

Impression for complete denture

Lecture:

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Impression

It is the negative replica of the teeth and surrounding structure in the oral cavity, introduced as a gel form then becomes relatively hard or set while in contact with these tissues.

Complete denture impression

It is the negative registration of the entire denture bearing, stabilizing and border seal areas present in the edentulous mouth.

Objectives for impression of complete denture; (importance is the sequence)

1) preservation

Preservation of the remaining residual ridges is one objective. As the teeth extracted the stimulation of natural teeth to alveolar ridge will loss so the alveolar ridge will atrophy or resorbed, the effect of impression technique and impression material on denture base may have continued effect on health of both soft and hard tissue jaws.

2) Support

It is the resistance to the force try to dislodge the denture in tissue ward direction .Maximum coverage provides distribution of applied forces over as wide an area as possible and this help in preservation, stability and retention.

3) Stability

Stability is resistance to horizontal movement. Close adaptation to undistorted mucosa is most important.

Stability decrease with the

1. Loss of vertical height of the ridge.
2. increase in movement of flabby movable tissue

4) Esthetics

Border thickness varies with the need of each patient in accordance with the extent of residual ridge loss.

Esthetics depends on thickness of the border so the vestibule should be filled, but not over filled to restore facial contour.

5) Retention

If the other objectives are achieved the retention will be adequate:

Factors affect retention

- a) Atmospheric pressure
- b) Adhesion
- c) Cohesion
- d) Mechanical interlock
- e) Muscle control.
- f) Patient tolerance.

Atmospheric pressure

Depend on peripheral seal, to ensure this seal the denture border should extend into but not to the extent to damage movable tissue.

Adhesion

It is the attraction of unlike molecule.i.e: it is the attraction of saliva to denture.

Cohesion

It is the attraction of molecules of saliva to each other.

Mechanical interlock

Mechanical interlock of undercut usually proves to be into level able to the patient. The soft tissue is subjective to damage during the insertion and removal of the denture

Muscle control and Patient tolerance

They are amazing influence. Dentures are often retained in the mouth and appear satisfactory, not because of the accuracy of conforming to the support but because of the adaptability of the muscle of the lip, tongue and cheek and patient tolerance.

BIOLOGIC CONSIDERATIONS FOR MANDIBULAR IMPRESSIONS

The considerations for the mandibular impressions are generally similar to that for those of maxillary impressions and yet there are many differences owing to the following facts:

1. The basal seat of mandible is different in size and form from the maxillary counterpart.
2. The submucosa in some parts of mandibular basal seat contains anatomic structures different from those in the upper jaw.
3. The nature the supporting bone on the crest of residual ridge usually differs between the two jaws.
4. The presence of the tongue complicates the impression procedures for the lower denture.

5. The available area of support from an edentulous mandible is 14 cm² while the same for the edentulous maxilla is 24cm².
6. Supporting and the peripheral sealing areas will be in contact with the dentures fitting or impression areas. The support for the mandibular denture is derived from the body of mandible.

There are several methods for classifying the impression and each method depend on certain criteria.

i. The most practical and easiest one depends on the amount of pressure exerted during impression taking. Impression can be classified into three categories

1. *non-pressure technique(mucostatic)*
2. *Selective pressure techniques,*
3. *pressure techniques*

Non-pressure technique (mucostatic)

Attempts made to record the tissue at rest. It require minimal pressure be applied to the oral tissue during the seating of the impression tray and set of the impression material. it eliminate all distortion of the oral tissue and thus create a denture base that models the unloaded tissue.

Requirement of (Mucostatic) technique

- a) The impression is made with the oral mucous membrane and the jaws in a normal, relaxed condition. Border moulding is not done here.
- b) The impression is made with an oversized tray. Spaced tray
- c) It requires a material of high fluidity (low viscosity) Impression material of choice is impression plaster, alginate.
- d) Retention is mainly due to interfacial surface tension. The mucostatic technique results in a denture, which is closely adapted to the mucosa of the denture-bearing area but has poor peripheral seal.

Pressure technique (Mucocompressive)

In this technique the impression is subjected to pressure during taking, this pressures either applied by

- dentist finger
- by the teeth of the patient and in this case it is called functional impression

Functional impression techniques

- a) Uses in complete denture that is delivered ,relieved on its internal aspects and filled with the slow-seating impression material(tissue conditioning material)
- b) The patient wears prosthesis for several days, allowing the tissue to be recorded in function.
- c) The complete impression then is converted to hard reline material via laboratory processing
- d) This seeks to create a denture base that models the functional loaded tissue.
- e) Records the oral tissues in a functional and displaced form. The materials used for this technique include impression compound, waxes and soft liners.
- f) The oral soft tissues are resilient and thus tend to return to their anatomical position once the forces are relieved. Dentures made by this technique tend to get displaced due to the tissue rebound at rest. During function, the constant pressure exerted onto the soft tissues limit the blood circulation leading to residual ridge resorption.

