

A Physiologic Impression Technique for Resorbed Mandibular Ridges

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Abstract :

Making a definitive impression of an edentulous arch can be challenging when the residual ridges present with less-than-ideal conditions. A procedure is described for the final impression of severely atrophied mandibular residual ridges especially for mandibular edentulous ridges with high muscle attachments. The objective is to develop a physiologic impression with maximum support of both hard and soft tissues. Tissues could be displaced during impression making and result in subsequent pathology, or they could be placed i.e. compression within the physiologic limits in order to maximize the support from the edentulous ridge. Close adaptation to the basal seat contributes to stability. This technique emphasizes on the concept of tissue placement and determination of the extent of mucobuccal denture extension which is achieved by the use of a close fitting tray and a viscous impression material. Final impression is made with an elastomeric impression material to capture the anatomic details of the tissues.

Keywords: Secondary Impression, Functional loading, Resorbed ridge, Border molding.

Introduction :

The art and science of complete dentures for oral restoration has been debated for over a century. Today's clinical techniques are an amalgamation of the original prosthodontic philosophies.¹ A complete denture impression is a negative registration of the entire denture bearing, stabilizing, and border seal areas present in edentulous mouth.² Impression techniques can be broadly divided into pressure, non pressure and selective pressure techniques.³ Dynamic impression techniques were also proposed with the intent of maximizing support from underlying tissues.⁴ The changes in impression techniques can be attributed to evolution of newer impression materials and better understanding of underlying tissues.

Long term edentulism and use of ill-fitting dentures result in severe resorption of edentulous ridges, making a definitive impression challenging. This paper presents a novel, cost effective technique for impressing a class IV edentulous ridge⁵ (Fig-1) with the intent of maximizing retention, stability, tissue support, without over compressing the tissues with the help of readily available dental materials.

Technique :

1. Make a preliminary impression of the edentulous arch using McCord's technique.⁶ [3 parts impression compound (DPI Pinnacle impression compound) +7 parts greenstick compound (DPI Pinnacle tracing sticks)]

in a metal stock tray.(Fig-2)

2. Refine the impression using irreversible hydrocolloid⁷ (Neocolloid alginate impression material Zhermack) over the existing primary impression.(Fig-3)
3. Remove, disinfect and pour the impression with dental plaster within 12 minutes. Retrieve the casts and adapt spacer wax extending from left canine to right canine region. Do not use a spacer in the buccal shelf area.(Fig-4)
4. Fabricate a custom impression tray on the preliminary cast using self cure acrylic resin(DPI-RR Cold cure acrylic repair material). Adjust the border extension of the tray to be at least 2 mm short of the vestibules. Evaluate and adjust the extension of the tray in mouth, if necessary. Remove the wax spacer.
5. Soften modeling plastic impression compound (green stick) by heating over the flame and load it over the anterior third of the intaglio surface of the special tray. Temper and seat the tray over the denture bearing area, mold the labial and buccal borders and ask the patient to perform various tongue movements to mold the lingual flange.
6. Repeat this procedure for middle third, followed by posterior third of the impression tray on either side simultaneously.(Fig-5) Trim away any excess green stick material on the periphery with a Bard-Parker blade No. 20.
7. Trim away the material from the crest of the ridge providing the required relief. (Fig-6) Roughen the impression surface by making grooves. This will enable mechanical retention of light body polyvinyl siloxane (ExpressTM VPS impression material light body regular set).
8. Apply adhesive on the impression and tray borders and allow it to dry(Universal tray adhesive Zhermack).

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Fig.1: Severely resorbed ridge

Fig.2: Primary impression made using Mc' Cords technique.



Fig.3: Refined primary impression.

Fig.4: Spacer wax adapted on primary cast.



Fig.5: Impression with border molding completed.

Fig.6: Provision of relief for non stress bearing area.

9. Mix base and catalyst pastes of light body Poly Vinyl Siloxane impression material, spread it over the intaglio surface of the impression and obtain the final wash impression by performing lip, cheek movements and tongue movements. Allow the impression material to polymerize according to the manufacturer's recommendations.(Fig-7)
10. Remove, disinfect the impression and pour with dental stone.(Fig-8)

Discussion :

The problems associated with class IV mandibular ridge are many, most evident being the frustration of the patient due to lack of retention of denture. Osseointegrated dental implants have emerged as the "gold standard" for treating edentulous patients as they provide unique option of complete rehabilitation. However, they come with their own restrictions; notably cost and surgical risk. Implants in



Fig.7: Completed secondary impression.

