ي prosthodontics

Impression materials and techniques for RPD

Making the master impression for fabrication of a removable partial denture (RPD) prosthesis is accomplished once the remaining teeth in the partially edentulous arch have been modified. The modifications, including intracoronal and extracoronal restorations and/or enameloplasty to enhance extracoronal contours, should follow the treatment plan derived after careful analysis, design, and prescription for the prosthesis.

Classification of impression technique

1. PRIMARY IMPRESSION

An impression made for the purpose of diagnosis or for the construction of a tray.

2. **Secondary or definitive impression**

An imprint that record the entire functional denture bearing area to ensure maximum support, retention and stability for the denture during use.

Primary purpose to record accurately the tissues of the denture bearing areas, in addition to recording functional width and depth of the sulci.

Secondary impression CLASSIFIED INTO:-

1. Conventional techniques
2. Selective pressure techniques
3. Functional techniques
4. Reline and rebases techniques

Conventional technique also known as Anatomical or Mucostatic impression techniques:-the surface contour of the ridge is recorded at its resting form (no occlusal load) (soft or less viscous alginate impression material)

Disadvantages: In free end saddle dentures, distal end will show tissue ward movement under occlusal recommended for tooth supported partial dentures Kennedy class III and IV these are bounded saddles.

Selective pressure technique

Techniques to achieve selective pressure impression Kennedy Class I. Altered cast technique

Functional dual impression technique or Applegate

Selection of impression material

It is important to make an accurate impression in order to ensure the accuracy of the resulting master cast. The elastomeric impression materials available for use for the final impression include a range of materials from irreversible hydrocolloid (alginate) to vinylpolysiloxane or polyether impression materials. The range of choices varies according to the preference of the clinician.

Impression material

1. Rigid Impression material

a. Plaster of Paris

Now elastic materials have completely replaced the impression plaster,

Modified impression plasters are used by many dentists to record maxillomandibular relationships. Also used for recording impression of edentulous area without under cut.

b. Metallic Oxide Paste

They are not used as primary impression materials and should never be used for impressions that include remaining natural teeth. They are also not to be used in stock impression trays.

Metallic oxide pastes, being rigid substances, can be used as secondary impression materials for complete dentures and for extension base edentulous with custom acrylic impression tray which has being properly designed and attached to the partial denture framework.

Metallic oxide pastes can also be used as an impression material for relining distal extension denture base

2. Thermo-plastic impression material

It cannot record minute details accurately because they undergo permanent distortion during with drawl from undercut

Modeling Plastic

This material is most often used for border correction (border molding) of custom impression trays for Kennedy Class I and II removable partial denture bases.

Modeling plastic is manufactured in two different colors the red (red-brown) material in cake form record impression for edentulous area & green

modeling plastics are obtainable in stick form for use in border molding an impression

Impression Waxes and Natural Resins

use in recording the functional or supporting form of an edentulous ridge.

The impression waxes also may be used to correct the borders of impressions made of more rigid materials

3. Elastomeric impression Materials include the following

1. Polysulphide
2. Polyether
3. Silicone
   a. Additional polymerizing silicone
   b. Condensation polymerizing silicone.

polysulphide Impression Material used for removable partial denture impressions and especially for secondary corrected or altered cast impression

Reversible Hydrocolloids (agar-agar):-

1. It is used primarily as impression materials for fixed restorations. They demonstrate acceptable accuracy when properly use
2. Fluid at high temp and gel on reduction temperature
3. Acceptable accuracy when properly used.
4. border control of impressions made with these materials is difficult
   Main use is in fabrication of refractory cast in duplication procedure.
   It required special equipment (cooling tray) if being used as an intra-oral impression material.

Irreversible hydrocolloid

1. Irreversible hydrocolloids are used for making diagnostic casts, orthodontic treatment casts, and master casts for removable partial denture.
2. Dimensionally unstable, it can be used in presence of moisture are hydrophilic;
3. A pleasant taste and odor; and are nontoxic, no staining.
4. These material have allow strength provide less surface details than other material

Differences between reversible and irreversible hydrocolloid

The principal differences between reversible and irreversible hydrocolloids are as follows:

1. Reversible hydrocolloid converts from the gel form to a sol by the application of heat. It may be reverted to gel form by a reduction in temperature. This physical change is reversible.

