facial measurements:** Two tattoos are marked on the upper and lower halves of the face before extraction .The vertical dimension is measured at occlusion and recoreded. This measurement is used after extraction.

f- **Measurements of former dentures:** Patient's previous denture can be used to compare the measurements with measurements made during the record-making procedure, and the measurements can be correlated with observation of the patient's face to determine the amount of change required.

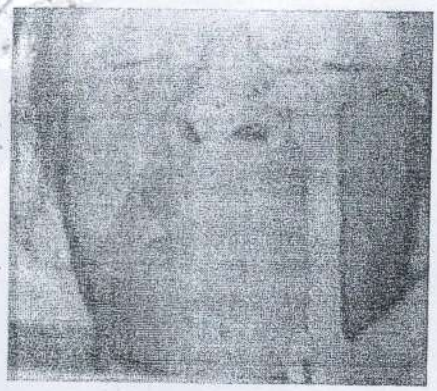
2. Methods without pre-extraction records:

a- power point (by Boos): A metal plate is attached to the maxillary record base. A Bimeter is attached to the mandibular record base. This bimeter has a gauge, which shows the amount of pressure acting on it. The record bases are inserted into the patient mouth and the patient is asked to bite on it at different degrees of jaw separation. When the highest value is reached, this is called the power point which represents the occlusal vertical dimension.

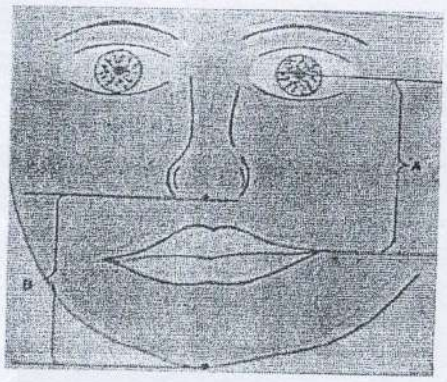
b- Neuromuscular perception: A central bearing device attached to accurately adapted record bases permits the patient to experience through neuromuscular perception the different vertical relations. The central bearing screw is adjusted downward and upward until the height of the contact feels right to the patient and this represents the occlusal vertical dimension.

c- Swallowing threshold: The theory behind this method is that when a person swallows, the teeth come in contact together with a very light contact at the beginning of swallowing cycle. This factor can be used as a guide to determine occlusal vertical dimension. The technique involves building cones of soft wax on the lower denture base so that it will contact the upper occlusion rim with the jaws too wide open. The flow of saliva is stimulated by a piece of candy. The repeated action of swallowing the saliva will gradually reduce the height of the wax cones to allow the mandible to reach the level of occlusal vertical dimension.

d- Phonetics: Phonetics methods are widely used to evaluate the proper vertical dimension of occlusion. During pronounciation of sounds like ch, s, j, the upper and lower teeth reach their closest relation without contact.

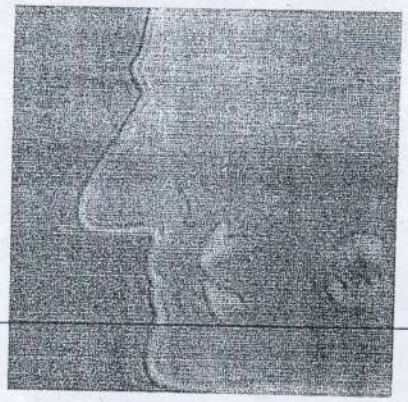


Facial measurements using two dots (nose and chin).

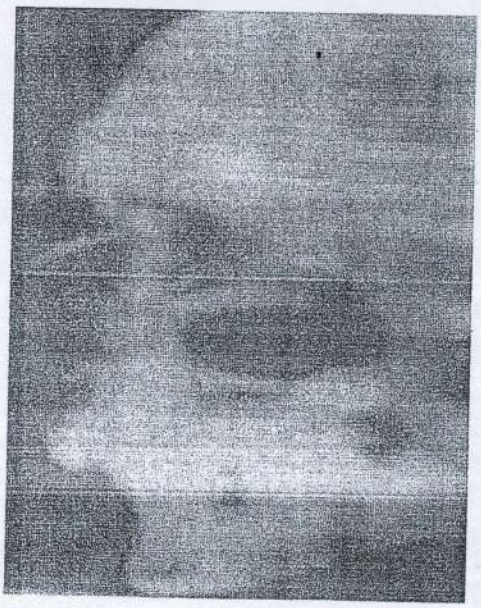


Anatomical landmarks to determine RVD (Distance A=B).

