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REVIEW ARTICLE

IMPRESSION TECHNIQUES FOR THE EFFECTIVE MANAGEMENT OF FLABBY RIDGES IN COMPLETE DENTURES

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ABSTRACT

Restoration of the edentulous flabby ridges often requires special considerations in impression making. The use of conventional impression techniques on flabby ridges can lead to an unstable and unsatisfactory denture. Modified impression techniques when used in this condition can record the flabby tissues in an undistorted form and thus help to fabricate a stable and functionally satisfying denture. The various impression techniques which could be used for flabby ridges are reviewed here.

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INTRODUCTION

The performance of a complete denture is often a reflection of it's support and retention. A final impression for a complete denture should record the entire functional denture-bearing area to ensure maximum support, retention and stability for the denture during use. However, flabby ridges, present a particular difficulty and may give rise to complaints of pain or looseness relating to a complete denture that rests on them. Flabby ridge is a superficial area of mobile soft tissue affecting the maxillary or mandibular alveolar ridges. It can be developed when hyperplastic soft tissue replaces the alveolar bone and is a common finding, particularly in long term denture wearers. Such ridges are reported to be caused due to trauma from denture bases. It also occurs in cases with a maxillary complete denture opposing mandibular anterior natural teeth, without proper posterior occlusal support. It could also arise as a result of unplanned or uncontrolled dental extractions. In the edentulous patient, it is found more commonly in the anterior region. The reported prevalence for this condition also varies among investigators, but it has been observed in up to 24% of edentulous maxilla, and in 5% of edentulous mandible. Histologically, flabby ridges are composed of hyperplastic mucosal tissue and loosely arranged fibrous connective tissue and dense collagenised connective tissue. In the soft tissue, a great amount of metaplastic cartilage and/or bone are observed. The flabby ridge can be determined by checking for the mobility of the tissue with the blunt end of a mouth mirror or a probe.

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THEORIES OF IMPRESSION MAKING FOR FLABBY RIDGES

Impression making is the most basic and important requirement for a functionally and esthetically successful denture. All impressions for complete dentures can be categorised in three ways:

1. The mucostatic technique
2. The mucocompressive technique
3. The selective pressure technique

A particular problem is encountered if a flabby ridge is present within an otherwise 'normal' denture bearing area. Flabby ridges adversely affect the support, retention and stability of complete dentures unless properly managed. The forces exerted during impression making results in distortion of the mobile tissues. If the flabby tissue is compressed during conventional impression making, it will later tend to recoil and dislodge the resultant overlying denture. So, an impression technique is required which will obtain optimal support from the stress-bearing areas, and, at the same time, will not distort the flabby tissues.

DIFFERENT IMPRESSION MATERIALS AND TECHNIQUES FOR THE EFFECTIVE MANAGEMENT OF FLABBY RIDGES

The three main approaches to the management of flabby ridge are:

1. Surgical removal of flabby tissue prior to conventional prosthodontics
2. Implant retained prosthesis
   - Fixed
   - Removable
3. Conventional prosthodontics without surgical intervention

1. Surgical Removal Of The Flabby Tissue

The advantage of this approach is that a firm denture-bearing area is produced, which enhances the stability of the prosthesis but the health of the patient must be taken into consideration. Removal is contraindicated in circumstances where little or no alveolar bone remains. However the fibrous part of the ridge has a cushioning effect which reduces trauma to the underlying bone, which therefore should not be removed. The removed tissue often requires prosthetic replacement by denture base material; this can increase the bulk and weight of the prosthesis. Retention is also adversely affected by the significant loss of the sulcus depth which is important in aiding border seal. Hence, an additional surgery of vestibuloplasty may be required. Although the flabby ridge may provide substandard retention for the denture base, it may be more desirable than no ridge at all.

2. Implant Retained Prosthesis

a) Fixed prosthesis
b) Removable prosthesis

Fixed and removable implant retained prosthesis offer benefits to many of the problems encountered with conventional prosthodontics. These may be an alternative due to the enhanced stability, retention and oral function. However, implants in the maxilla, which has a higher prevalence of flabby ridge, are not as successful as in the mandible. The success rates for maxillary implants have been shown to be as low as 78.7%. This could be due to the placement of shorter implants into highly vascular, poor volume, low density bone. The diminished alveolar bone volume in this subject group may result in restrictions on suitable implant sites or the need for bone augmentation. The initial cost and long-term maintenance costs of these restorations can be high. Other factors that must be considered include: surgery, discomfort and inconvenience, general health of the patient and risk of surgical complications or implant failure.

