

Management of the Mandibular Compromised Ridge: A Literature Review and Case Report

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ABSTRACT

Restoration of the mandibular compromised ridge requires various treatment modalities. The simplest approach often is to extend the denture base adequately for proper use of all available supporting tissues. To achieve this goal a good impression of the mandibular resorbed ridge is very important. The impression should be able to record the tissue in a static as well as in functional form.

The aim of this article is to review various impression procedures for resorbed mandibular ridges and to describe functional impression technique in a patient with resorbed mandibular ridge. The ultimate goal, regardless of the treatment modality chosen, is to restore the patient to a level of satisfactory masticatory function.

Keywords: Resorbed ridge, Flabby ridges, Functional impression.

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INTRODUCTION

It could be well said that prosthodontics is one of the branches of dentistry where a good impression holds the key to a successful diagnosis and treatment. This statement holds more importance in cases of resorbed mandibular ridges where we have minimum tissue to fulfill the fundamental requirement of retention, stability and support. The success of any prosthesis rests in the prosthodontist's ability to incorporate these requirements through an accurate biologic impression of the tissues being involved. No matter how good the prosthesis is constructed, it will not function as intended if it was not made on an accurate impression.

The residual ridge of an edentulous patient is the foundation for fabrication of complete denture. If the foundation or the residual ridge is compromised in any form the success of the complete denture fabricated can also be doubtful. Over the years, tremendous progress has been made to develop impression procedures for managing various compromised residual ridge conditions, for example resorbed and flabby ridges, etc.

Various compromised residual ridge conditions involves:¹

- Flabby or hyperplastic ridge
- Displaceable maxillary ridge

- Patient with severely resorbed mandibular ridge
- Unemployed mandibular ridge.

Managing Hyperplastic or Flabby Tissue (Unsupported Movable Tissue)

Impression for flabby or hyperplastic ridge can be made by recording the unsupported movable tissue with minimal displacement and the rest of the tissue with selective pressure technique. Various techniques to record the hyperplastic tissues are as follows:

*William H Filler:*² He described a technique using two trays. The second tray is keyed on the first tray. Light body material is used in the first tray as a corrective wash material. Adhesives are painted over the areas not covered by the first impression in second tray and impression is made. The two trays are held tightly together until the impression material sets. Impression is removed as a single unit.

*Hobkirk technique:*³ Only a single custom tray is used. Border molding is done in the usual manner and impression is made with heavy bodied addition silicone. The areas of movable tissue are cut out and relief holes are made. Wash impression is made with light body impression material.

*Zafrulla Khan technique:*⁴ A window is cut in the custom tray where the unsupported area is present. The unsupported area is recorded with impression plaster and the remaining areas are recorded with final impression material.

*Jone D Walter technique:*⁵ He recorded the healthy denture bearing tissues with zinc oxide eugenol paste and the undisplaced fibers of tissue with impression plaster.

*'Splint Method' By Allan Mack:*⁶ It is used if tissues are excessively and exceptionally flabby. Loosely fitting tray or a special tray made with heavy relief over the flabby area is taken. Plaster is mixed and applied over the flabby area to a thickness of about 3 mm and is allowed to set. Tray is filled with second mix of plaster and the impression is made. The initial coating of the flabby areas thus acts as a 'splint'. It gets removed with the second impression.

*Modified Fluid wax impression:*⁷ They suggested a functional impression technique using fluid wax that captures the primary and secondary load-bearing areas without distortion of the residual ridge. The steps involved in this technique are:

- Preliminary impression made with an irreversible hydrocolloid impression material.

- Border mold the tray with modeling plastic impression compound in segments.
- Trim the tray over the crest of the residual ridge and create a window opening above the displaceable mandibular ridge.
- Melt the impression wax in a water bath and apply onto the borders of the tray with a wax spatula until a glossy surface is visible.
- Apply adhesive on the tray surrounding the window opening and allow it to dry.
- Place the impression tray on the ridge and inject vinyl polysiloxane impression material over the window opening.