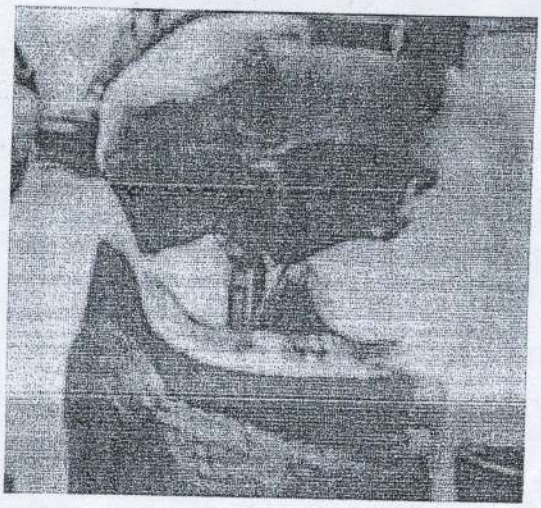
Profile photograph is used to determine OVD.



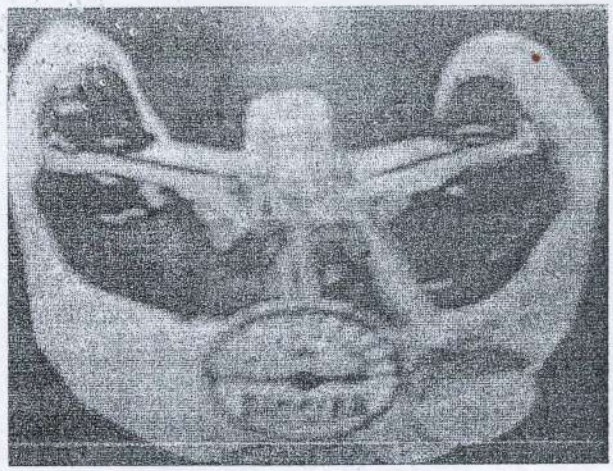
Profile silhouettes is used to determine OVD.



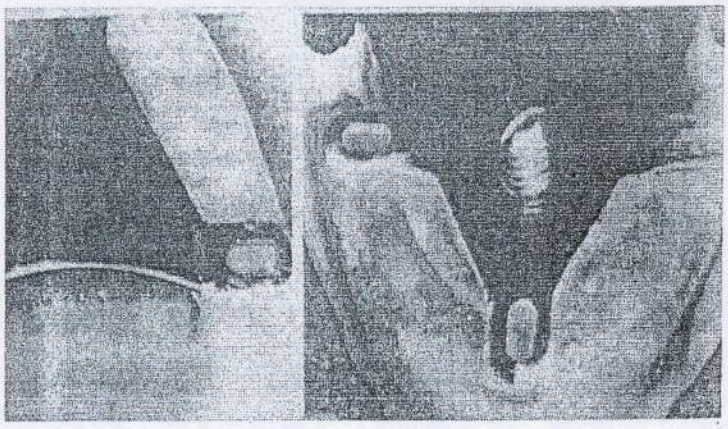
Cephalometric radiograph.



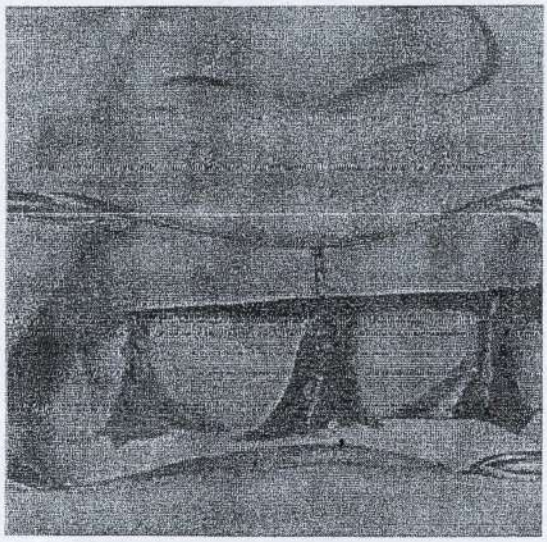
Articulated casts are used to determine OVD.