2. Irreversible hydrocolloid becomes a gel via a chemical reaction as a result of mixing alginate powder with water. This physical change is irreversible.

use of irreversible hydrocolloid material — alginate — has been advocated based on multiple factors such as: the material is used widely in most dental practices, there is ease of handling and manipulation by support personnel, and it is relatively inexpensive and does not require special equipment in the office in most instances.

The key disadvantage in use of this material relates to the handling characteristics, in that there is a relatively short time period in which the material is accurate. The short period of time for predictable accuracy of alginate is based on the physical properties such as syneresis; the loss of fluid occurs in a short period of time and can affect the accuracy of the master cast. If managed properly, alginate impression material is cost - effective when pouring the master cast can be accomplished immediately after the impression is removed and disinfected. This implies the master cast is poured in the office in a timely fashion — less than 12 – 14 minutes from removal — rather than shipping the impression to an off - site dental laboratory for fabrication of the master cast at a later time.

The vinylpolysiloxane or polyether impression materials may be the impression material of choice since under the right conditions, either

maintains accuracy for a longer period of time when compared to alginate impression material. The ultimate goal is to obtain an accurate cast for fabrication of a removable partial denture prosthesis.

Important Precautions to Be Observed in the Handling of Hydrocolloid Impressions

1. Impression should not be exposed to air because some dehydration will inevitably occur and result in shrinkage.
2. Impression should not be immersed in water or disinfectants, because some imbibition will inevitably result, with an accompanying expansion
3. Impression should be protected from dehydration by placing it in a humid atmosphere or wrapping it in a damp paper towel until a cast can be poured. To prevent volume change, this should be done within 15 minutes after removal of the impression from the mouth
4. Exudates from hydrocolloid have a retarding effect on the chemical reaction of gypsum products and results in a chalky cast surface. This can be prevented by pouring the cast immediately or by first immersing the impression in a solution of accelerator, if an accelerator is not included in the formula.

STEPS IN IMPRESSION MAKING

a. Position of patient & dentist (Dentist should stand & patient should sit upright)
b. Tray selection
c. Mixing the material & loading into the tray
d. Impression making & removal
e. Inspecting, cleaning & disinfecting the impression

Occlusal plane should be parallel to the floor

MAXILLARY IMPRESSION- dentist should stand at the right rear of the patient.

MANDIBULAR IMPRESSION- dentist should stand at the right front of the patient.

Tray selection

The choice of an impression tray can include stock impression trays both made of metal or the more rigid plastics available. The use of rigid plastic impression trays can be advantageous since most are intended to be disposable and do not require additional dental assistant time for cleaning after use. Stock impression trays are available as rim - lock or other mechanical retention design such as perforated trays, and both can be modified for use intraorally to meet the anatomical features of the patient. The prime consideration in tray selection is to choose one with the absolute rigidity that must be afforded by the tray material.

The step-by-step procedure and important points to observe in the making of a hydrocolloid impression are as follows:

1. Select a suitable, sterilized, perforated or rim-lock impression tray that is large enough to provide a 2- 4 to -mm thickness of the impression material between the teeth and tissues and the tray.

2. Build up the palatal portion of the maxillary impression tray with wax or modeling plastic to ensure even distribution of the impression material and to prevent the material from slumping away from the palatal surface. At this time, it is also helpful to pack the palate with gauze that has been sprayed with a topical anesthetic. This will serve to anesthetize the minor salivary glands and mucous glands of the palate and thus prevent secretions as a response to smell or taste or to the physical presence of the impression material. If gelation occurs next to the tissues while the deeper portion is 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 the finished casting not being in contact with the underlying tissues. The maxillary tray frequently has to be extended posteriorly to include the tuberosities and the vibrating line region of the palate. Such an extension also aids in correctly orienting the tray in the patient's mouth when the impression is made.