Selective pressure techniques,

- Uses accustom tray constructed with less relief in the primary denture stress bearing area and greater relief in the non bearing areas.
- Variation in relief result in theoretically in greater amount of pressure being applied directly to the primary bearing area ,which are biologically and biomechanically more capable of supporting and distributing the load.
- Low pressure is applied through greater relief for impression materials to the non bearing areas
- This technique seeks to create a denture base that selecting loads the oral tissue during function of the prostheses, thus optimizing the stability and retention of the prostheses.

ii. Depending on the technique

❖ Open mouth impressions

The open mouth impression is built in a tray which carries the impression material of choice into the desired contact with the supporting tissues and into an approximate relation to the peripheral tissues when the mouth is opened and without applied pressure

The rationale behind this method is that the dentures do not dislodge when subjected to biting force.

- The open mouth methods provide clearance for the tissues that are pulled over the edges of the dentures as in function of speech.
- It develops a contour of impression surface which is in harmony with the relaxed supporting tissues, and which may be out of perfect adaptation with these tissues when the denture is subjected to occlusal loading.

❖ **Close mouth impression technique**

- These require wax occlusal rims to be fabricated on the preliminary cast.

The patient is made to close on these rims and a generous clearance is made for the various frenula so that the patient can manipulate his tissues by closing, grimacing, sucking and swallowing to form peripheral borders.

iii. Impression can be classified depend on the sequence of the impression into:

- 1. Primary impression.**
- 2. Secondary (final) impression).**

The primary impression:

- The patient should be seated in an upright and relaxed position in the dental chair. The jaw should be at the level of the operator's elbow for the upper impression and at the level of the operator shoulder for the lower impression.
- The aim of the primary impression is to record the entire denture-bearing area. Failure to record the denture-bearing area on the primary impression will create difficulties in recording a satisfactory definitive impression and ultimately result in a poorly retentive denture. Consequently, it is unwise to disregard the importance of having a satisfactory primary impression in the hope that deficiencies will be rectified in the definitive impression.
- The nature of primary impressions is such that control of the tissues when recording the impression is minimal, and thus the impression will be overextended. If a denture is made on a model cast from such an impression, then it too will be overextended and not retentive.

Tray, materials and technique for primary impression:

- Stock trays are constructed in either metal or plastic and may be perforated or unperforated. An edentulous stock tray that is approximately 5 mm larger than the outside surface of the residual ridge is selected.

- The dentist places the tray in the mouth and initially positions it by centering the labial notch of the tray over the labial frenum. In the maxilla, the distal extension covers to the vibrating line, allowing space and coverage of the tuberosities. The mandibular tray should extend to the ascending ramus. The preliminary impression should be as accurate as possible and overextension of peripheral borders is preferred to under extension as ultimately a slightly under extended custom tray will be fabricated on this overextended preliminary cast.
- Therefore when the preliminary impression is made, it is advisable to select an impression material that has a relatively high viscosity, thereby allowing the material to compensate more easily for the deficiencies of the tray. The most suitable materials are alginate (irreversible hydrocolloid), silicone putty, or impression compound.

Making alginate primary impression

Wax or compound may be added to the stock tray border before impression making to extend the borders. To avoid voids and an under extended impression, the impression material should be placed, by finger, into any areas that the clinician feels may not be adequately reached by the impression tray. These areas often include the palatal vault, retromylohyoid spaces, and/or buccal vestibules.

The loaded tray is placed and rotated from one tuberosity and then rotated from that lateral side to the other lateral side and tuberosity. This decreases the risk of trapping air and allows the material to flow to the peripheries.

The denture is supported and the patient is asked to suck and pull the cheeks and lips down. The mandible is moved right and left to capture the coronoid space. The mandibular tray and alginate are placed in the mouth with the tongue raised. The tray is slipped between the tongue and ridge and the patient then relaxes the tongue as the tray is seated.

After seating the tray, the patient can suck their lips inward, open the mouth wide, and protrude and move the tongue laterally. The impression should appear very similar to the shape of the final denture.

Making impression compound primary impression

Impression cake compound is a thermoplastic material with a high viscosity. Uniform softening of the material when heated in a water-bath to temperatures between 55°C and 70°C. For the upper impression the material loaded in ball like shape while for the lower,

the compound loaded in a roll like shape. The procedure for making the impression is the same as alginate except that the borders of the stock tray do not require modification.

There is no need to use a tray adhesive for impression compound, preloading of material in the mouth is usually not required.

The tray is loaded with the impression material and seated in the mouth in exactly the same manner as for alginate impression material.

Impression putty:

This is a rigid material and, like impression compound, should ideally be used in a metal stock tray, but a plastic tray will suffice (tray adhesive is necessary for putty). It is more elastic than compound, and therefore suitable for use in undercut areas. Its main disadvantage is its cost.