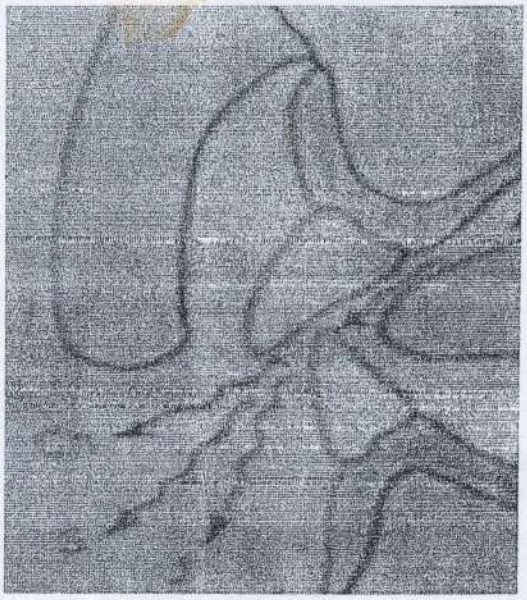
Boos bimeter is used to determine the power point which represents OVD.



Central bearing device with screw to determine OVD through neuromuscular perception.



Swallowing method using cones of soft wax to determine OVD.



Phonetics method (closest speaking relation).

Lec: 9

(Prosthodontics)

Horizontal jaw relations: It is the relationship of the mandible to the maxilla in a horizontal plane. It can also be described as the relationship of the mandible to the maxilla in anteroposterior and side to side direction.

- The horizontal relations include:

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

A. protruded or forward relation.

B. Left or right lateral relation.

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

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

Importance of centric jaw relation (significance):

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

(Methods of recording centric jaw relation):

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

1- (Functional methods):

A- Needles-House technique: The needle-House method uses compound occlusion rims with four metal styli placed in the maxillary rim. When the mandible moves with the styli contacting the mandibular rim and cut four diamonds-shaped tracings. The posterior most point of this diamond pattern indicates the centric jaw relation.

B- Patterson technique: The Patterson method uses wax occlusion rims. A trench is made in the mandibular rim and a mixture of half plaster and half pumice is placed in the trench. The mandibular movement generates compensating curves in the plaster and pumice. When the plaster and

pumice are reduced to the pre-determined vertical dimension of occlusion, the patient is instructed to retrude the mandible and the occlusion rims are joined together. The disadvantages of Needle-House and Patterson techniques involve lateral and anteroposterior displacement of the recording bases in relation to the supporting bone while the record is being made.

C- Swallowing technique: In this method, soft cones of wax are placed on the lower record base. The wax cones contact the upper occlusion rim when the patient swallows. This procedure is supposed to establish both proper vertical and horizontal relation of mandible to maxillae.

2- (Graphic methods): The graphic methods record a tracing of mandibular movement in one plane (horizontal plane). These movements in the horizontal plane describe a figure known as the Gothic arch tracing, also known as arrow point tracing. The apex of the tracing is the centric relation position, with the two sides of the tracing originating at that point being the limits of lateral movements. A needle point tracing made on a tracing table coated with carbon or wax can be used to indicate the relative position of the upper and lower jaw in the horizontal plane. Graphic methods are either intra-oral or extra-oral depending upon the placement of the recording device. The extra-oral is preferable to the intra-oral tracing, because the extra-oral is more accurate, more visible and larger in comparing with intra-oral tracing.

3- (Tactile) or inter occlusal check record method: In inter occlusal method the centric relation is recorded by placing a recording medium between the record bases when the jaws positioned at centric relation. Materials that are commonly used for inter occlusal records include plaster, wax, zinc oxide eugenol paste, cold cure acrylic, impression compound, silicon and polyether. The patient closes into the recording medium with the lower jaw in its most retruded position and stops the closure at predetermined vertical relation. This method is simple because mechanical devices are not used in the patient mouth and are not attached to the occlusion rims. This method has the advantage of causing minimal displacement of the recording bases in relation to the supporting bone.

(Indications of inter occlusal check record):

1- Abnormally related jaws.
2- Displaceable, flabby tissue.
3- Large tongue.
4- Uncontrollable mandibular movements.
5- It can also be done for patients already using a complete denture.

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

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

(Factors that complicates centric relation record):

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

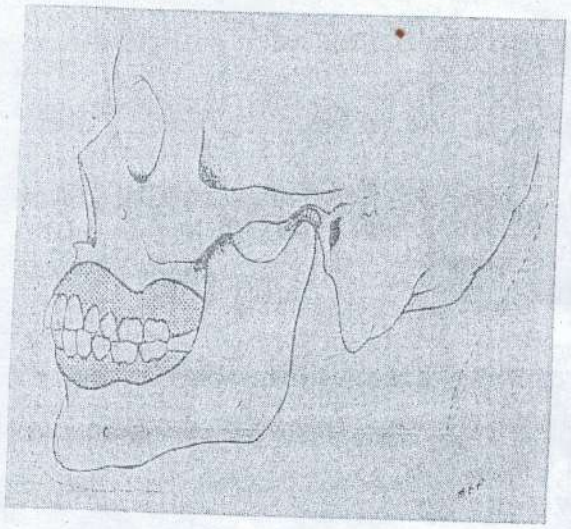
(Eccentric jaw relations): Any relationship between the jaws other than centric relation.