3. Conventional Prosthetic Management

Uncontrolled mobility of the flabby tissue from its resting position, by forces exerted during conventional impression making, results in a record of a distorted denture bearing area. Thus, many impression techniques have been proposed to overcome this difficulty.

a. One Part Impression Technique (Selective Perforation Tray)

If the degree of mobility of the flabby tissues is minimal, then this technique may be used (Lynch and Allen, 2003).

Fig.1. Selective perforation maxillary special tray

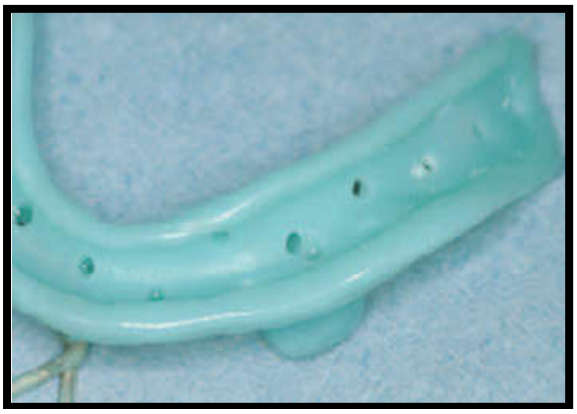

Fig.2. Selective perforation mandibular special tray

1. Preliminary impressions are made in stock trays using low-viscosity alginate after appropriate border correction.
2. A special tray with a spacer is fabricated from the primary cast for use with a low viscosity impression material, such as impression plaster, low-viscosity silicone or alginate.
3. Pressure on the unsupported, flabby tissue can be minimized further by the use of multiple perforations in the tray overlying these areas (Figs. 1 & 2).

b. Controlled Lateral Pressure Technique

This technique is administered in a flabby posterior mandibular ridge (Crawford and Walmsley, 2005). In this technique, a low fusing tracing compound is used to border mould as well as record the denture bearing area using a correctly extended special tray. The low fusing compound over the flabby crestal tissue is removed with a heated instrument and tray is perforated in this region. Light body silicone impression material is applied on to the buccal and lingual aspects of the low fusing compound in the area and the impression is made. The excess material escapes through the perforation and the flabby ridge will assume a resting central position having subjected to even bilateral pressure by the extensions of the low fusing compound.

c. Palatal Splinting Using A Two-Part Tray System

In 1964, Osborne described an impression technique involving two overlying impression trays used for recording maxillary arches with flabby anterior ridges. The aim of this technique is

to maintain the contour of the easily mobile tissue while the rest of the denture bearing area is recorded. A primary impression is made in alginate and a primary cast is poured or a primary cast is constructed using the fitting surface contour of a previous denture. On this a palatal tray is fabricated with wax being used as a spacer on the palatal aspect of the mobile area and extending to the ridge crest around the arch. In this acrylic resin palatal tray, a low viscosity zinc oxide paste impression is made of the palate. An upward force is maintained until it is apparent that the mobile ridge is just beginning to have pressure applied to it. Once this has set, a second special tray impression is made completely encompassing the first tray. It should be inserted from in front, backwards. Silicone impression material can be used and the presence of the supporting zinc oxide should prevent backward distortion of the mobile ridge. A modification of this approach was described by Devlin in 1985, in which a locating rod is positioned in the centre of the palatal tray, but proclined to allow the second special tray impression to be guided in an oblique upward and backward direction to envelope the palatal tray (Devlin, 1985). The palatal tray accurately locates the second part special tray using a stop, thereby allowing for a pre-planned even thickness of the impression material (Fig. 3).