Management of Severely Resorbed Mandibular Ridge

Lack of ideal amount of supporting structures decreases the support and the encroachment of the surrounding mobile tissues onto the denture borders. Thus, the main aim of the impression procedure is to gain maximum area of coverage (of minimum pressure) by obtaining, a fairly long retromylohyoid flange for a better border seal and retention and to educate and train the patient to maintain tongue position; i.e. forward and resting on top of lower anterior ridge when the mouth is open.

Flange Technique by Lott and Levin⁸

An anatomic and physiologic approach to increased retention, function, comfort and appearance of dentures given by Frank Lott and Bernard Levin. In this technique, much attention is given to impressions in order to make efficient bases for dentures. Much emphasis is placed on occlusion. The facial, tongue and palatal surfaces of dentures, however, have been completely ignored. These surfaces are usually carved into an 'ideal' form without sufficient consideration for the position and function of cheeks, tongue and lips which are always in contact with the dentures.

Athur S Freese⁹

The objective is to make an impression which records the surfaces of the tissues without excessive displacement in the positions they occupy when in function.

Roberto Von Krammede et al⁶

Used modeling compound to record the extension of the surface without interfering the function of mastication and deglutition. The active incorporation of tongue activity also stabilizes the denture.

Modified Fournet Tuller Technique¹⁰

Also utilizes the same principle of achieving the maximum peripheral seal together with minimal pressure on the crest of the ridge to obtain retention and stability. Softened low fusing impression compound was used to make secondary impression so that maximum extent of the functional periphery is recorded.

Winkler Technique¹¹

He described closed mouth impression technique which uses tissue conditioners and final wash impression is made with a light body elastomeric impression material. Miller used mouth temperature waxes instead of tissue conditioners.

Shanahan Technique¹²

He said that training the patient to achieve an ideal tongue position helps to attain an effective lingual border seal. He used alginate for making preliminary impression. Resin tray was fabricated and static final impression was done. Patient was asked to wear the trial denture bases and return in 2 days.

Klein¹³

Proposed the development of impression without a tray, as a stock tray may cause some distortion of the tissue and may result in an over extended impression. He used a moldable material (putty silicone), reinforced by an internal metallic core, which was placed over the residual ridge and the borders molded by speech exercises. A low viscosity material is placed on the impression surface of this tray and a functional preliminary impression is made.

Making impression in a patient with resorbed mandibular ridge using closed mouth technique (Functional impression technique).

A 62-year-old female patient (Fig. 1), reported to the Department of Prosthodontics with the chief complaint of loose lower denture. Medical history was insignificant. Patient was a denture wearer since past 10 years and got her last denture made 6 months back but was not satisfied with it. On intraoral examination resorbed mandibular residual ridge especially in the posterier region was reported along with high frenal attachments (Fig. 2). Closed mouth impression technique (Winkler technique) was used for making impression to make a functional impression and to record the maximum denture bearing area possible. The technique is described as below:

In this technique the maxillary and mandibular impressions are made together. The impressions are made after jaw relations are recorded especially at VDO or during



Fig. 1: Preoperative extraoral view



Fig. 4: Three applications of tissue conditioner material done and impression made