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

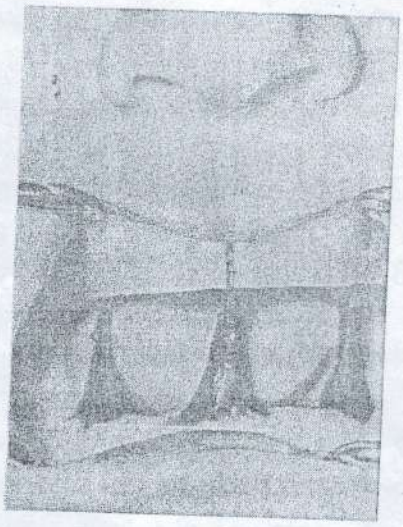
(Methods of recording eccentric jaw relation): The main reason in making an eccentric jaw relation is to adjust the articulator to simulate the eccentric movement (lateral and protrusive) of the mandible to maxilla, and to establish balanced occlusion. The records are made in the same manner as for centric relation record and these include the functional, graphic and inter occlusal record for protrusive, left and right lateral movement. Inter occlusal eccentric records may be made on the occlusion rim before the teeth are set up or on the posterior teeth at the try-in appointment. When this record is made on Hanau articulator, the following formula is used to obtain an acceptable lateral inclination:

$L = H/8+12$

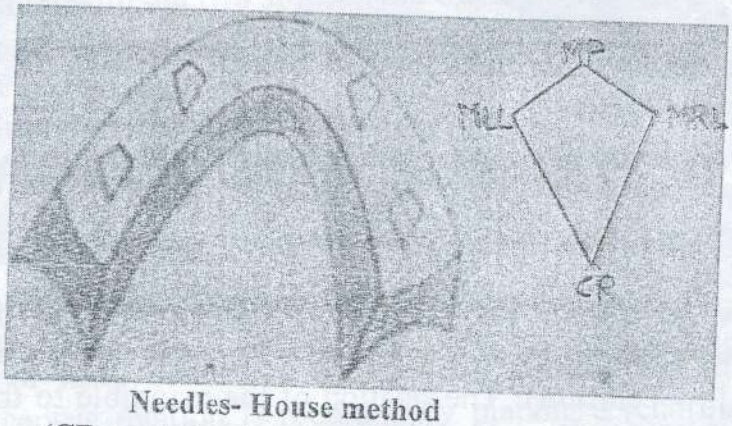
L = lateral condylar inclination in degrees.
H = horizontal condylar inclination in degrees as established by the protrusive relation record.



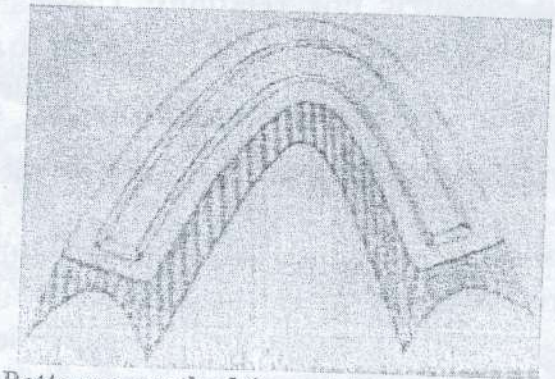
Centric jaw relation (bone to bone relation)
Centric occlusion (tooth to tooth relation).



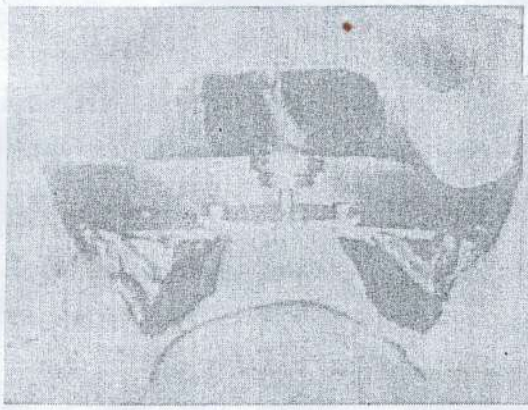
Swallowing technique (soft cones of wax are used).