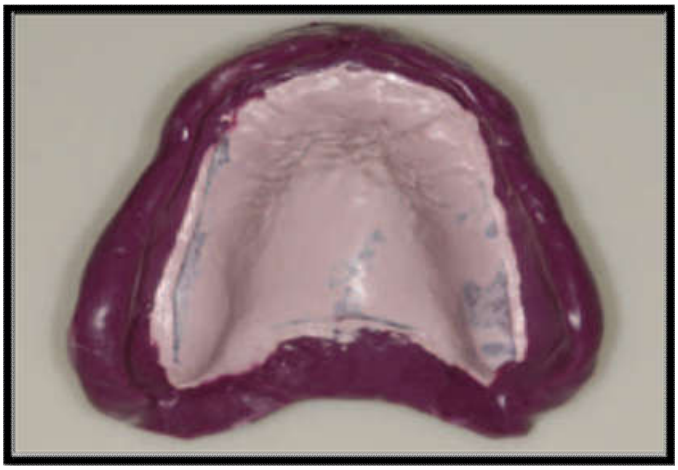

Fig.3. Final completed impression

d. Selective Impression Compound Flaming Technique

1. A preliminary impression in a free flowing material such as alginate is made producing a model of a relatively undistorted ridge.
2. A special tray with a 3-4 mm spacer is constructed and used to make an impression of the primary cast with impression compound.
3. The impression periphery is carefully softened and functionally trimmed. The fibrous part of the ridge can be outlined on the impression surface.
4. The impression compound overlying the firm denture bearing area is softened with a flame before the tray is seated under heavy pressure, attempting to replicate functional force. Impression paste is used over the impression compound to make the final impression.

By performing the impression in this way, the original relatively undistorted shape of the fibrous tissues is retained while the tissues more capable of functional denture support are recorded under pressure (Fig. 4) (Lynch and Allen, 2006).

e. Modified Fluid Wax Impression Technique

This technique records the primary and the secondary stress bearing areas without distortion of the residual ridge (Tan *et al*., 2009). Impression compound is softened and placed in the region corresponding to mandibular central incisor and both the mandibular first molars bilaterally in an adjusted special tray to serve as spacers for impression wax. Border moulding is done with low fusing compound and then a window opening is created above the flabby alveolar ridge. The size of the window depends on the extent of the flabby tissue. The melted impression wax is applied on to the borders of the tray with a wax spatula while it is still fluid. The temperature used to melt the impression wax should be less than the working temperature of the modeling plastic compound used for border moulding to prevent distortion of the low fusing impression compound. Place the impression tray immediately over the edentulous ridge and leave it in the mouth for 5 minutes. Allow adequate time for the mouth temperature impression wax to flow and escape to the periphery of the impression. Remove and cool to room temperature. Add impression wax to the intaglio surface of the tray to record the remaining surface of the ridge. Add on slopes of ridge than crests in increments until a glossy surface is visible. Trim away excess impression wax on the periphery or over the window opening with a scalpel blade. Apply adhesive on the tray in the area of the window opening. Place the impression tray on the ridge, inject poly siloxane impression material over the window opening. The distortion of the soft tissue is prevented by placing the impression material in the most passive manner possible (Fig. 5).

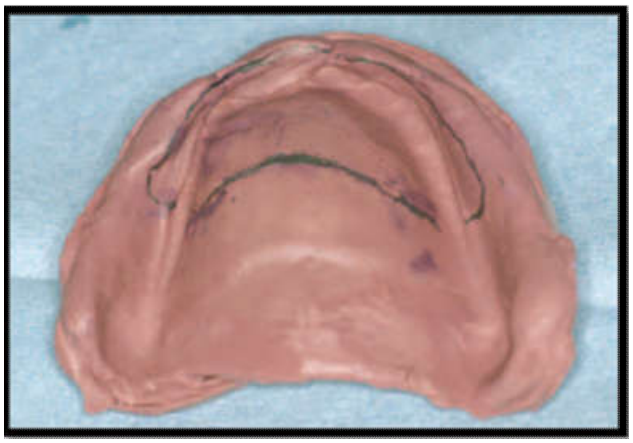

Fig 4. Final impression after flaming and placing in the patient's mouth

Fig.5. Completed modified fluid wax impression

f. Multiple Viscosities Of PVS Impression Technique

It was introduced by Massad *et al* (Massad *et al*., 2006). The procedure demonstrates a layering method of impression making that maintains the integrity between the layers of the impression materials of varying viscosities and controls the path of insertion, minimizing the incidence of overextension. It is important to use an impression material that maintains dimensional stability during removal and re-insertion while making an impression that must be seated beyond anatomical undercuts. So the material should have a high percentage of recovery from deformation.