3. The lingual flange of the mandibular tray may need to be lengthened with wax in the retromylohyoid area or to be extended posteriorly, but it rarely

ever needs to be lengthened elsewhere. Wax may need to be added inside the distolingual flange to prevent the tissues of the floor of the mouth from rising inside the tray.

4. Place the patient in an upright position, with the arch to be impressed nearly parallel to the floor.

5. When irreversible hydrocolloid is used, place the measured amount of water (at 70°F) in a clean, dry, rubber mixing bowl (600-mL capacity). Add the correct measure of powder. Spatula move rapidly against the side of the bowl with a short, stiff spatula. This should be accomplished in less than 1 minute. The patient should rinse his or her mouth with cool water to eliminate excess saliva while the impression material is being mixed and the tray is being loaded.

6. In placing the material in the tray, avoid entrapping air. Have the first layer of material lock through the perforations of the tray or rim-lock to prevent any possible dislodgment after gelation.

7. After loading the tray, remove the gauze with the topical anesthetic and quickly place (rub) some of the impression material on any critical areas using your finger (areas such as rest preparations and abutment teeth). If a maxillary impression is being made, place the material in the highest aspect of the palate and over the rugae.

8. Use a mouth mirror or index finger to retract the cheek on the side away from you as the tray is rotated into the mouth from the near side.

9. Seat the tray first on the side away from you, next on the anterior area, while reflecting the lip, and then on the near side, with the mouth mirror or finger for cheek retraction. Finally, make sure that the lip is draping naturally over the tray.

10. Be careful not to seat the tray too deeply, leaving room for a thickness of material over the occlusal and incisal surfaces.

11. Hold the tray immobile for 3 minutes with light finger pressure over the left and right premolar areas. To avoid internal stresses in the finished

impression, do not allow the tray to move during gelation. Any movement of the tray during gelation will produce an inaccurate impression.If, for example, you allow the patient or the assistant to hold the tray in position at any time during the impression procedure, some movement of the tray will be inevitable during the transfer and the impression will probably be inaccurate. Do not remove the impressionfrom the mouth until the impression material has completely set.

12. After releasing the surface tension, remove the impression quickly in line with the long axis of the teeth to avoid tearing or other distortion.

13. Rinse the impression free of saliva with slurry water, or dust it with plaster, and rinse gently; then examine it critically. Spray the impression thoroughly with a suitable disinfectant and cover it immediately with a damp paper towel. A cast should be poured immediately into a disinfected hydrocolloid impression to avoid dimensional changes and syneresis. Circumstances often necessitate some delay, but this time lapse should be kept to a minimum. A delay of 15minutes will satisfy the disinfection requirements and should not be deleterious if the impression is kept in a humid atmosphere

Step-by-Step Procedure for Making a Stone Cast from a Hydrocolloid Impression The step-by-step procedure for making a stone cast from the impression is as follows:

1. A more abrasive-resistant type IV stone should be used to form removable partial denture casts. Have the measured dental stone at hand, along with the designated quantity of room temperature water, as recommended by the manufacturer. A clean 600-mL rubber mixing bowl, a stiff spatula, and a vibrator complete the preparations. A No. 7 spatula also should be within reach.

2. First, pour the measure of water into the mixing bowl and then add the measure of stone. Spatulate thoroughly for 1 minute, remembering that a weak and porous stone cast may result from insufficient spatulation. Mechanical spatulation under vacuum is preferred. After any spatulation

other than in a vacuum, place the mixing bowl on the vibrator and knead the material to permit the escape of any trapped air.

3. After removing the impression from the damp towel, gently shake out surplus moisture and hold the impression over the vibrator, impression side up, with only the handle of the tray contacting the vibrator. The impression material must not be placed in contact with the vibrator because of possible distortion of the impression.

4. With a small spatula, add the first cast material to the distal area away from you. Allow this first material to be vibrated around the arch from tooth to tooth toward the anterior part of the impression. Continue to add small increments of material at this same distal area, with each portion of added stone pushing the mass ahead of it. This avoids the entrapment of air. The weight of the material causes 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. When the impressions of all teeth have been filled, continue to add artificial stone in larger portions until the impression is completely filled.