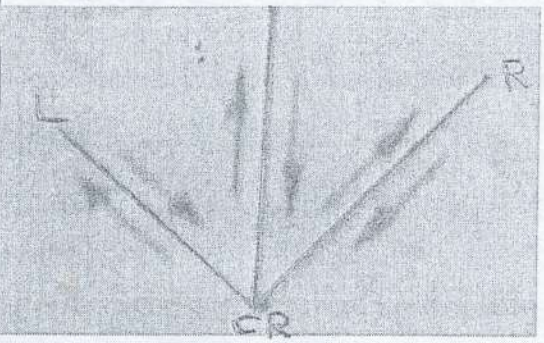
Needles- House method
(CR=centric relation, MP=maximum protrusion,
MLL= maximum left lateral, MRL=max right lateral)



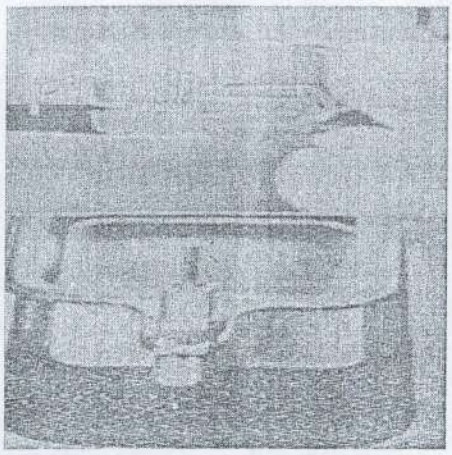
Patterson method (trench is made in lower rim containing a mixture of plaster and pumice)



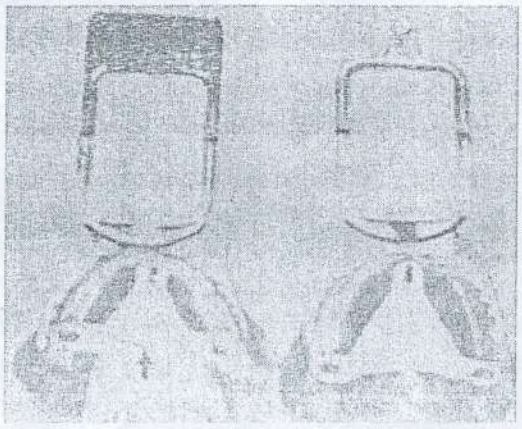
Intraoral tracing device (tracing point contact with central bearing plate).



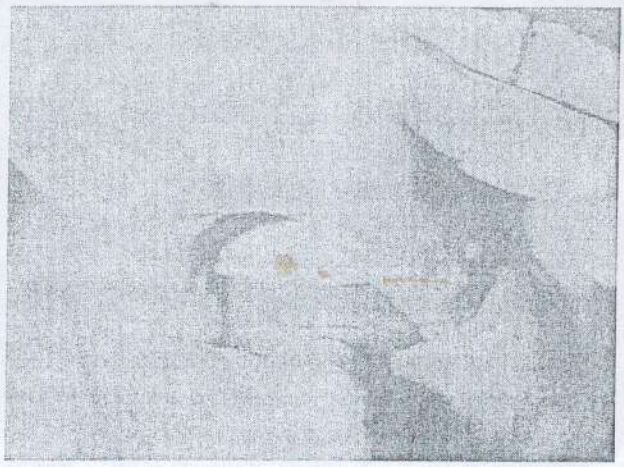
Gothic arch tracing(Arrow point tracing) CR=centric relation, R=right, L=left lateral relation.



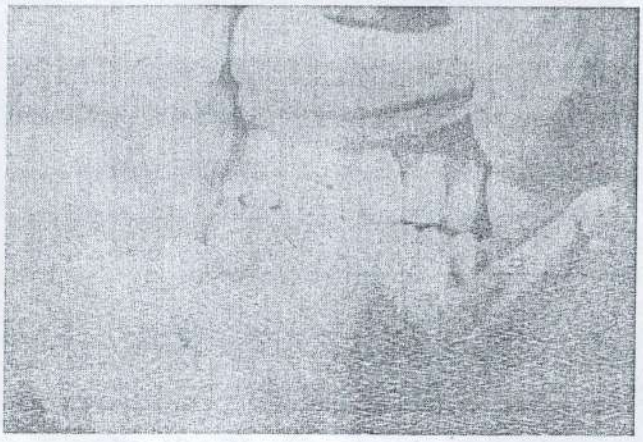
Extraoral needle point tracing device.