Fig.8: Master cast of the edentulous ridge.

resorbed ridge have high surgical risk complications due to the need of regenerative techniques to improve the foundation for implants. Medical, social problems, in addition to cost factor may contraindicate autogenous bone transplantation.⁸ Therefore, conventional dentures still remain as a viable solution for majority of the ageing population.

The impression of the completely edentulous arch is the single most contributing factor towards achieving retention, stability and support. Modifications of impression techniques have been tried in the past with a view of maximizing retention, stability and support of the denture.^{4,6,7,9} The primary impression should fulfill the objectives of retention, stability and also provide functional support which is of paramount importance in resorbed ridges in order to preserve the ridges.

Soft tissues have varying degrees of displacement. They can be placed within physiological limit up to 2-2.5mm without undergoing compressive trauma.¹⁰ The tissues in the buccal shelf of the mandibular ridge do not resorb to the same extent as the anterior mandible as it is covered with dense cortical bone, it is usually at right angles to the occlusal plane and to the vertical occlusal forces.³

The impression technique takes into consideration the varying histological characteristics of the soft and hard tissues in the mandible. The focus is on primary impression, spacer design, secondary impression and the choice of impression materials.

The primary impression in this technique makes use of low fusing green stick that is less viscous than impression compound and does not over compress the tissues as the latter does. It also possesses better flow and handling characteristics and records accurate details¹¹. This impression is refined to record the finer surface details by making the impression with alginate that provides a stable, properly extended, close fitting custom tray.⁷

The histological characteristics of the tissues that cover the residual alveolar bone, the nature of the residual ridge bone, and its positional relationship to the direction of stresses that will be placed on it determine the spacer design. Spacer wax was adapted in the anterior region and not in the buccal shelf area as buccal shelf region is the primary stress bearing area³ and the tissues can be adequately placed to make an impression providing functional support.

The custom tray so prepared is a closed fitting tray in the area of buccal shelf and proposed borders of the denture maximizing support in the buccal shelf area and the border tissue (peripheral molding). It also provides adequate space for the impression material, records functional form of the primary stress-bearing area and anatomic form of the area that cannot withstand functional loading. This helps in development of denture bases that exert additional pressure on primary stress bearing area when functionally loaded and relieve the areas not able to withstand the stresses. The goal is achieved by restricting the flow of impression material in the primary stress bearing area and scraping out the material from other areas.

In this technique, green stick compound was used for border molding.¹² It is a viscous material with low flow characteristics (70% at 45°C)⁹ and when placed in a closed confined, it causes tissue placement without compression.

There is no finger pressure exerted on any part of the tray. Tray is held by placing 2 fingers on the tray in the buccal shelf area and the thumb supporting the chin.

Final impression was made by light body poly vinyl siloxane providing accurate recording of the ridge as it applies lowest pressure during impression making procedure and provides excellent record of minute details of the residual ridge in its passive form. The space for the elastomeric material is provided by scraping off the compound from the intaglio surface of the impression except the buccal shelf area. This makes it a true functional recording of the edentulous jaws. Close adaptation to basal tissues ensures maximum retention, stability and support.

An alternative to the use of elastomeric light body material is fluid wax. However, greater convenience, better handling and flow characteristics make light body a preferable choice.

Summary And Conclusion :

The presented procedure describes a simple, quick and reliable technique to impress the class IV mandibular ridge using a custom tray, green stick compound and elastomeric

impression material. Area to be relieved, namely the crest of the ridge, is impressed in anatomic form and the primary stress-bearing area is recorded in its functional form ensuring healthy state of the tissues for extended periods.

This technique combines both traditional and contemporary methods and the amalgamation leads to prosthesis with better retention and stability. Use of a viscous material in a close fitting tray allows physiological compression of tissues in the primary stress bearing areas. Elastomeric impression material helps in recording finer details of the ridge. Thus this technique helps in maximizing the functional support from the edentulous ridge. Due consideration is given to histological characteristics of the tissues and ensures the preservation of the residual alveolar ridge, thereby fulfilling all the objectives of impression making. Furthermore, readily available dental materials were used making this technique easy to adapt and master. As it is a new technique, its usefulness and relevance needs to be evaluated further. Patient education is mandatory prior to and following the treatment as he must understand the limitations of denture performance prior to the treatment.

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