5. The filled impression should be placed so that its weight does not distort the hydocolloid impression material. The base of the cast can be completed with the same mix of stone. The base of the cast should be 16 to 18 mm (23 to34 inch) at its thinnest portion and should be extended beyond the borders of the impression so that buccal, labial, and lingual borders will be recorded correctly in the finished cast. A distorted cast may result from an inverted impression.

6. As soon as the cast material has developed sufficient body, trim the excess from the sides of the cast. Wrap the impression and cast in a wet paper towel, or place it in a humidor, until the initial set of the stone has taken place. The impression is thus prevented from losing water by evaporation, which might deprive the cast material of sufficient water for crystallization. Chalky cast surfaces around the teeth are often the result of the hydrocolloid’s acting as a sponge and robbing the cast material of its necessary water for crystallization.

7. After the cast and impression have been in the humid atmosphere for 30 minutes, separate the impression from the cast. Thirty minutes is sufficient for initial setting. Any stone that interferes with separation from the tray must be trimmed away with a knife.

8. Clean the impression tray immediately while the used impression material is still elastic.

9. Trimming of the cast should be deferred until final setting has occurred. The sides of the cast then may be trimmed to be parallel, and any blebs or defects resulting from air bubbles in the impression may be removed. Master casts and other working casts are ordinarily trimmed only to remove excess stone.

Possible Causes of an Inaccurate and/or a Weak Cast of a Dental Arch

The possible causes of an inaccurate cast are as follows:

1. Distortion of the hydrocolloid impression (a) by use of an impression tray that is not rigid; (b) by partial dislodgment from the tray; (c) by shrinkage caused by dehydration;(d) by expansion caused by imbibition (this will be toward the teeth and will result in an undersized rather than oversized cast); and (e) by attempting to pour the cast with stone that has already begun to set.

2. A ratio of water to powder that is too high. Although this may not cause volumetric changes in the size of the cast, it will result in a weak cast.

3. Improper mixing. This also results in a weak cast or one 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 that results from the 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 the cast from the impression for an extended period.

TECHNIQUE USED FOR INDIVIDUAL IMPRESSION TRAYS:-

1. Outline the extent of the tray on the cast with a pencil. The tray must include all teeth and tissues that will be involved in the removable partial denture.

2. Adapt one layer of baseplate wax over the tissue surfaces and two layers over the teeth of the cast to serve as a spacer for impression material. The wax spacer should be trimmed 2 to 3 mm short of the outline drawn on the diagnostic cast. Wax covering the posterior palatal seal area should be removed so that intimate contact of the tray and tissue in this region may serve as an aid incorrectly orienting the tray when the impression is made. Expose portions of the incisal edges of the central incisors to serve as anterior stops when placing the tray in the mouth. Bevel the wax so that the completed tray will have a guiding incline that will help position the tray on the anterior stop. Other cast undercuts should be blocked out with wax or modeling compound. NOTE:

Adapt an additional layer of baseplate wax over the teeth if the impression is to be made in irreversible hydrocolloid. This step is not necessary if the choice of impression material is a rubber-base or silicone type of material.

3. Paint the exposed surfaces of the cast that may be contacted by the light polymerized resin tray material with a model release agent (MRA) to facilitate separation of the polymerized tray from the cast.

4. Remove the VLC tray material from the light-proof pouch and carefully cut the desired length with a knife or scalpel. Adapt the VLC material to the

cast and trim it with a knife. Be sure not to thin the material over the teeth or the posterior border area.

5. Attach a handle by molding excess VLC material into the desired shape and blend it into the tray material in the cast. With some materials, a paper clip or similar wire may be shaped and used to reinforce the handle. Alternatively, some manufacturers make prefabricated metal custom tray handles that may be easily adapted. Place the cast with the adapted tray in the light polymerizing and process according to the manufacturer's directions—usually a maximum of 1 minute.

7. Remove the cast from the unit and gently remove the tray from the cast. Peel the softened wax out of the tray while the wax is still warm.