Central bearing device with extra oral needle tracing device.



Inter occlusal centric relation record method.



Protrusive eccentric inter occlusal record method.

Lateral eccentric inter occlusal record method.

PROSTHODONTICS

Lec: 17

د محمد رياض المرحله الرابعه

Trial Denture

While still on the articulator, the upper trial denture should be removed from the cast and lower teeth compared with the upper cast to see if the relationships are logical. The lower is removed and the upper trail denture is checked against the lower cast.

After the preliminary arrangement of the artificial teeth on the occlusion rims, it is essential that the accuracy of the jaw relation records made with the occlusion rims be tested, perfected if incorrect, and then verified to be correct. Patient should be advised to leave existing dentures if present out of the mouth about 4 hours before the jaw relation records are perfected and verified at the trying appointment. If they are not willing to take them out, then an acceptable alteration is to have the existing dentures relined with a soft temporary materials to rest the soft tissue of the basal seat area in the same form as they were when the final impression were made . If this is not followed, the distorted condition of the soft tissue can prevent the registration of accurate inter occlusal records.

The lower denture should now be checked in the mouth and the patient is instructed to let the tongue lightly touch the inside of the denture to maintain lingual seal and also to train the tongue to be less active , when

first learning to chew. The fit and extension of the lower should be checked. The trial denture should have good stability and the dorsum of the tongue should be slightly above the occlusal surfer of the posterior teeth. Both bases should fit the casts accurately and they must be stable in the mouth otherwise the jaw relation records cannot be checked. We insert the lower first and then the upper because there is less chance of having the upper drop down.

Verifying The vertical Dimension:

The vertical dimension of occlusion and of rest must be tested, because the final position of the anterior and posterior teeth will depend to a great extent on the amount of space available vertically . Factors the govern the final determination of vertical relation depends on careful consideration of:

1- Pre extraction records.
2- The amount of inter occlusal distance to which the patient was accustomed, either before the loss of natural teeth or with old dentures .
3- Phonetic and esthetics .
4- The amount of inter occlusal distance between the teeth when the mandible is in its rest position .
5- A study of facial dimensions and facial expression .
6- Lip length in relation to the teeth .
7- The inter arch distance and the parallelism of the ridges as observed from the mounted casts .
8- The condition and amount of shrinkage of the ridges .

A combination of these factors may be used to determine an acceptable vertical dimension.

Verifying Centric Relation:

CR can be verified by intraoral observation of the intercuspation or by an external method on the articulator .

Intraoral observation of intercuspation :

The preliminary CR record is tested by observing the intercuspation when the mandible is pulled back by the patient as far as it will go and closure is stopped at the first tooth contact. The patient is guided into CR by a thumb placed on the antero-inferior portion of the chin and the index fingers bilaterally on the buccal flanges of the lower trial denture. The patient closes until the back teeth make a feather touch, Then the patient closes tightly. Any error in CR will be apparent when the teeth slide over each other , especially if anatomical teeth are used. A second closure is again made to permit visual observation of any error .

The vertical overlap of the anterior teeth is carefully noted , this is important because the amount of vertical overlap will be a guide to the amount of closure permitted when next inter occlusal record is made .

Intra oral inter occlusal records :

The posterior teeth are removed from the lower occlusion rim and both occlusion rims are placed on the mouth. Impression plaster or any selected recording medium is placed on both sides of the lower occlusion rims. The

patient is instructed to pull the jaw back and close slowly until requested to stop and hold that position . The closure stopped when the anterior teeth have the same vertical overlap as they had before the posterior teeth were removed, when the plaster is set the new record is removed with the two occlusion rims and the lower cast is remounted on the articulator .

The occlusion rims with the teeth in good tight centric occlusion, are returned to the mouth , and the same tests are made as before . If the teeth occlude perfectly and uniformly when the lower jaw is drawn back , the CR mounting is correct . There should be uniform simultaneous contact on both sides of the mouth in the front and back and without any detectable touch and slide .

Extra oral articulator method :

Impression material eig . two pieces of aluwax is placed over the posterior mandibular teeth. The wax is sealed with warm spatula, then the upper trail denture is inserted in the mouth and the wax portion on the lower teeth is immersed in warm water bath at 54c^{0} for 30 seconds , then seated in the mouth and the patient is guided to close in CR , until a good index is made. The patient should not penetrate the wax. The trial dentures are chilled in ice water, and returned to the patient mouth to check the accuracy of the record. Then the trial dentures after chilling the wax are placed on their casts and the articulator is closed in CR. The opposing teeth should fit into the indentations in every way . When the original CR

interocclusal record and the check are both correct, these teeth will fit into the indentations .