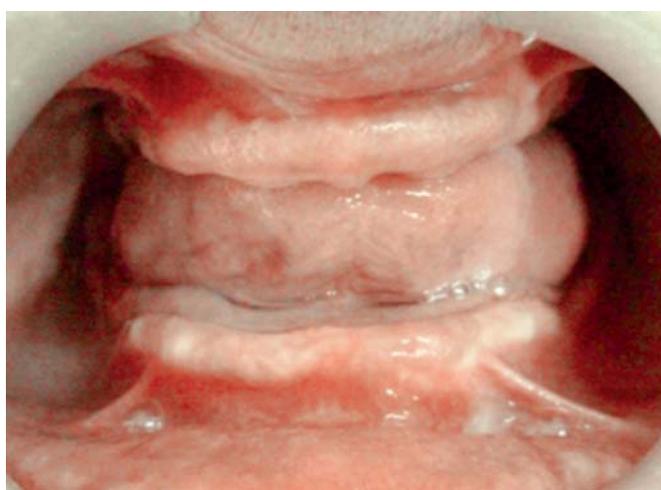


Fig. 2: Preoperative intraoral view

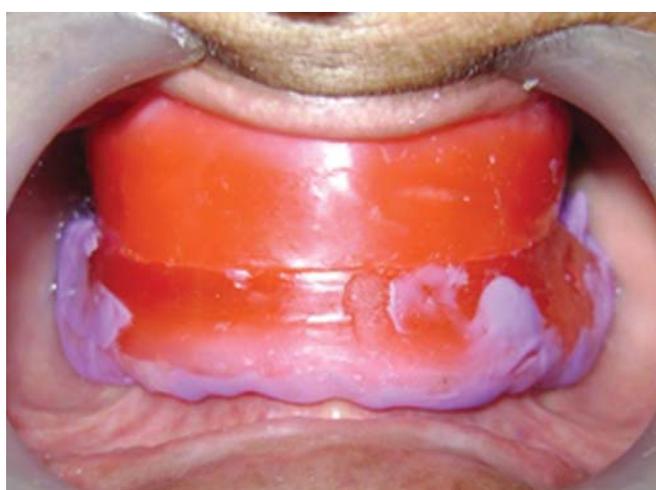


Fig. 5: Final wash impression made using light body with closed mouth technique



Fig. 3: Over extended primary alginate impression made

the try in stage. The manipulation of oral tissues is done by the patient himself. For this the patient is asked to perform functions like puffing, blowing, whistling and smiling, etc.

- An over extended primary impression with alginate was made using stock trays (Fig. 3). Denture base along with occlusal rims were constructed on the primary cast.

- Jaw relations were made to record appropriate horizontal and vertical dimensions.
- Borders are adjusted so that lingual flange and sublingual area are in harmony with the resulting and active phases of the floor of the mouth by an open and closed mouth technique.
- Three applications of tissue conditioning material were used – each application approximately 8 to 10 minutes (Fig. 4). Patient was asked to close the mouth in a pre-recorded vertical position with tissue conditioning material placed in denture base and make various functional movements like puffing, blowing, whistling and smiling, etc.

Hand manipulation: Contours of denture made by dentist with the use of manipulation of lips and cheek within functional limits.

Functional movements: Functional movements generated by the patient's oral structures. We ask the patient to sucking, swallowing, grinning, licking, etc.

- The third and final wash impression is made with a light bodied material (Figs 5 and 6).



Fig. 6: Mandibular secondary impression



Fig. 7: Postoperative intraoral view



Fig. 8: Postoperative extraoral view

After this denture was fabricated using conventional denture fabrication procedures and denture was delivered (Figs 7 and 8). This method helped us to record the denture bearing area in a functional form. Patient was recalled for

follow-up at 24 hours, 1 week and 1 month Interval. She was quite happy with the denture and her complaint of loose lower denture was no more.

DISCUSSION

Poor ridges form one of the most common difficult situations that may challenge the prosthodontist. Number of impression techniques has been described in literature. Each one of them carries their advantages to be used in particular situation. The closed mouth technique used in this situation is time saving, interference of tray handle is eliminated, there are less chances of over or under extensions as movements are performed by the patient and pressure applied by the patient during impression making is same as the pressure applied during occluding. This technique also carries disadvantages like appointment time fatigue, over or under extension if the patient is unable to perform functions properly, dentist has no control over amount of pressure and tongue is restricted to move anteriorly so lingual border anatomy may be altered.

CONCLUSION

The basic objective of a maxillary or mandibular impression is to record all the potential denture-bearing surface available. To a large extent this surface is readily identified if the biologic considerations of impression making are correctly understood. The objective is to maximize the supportive aspect of the available denture foundation by two approaches that are functional and anatomic.

For fabrication of a successful complete denture it is prosthodontist's duty to select proper impression technique to be used for particular ridge form.

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