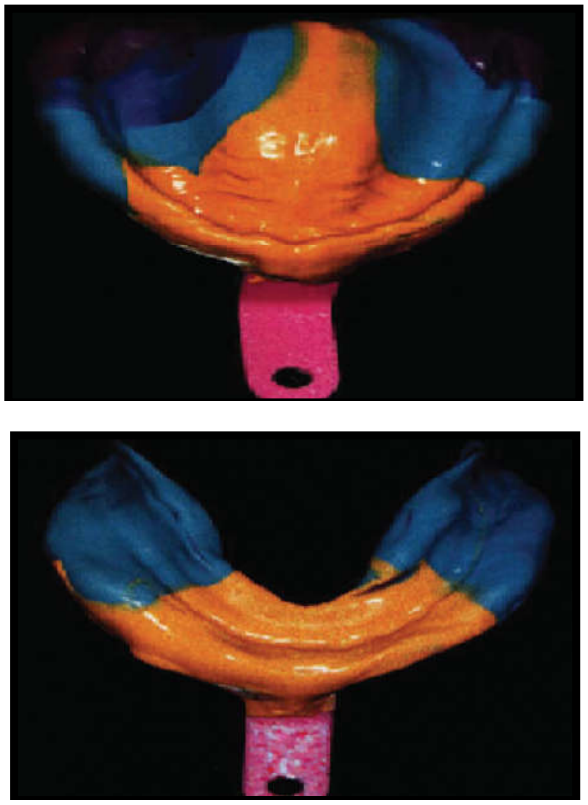

Fig.6. Final impressions of the edentulous maxillary and mandibular arch show the use of multiple viscosities of PVS impression material as defined by various colours

Fig.7. Final impression

The clinician should be able to apply multiple viscosities sequentially and simultaneously that will set to form a homogeneous mass of impression material, regardless of the viscosities used. The materials selected must exhibit high tear strength across the multiple viscosities used in this procedure. The use of multiple viscosities of impression material should be such that an anatomically correct and detailed reproduction that captures all aspects of the edentulous arches should be present. Based on the characteristics of the materials, polyvinyl siloxane (PVS) materials appear to meet all the requirements that support the use of this layering impression technique. The high viscosity of PVS impression material with low strain in compression is used initially to create tissue stops before proceeding. The impression tray is removed and excess impression material is trimmed. Border moulding is then done with the help of high or medium PVS.

Dry the impression and place the appropriate viscosity impression material on to the basal seat as a thin "wash" impression. The premaxilla and anterior mandibular areas required the extra light viscosity material, while the posterior maxillary and mandibular arches need low or average viscosity PVS material. Inspect the accuracy of the impressions to ensure that all tissue details have been captured before pouring the master cast (Fig. 6).

g. Window Technique

It was first discussed by Osborne in 1964 (Osborne, 1964). A preliminary impression is made in a stock tray with irreversible hydrocolloid impression material alginate, which minimally distorts the mobile tissue. After the cast is poured, the flabby ridge is marked on the cast and a tray with a spacer of 1 mm thickness is made with autopolymerising resin. Finger stops are made on the tray. The peripheral extension of the tray is decided and adjusted so that it is 2mm short of the sulcus. Border molding is done with softened green stick tracing compound till the functional sulcus is recorded. Then a window is made on the tray over the flabby ridge area. Final impression is made with zinc oxide eugenol impression paste. The impression is taken out and the material that has escaped through the window in the tray is trimmed back. The impression is positioned back in the patient's mouth and impression plaster is painted on the flabby ridge exposed through the window. This can be done using a wax knife or a brush. The material should be stiff enough to be applied and should not be runny in consistency. Once it sets, the impression is carefully removed, separating medium is applied to the plaster area and the cast is poured in dental stone. In this technique, the flabby tissue is recorded in a minimally distorted form and the rest of the tissue in functional form (Fig. 7).

CONCLUSION

Flabby ridges pose a prosthodontic challenge for the achievement of stable and retentive dental prostheses. Emphasis has moved away from surgical removal of the flabby tissue. Implant retained prostheses may not be the most suitable treatment option for many patients. When considering conventional prosthodontics, there are a variety of impression techniques available to address the problems caused by the flabby tissue during denture fabrication, however currently there is a lack of scientific evidence for support of any technique over another. Considerations for selection should include the location and extent of the flabby tissue and the patient's presenting complaint.

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