If the opposing teeth do not fit exactly into the indentations in the new record , it means that the original mounting was incorrect or that the patient did not bite clearly into the interocclusal wax . To evaluate this , the chilled trial dentures and the wax record be returned to the mouth and their accuracy

Reevaluated as previously done . If the record still appears to be correct in the patients mouth , then the original CR registration and / or mounting were incorrect . In these cases the mandibular cast should be separated from the mounting ring and the cast remounted by means of the last interocclusal wax record . The new mounting is again checked to prove or disprove its correctness .

It is important that the same recording medium (whether plaster or bite registration paste) should be used in the initial registration and in the versification record of the mounting on the articulator.

The Posterior Palatal Seal:

Definition: The posterior palatal seal area. The soft tissue area at or beyond the junction of the hard and soft palates on which pressure , within physiologic limits, can be applied by complete removable denture prosthesis to aid in its retention .

The posterior border of the denture is determined in the mouth and its location is transferred into the cast. On the posterior angle of the tuberosity deep into the pterygomaxillary (hamular) notch, these locations on both sides marked with indelible pencil. The vibrating line of the soft palate which is a guide to the ideal posterior border of the denture is located anterior to the foveae palatinae . It could also be on or slightly posterior to the foveae palatinae. This line can be decided by asking the patient to say (ah) which lead to vibrating the soft palate. We then join with this line the two pterygomaxillary notch markings, by indelible pencil. The upper trail denture is inserted now so that this line is transferred from the soft palate to the denture base.

The excess portion of the denture base is reduces to this line. The trial denture is placed on the cast and with a knife or a pencil, the line following the posterior limit of the denture is marked. This line is marked laterally to appoint 3mm beyond the crest of the hamular notch.

The anterior line that indicate the location of the posterior palatal seal is drawn on the cast in front of the line indicating the end of the denture. The width of the posterior palatal seal is 1-1.5 mm high and 1.5 mm broad. Hence a groove of 1-1.5 mm in depth is curved in the cast having a v-shaped groove through the hamular notch and across the palate of the cast. The narrow and sharp bead that will be present in the denture will sink easily into the soft tissue providing a seal against air being forced under the denture.

PROSTHODONTICS

Lec: 19 **د محمد رياض**

Trial Denture

While still on the articulator, the upper trial denture should be removed from the cast and lower teeth compared with the upper cast to see if the relationships are logical. The lower is removed and the upper trail denture is checked against the lower cast.

After the preliminary arrangement of the artificial teeth on the occlusion rims, it is essential that the accuracy of the jaw relation records made with the occlusion rims be tested, perfected if incorrect, and then verified to be correct. Patient should be advised to leave existing dentures if present out of the mouth about 4 hours before the jaw relation records are perfected and verified at the trying appointment. If they are not willing to take them out, then an acceptable alteration is to have the existing dentures relined with a soft temporary materials to rest the soft tissue of the basal seat area in the same form as they were when the final impression were made. If this is not followed, the distorted condition of the soft tissue can prevent the registration of accurate inter occlusal records.

The lower denture should now be checked in the mouth and the patient is instructed to let the tongue lightly touch the inside of the denture to maintain lingual seal and also to train the tongue to be less active , when first learning to chew. The fit and extension of the lower should be checked. The trial denture should have good stability and the dorsum of the tongue should be slightly above the occlusal surface of the posterior teeth. Both bases should fit the casts accurately and they must be stable in the mouth otherwise the jaw relation records cannot be checked. We insert the lower first and then the upper because there is less chance of having the upper drop down.

Verifying The vertical Dimension:

The vertical dimension of occlusion and of rest must be tested, because the final position of the anterior and posterior teeth will depend to a great extent on the amount of space available vertically. Factors the govern the final determination of vertical relation depends on careful consideration of:

1- Pre extraction records.
2- The amount of inter-occlusal distance to which the patient was accustomed, either before the loss of natural teeth or with old dentures.
3- Phonetic and esthetics.
4- The amount of inter occlusal distance between the teeth when the mandible is in its rest position .
5- A study of facial dimensions and facial expression .
6- Lip length in relation to the teeth .
7- The inter arch distance and the parallelism of the ridges as observed from the mounted casts .
8- The condition and amount of shrinkage of the ridges .