8. Paint the entire impression tray with the manufacturer's air barrier coating material and return the tray to the unit turnstile for additional polymerizing, tissue side up.

9. When the polymerizing cycle is completed, remove the tray from the unit and clean it with a brush and water.

10. Perfect the borders of the tray with rotary instruments (vulcanite burs, acrylic-resin trimmers, etc.), and slightly polish the external surface of the tray.

11. Place perforations (No. 8 bur size) in the VLC resin tray at 5-mm (316-inch) intervals, with the exception of the alveolar groove areas, if an irreversible hydrocolloid impression material is to be used .

12. The finished tray must be sanitized and tried in the mouth so that any necessary corrections to the tray can be accomplished before the impression is made.

Secondary impression(Same as that for diagnostic impression).

In this procedure paint or inject impression material in critical areas:

- Rest preparation
- Hard palate
- Peripheral extensions

SPECIAL IMPRESSION PROCEDURES

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

b. Functional Form of Ridge:- The functional form of the residual ridge is the surface contour of the ridge when it is supporting a functional load

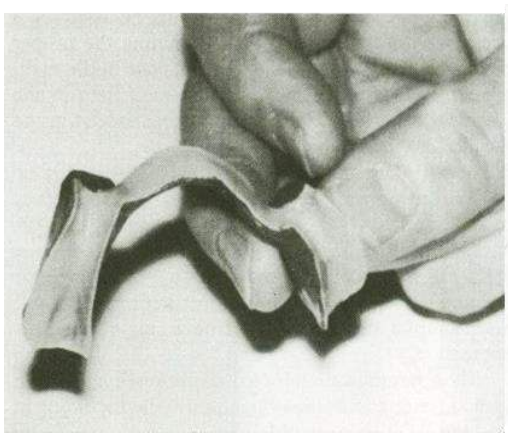
Procedure

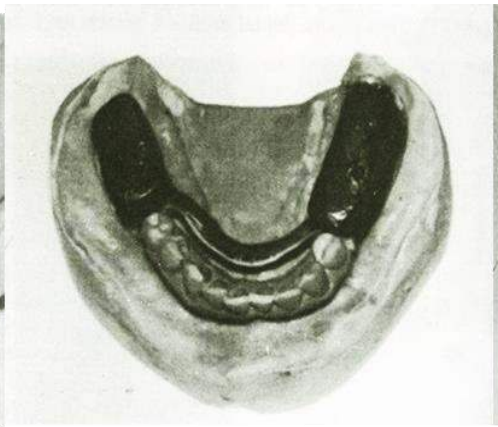
A custom impression tray is constructed over a preliminary cast

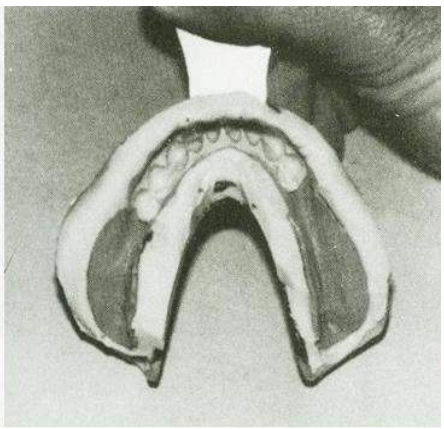
Functional impression of distal extension ridge is made. Patient applies some biting force with occlusion rims

Then an Alginate impression is made with the 1st impression held in its functional position with finger pressure

Mc LEAN'S PHYSIOLOGIC IMPRESSION







HINDEL'S MODIFICATION

Main difference of this with Mc Lean's is that

- impression of edentulous ridge is not made under pressure but is an anatomic impression made at rest with ZOE paste.
- As the hydrocolloid impression was being made finger pressure was applied through holes in the tray to the anatomic impression.

<u>Disadvantages of these methods</u>

- Constantly compressed residual ridge is prone to excessive bone resorption.
- If the clasp do not hold the partial denture, the denture will be pushed slightly occlusally by the tissue causing premature contacts (TISSUE REBOUND)

The Recommended Infection Control Practices for Dental Treatment

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