Common faults or errors in impression making:

1. Incorrect tray position in the mouth, which has caused one or more anatomical areas not to be captured in the impression.
2. Excessive areas of the impression tray showing through the impression material indicating pressure that may have resulted in a distorted impression.
3. Any void or discrepancy too large to accurately correct on the cast.
4. Incorrect border formation as a result of incorrect border length of the tray. A sharp border usually indicates that the impression is under extended in that area.
5. Obviously distorted impression because of movement of the tray during the setting of the final impression material.
6. Poor detail in the impression because of a poor mixing technique or because the material had begun to set before the impression was fully Seated.

Final (secondary) impression:

The impression that represents the completion of the registration of the surface or object.

It is an impression made for the purpose of fabrication of prosthesis. This impression is made with individual tray.

Final impression must be poured with *stone* material to produce the *master cast*.

Materials used for final impression:

1. Zinc oxide eugenol impression material.
2. Impression plaster.
3. Alginate impression material
4. Elastomers impression material (rubber base).

Steps for making final impression:

For making final impression, a properly constructed special tray should be made over relieved primary cast (The relief area is created by applying one thickness of baseplate wax over all non-stress-bearing areas of the diagnostic cast prior to fabricating the impression tray, this wax is commonly called "relief wax.")

Additionally, to allow tray removal from the diagnostic cast, all excessive undercuts and tissue irregularities present on the diagnostic cast are minimally relieved or blocked out using a baseplate wax. This is often referred to as "block out" wax.

Correction of special tray:

1. Laboratory correction:
 - a. The flange should be 2 mm away from the mucobuccal fold.
 - b. There must be enough room for the frenum.
 - c. The border should be smooth, rounded, and well-polished (this can be checked by little finger).
2. Clinical correction:

At this stage, the special tray inside the patient mouth should be checked for:

 - a. The flange is 2mm away from the mucobuccal fold.
 - b. There must be enough clearance for labial and buccal frenum.
 - c. The borders must be smooth and rounded.
 - d. Reasonable retention and stability are recommended.
 - e. Check for over extension of the special tray, for the maxillary tray there must be no interference with the pterygomandibular raphe, while for the mandibular tray there must be no over-extension of buccal flange at the buccinator muscle region, also lingually there must be no over extension at the site of sublingual region, mylohyoid and retromylohyoid areas.

Border molding of the special tray:

Border molding can be performed using two techniques namely:

- Single step or simultaneous border molding.
- Incremental or sectional border molding.

Single step or simultaneous border molding

It is a procedure by which the entire periphery of the tray is refined in a single step. Polyether impression material is the material of choice.

Advantages:

- a. It is one step that means the procedure is carried out at the same time.
- b. Less possibility of error if placed correctly.

Disadvantages:

It is difficult and need well trained dentist.

Incremental or sectional border molding:

It is a procedure in which portions of the periphery of the tray are refined individually. The material of choice for this procedure is green stick compound.

Maxillary tray border molding:

1. The lips are first elevated and then extended outwards, downwards and inward.
2. The cheek is elevated and then pulled outward, downward and inward.
3. The buccal frenum is recorded by pulling the cheek backwards and forwards.
4. The disto-buccal region is recorded by pulling the cheek outwards, downwards and inwards followed by opening the mouth wide and moving the mandible from side to side.
5. Next the posterior part of the palate is recorded. The patient asked to say “ah” while refining the posterior border.

Mandibular tray border molding:

1. The labial portion is molded by moving the lip outward, upward and inward.
2. The buccal frenum is recorded by moving the cheek outward, upward, backward and forward.
3. To record the disto-buccal sulcus, the cheek should be well-retracted and moved upward and inward.
4. To record the action of the masseter muscle, the patient is asked to willfully close his mouth, while the operator applies pressure in a downward direction. The masseter muscle acting on the buccinator, produces a depression in the impression, called the masseteric notch.
5. Recording the lingual flange at the anterior lingual border is by asking the patient to protrude his tongue out and later to touch the anterior part of the palate. Protrusion of the tongue

helps to record the length of the lingual flange and touching the anterior part of the hard palate helps in establishing the width of the flange.

6. The distolingual flange is border molded by asking the patient to protrude his tongue and move it to the right and left buccal vestibules.
7. Recording the retromolar pad, the patient is asked to open his mouth wide.
8. Finally, after border molding is complete, the patient should be able to touch the entire upper lip with the tongue without displacement of the tray.

Making the final impression:

- a. The wax spacer is removed and escape vents are made in the palatine raphe area and on either sides to permit excess material to flow out.
- b. Zinc oxide eugenol impression material is used according to manufacturer's instructions. (Two equal length of base and catalyst are mixed together.
- c. The homogenous mixture applied to the inner surface of the special tray and the border.
- d. The loaded tray is inserted into the patient's mouth, centered correctly (using the labial frenum and tray handle as a reference), and seated in position. Tissue function simulated and pressure is maintained till the material has set.
- e. The tray is then withdrawn and the impression is rinsed in cold water, followed by thorough examination of the impression surface.

Making final impression utilizing digital intraoral scanner:

Recently computer-aided design and computer-aided manufacturing (CAD/CAM) technology have been applied to complete dentures. A specialized scan retractor was used to retract the mobile tissues of lips, cheeks and vestibule while taking a digital impression.

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