A combination of these factors may be used to determine an acceptable vertical dimension.

Verifying Centric Relation:

CR can be verified by intraoral observation of the inter-cuspation or by an external method on the articulator .

Intraoral observation of intercuspation :

The preliminary CR record is tested by observing the intercuspation when the mandible is pulled back by the patient as far as it will go and closure is stopped at the first tooth contact. The patient is guided into CR by a thumb placed on the antero-inferior portion of the chin and the index fingers bilaterally on the buccal flanges of the lower trial denture. The patient closes until the back teeth make a feather touch, Then the patient closes tightly. Any error in CR will be apparent when the teeth slide over each other , especially if anatomical teeth are used. A second closure is again made to permit visual observation of any error .

The vertical overlap of the anterior teeth is carefully noted, this is important because the amount of vertical overlap will be a guide to the amount of closure permitted when next inter occlusal record is made.

Intra-oral (inter-occlusal records):

The posterior teeth are removed from the lower occlusion rim and both occlusion rims are placed on the mouth. Impression plaster or any selected recording medium is placed on both sides of the lower occlusion rims. The patient is instructed to pull the jaw back and close slowly until requested to stop and hold that position .The closure stopped when the anterior teeth have the same vertical overlap as they had before the posterior teeth were removed, when

the plaster is set the new record is removed with the two occlusion rims and the lower cast is remounted on the articulator.

The occlusion rims with the teeth in good tight centric occlusion, are returned to the mouth , and the same tests are made as before. If the teeth occlude perfectly and uniformly when the lower jaw is drawn back, the CR mounting is correct. There should be uniform simultaneous contact on both sides of the mouth in the front and back and without any detectable touch and slide.

Extra-oral (articulator method):

Impression material eg. two pieces of aluwax is placed over the posterior mandibular teeth. The wax is sealed with warm spatula, then the upper trail denture is inserted in the mouth and the wax portion on the lower teeth is immersed in warm water bath at 54c° for 30 seconds, then seated in the mouth and the patient is guided to close in CR, until a good index is made. The patient should not penetrate the wax. The trial dentures are chilled in ice water, and returned to the patient mouth to check the accuracy of the record. Then the trial dentures after chilling the wax are placed on their casts and the articulator is closed in CR. The opposing teeth should fit into the indentations in every way. When the original CR inter-occlusal record and the check are both correct, these teeth will fit into the indentations .

If the opposing teeth do not fit exactly into the indentations in the new record , it means that the original mounting was incorrect or that the patient did not bite clearly into the inter-occlusal wax. To evaluate this, the chilled trial dentures and the wax record be returned to the mouth and their accuracy

Reevaluated as previously done . If the record still appears to be correct in the patients mouth, then the original CR registration and/or mounting were incorrect. In these cases the mandibular cast should be separated from the mounting ring and the cast remounted by means of the last inter-occlusal wax record.The new mounting is again checked to prove or disprove its correctness.

It is important that the same recording medium (whether plaster or bite registration paste) should be used in the initial registration and in the versification record of the mounting on the articulator.

The Posterior Palatal Seal:

Definition: The posterior palatal seal area. The soft tissue area at or beyond the junction of the hard and soft palates on which pressure , within physiologic limits, can be applied by complete removable denture prosthesis to aid in its retention .

The posterior border of the denture is determined in the mouth and its location is transferred into the cast. On the posterior angle of the tuberosity deep into the pterygomaxillary (hamular) notch, these locations on both sides marked with indelible pencil. The vibrating line of the soft palate which is a guide to the ideal posterior border of the denture is located anterior to the foveae palatinae. It could also be on or slightly posterior to the foveae palatinae. This line can be decided by asking the patient to say (ah) which lead to vibrating the soft palate. We then join with this line the two pterygomaxillary notch markings, by indelible pencil. The upper trail denture is inserted now so that this line is transferred from the soft palate to the denture base.

The excess portion of the denture base is reduces to this line. The trial denture is placed on the cast and with a knife or a pencil, the line following the posterior limit of the denture is marked. This line is marked laterally to appoint 3mm beyond the crest of the hamular notch.

The anterior line that indicate the location of the posterior palatal seal is drawn on the cast in front of the line indicating the end of the denture. The width of the posterior palatal seal is 1-1.5 mm high and 1.5 mm broad. Hence a groove of 1-1.5 mm in depth is curved in the cast having a v- shaped groove through the hamular notch and across the palate of the cast. The narrow and sharp bead that will be present in the denture will sink easily into the soft tissue providing a seal against air being forced under the denture.