

IN BRIEF

- Provides a review of the impression techniques that can be used to optimise the treatment of patients with fibrous ridges.
- Discusses surgical options for the management of fibrous ridges.
- Presents step-by-step guidance of clinical and laboratory procedures, allowing integration of the techniques into current clinical practice.

A review of prosthodontic management of fibrous ridges

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'Fibrous' or 'flabby' alveolar ridges pose significant problems for the provision of stable and retentive dental prostheses for affected patients. In particular, problems arise during the act of impression taking, when forces cause the mobile denture bearing tissues to become distorted. The purpose of this paper is to review the impression techniques that can be used to optimise the treatment of edentulous patients with 'flabby' alveolar ridges.

INTRODUCTION

A so-called 'fibrous' or 'flabby' ridge is a superficial area of mobile soft tissue affecting the maxillary or mandibular alveolar ridges. It can develop when hyperplastic soft tissue replaces the alveolar bone and is a common finding, particularly in the upper anterior region of long-term denture wearers.

Masticatory forces can displace this mobile denture-bearing tissue, leading to altered denture positioning and loss of peripheral seal. Forces exerted during the act of impression taking can result in distortion of the mobile tissue. The resulting stability of the denture can be poor and both function and appearance can be heavily compromised.

It has long been believed that the condition, sometimes named 'combination syndrome', is caused by the presence of opposing natural teeth to an edentulous

area. Kelly,¹ in 1972, first described 'combination syndrome' based on the observations of six patients followed up over a three year period. Each patient wore a complete maxillary denture opposed by mandibular teeth and a distal extension removable partial denture. His observations included alveolar bone resorption in the anterior maxilla, enlargement of the tuberosities and bone resorption underneath the mandibular denture bases. A comprehensive review of studies investigating 'combination syndrome' carried out by Palmvist *et al.*,² in 2003, reported that there was no evidence to support the belief that bone resorption in the anterior maxilla is related to the presence of anterior mandibular teeth. Furthermore, no evidence was found to indicate that the use of a mandibular removable partial denture in these instances can prevent the development of anterior maxillary bone resorption. This is probably not surprising when the many complex factors influencing bone metabolism are considered.

The reported prevalence has varied, but has been demonstrated in up to 24% of edentulous maxillae, and in 5% of edentulous mandibles. In the edentulous patient, it is found in the anterior region more commonly in both arches.³⁻⁶ It is often related to the degree of bone resorption and in severe cases this can be to the level of the anterior nasal spine.⁴



Fig. 1 Undisplaced mandibular ridge



Fig. 2 Displaced mandibular ridge



Fig. 3 Selective perforation special tray

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Fig. 4 Wax Spacer



Fig. 6 Second tray



Fig. 8 Palatal impression using zinc oxide paste

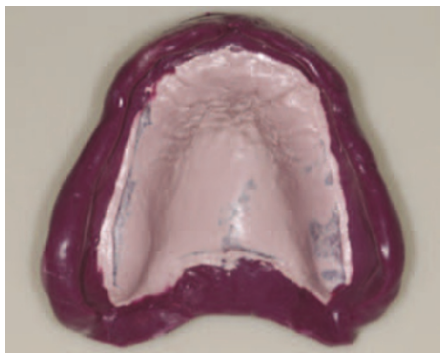


Fig. 10 Finished impression

Typically these 'flabby ridges' are composed of mucosal hyperplasia and loosely arranged fibrous connective tissue as well as more dense collagenised connective tissue. In the soft tissue, varying amounts

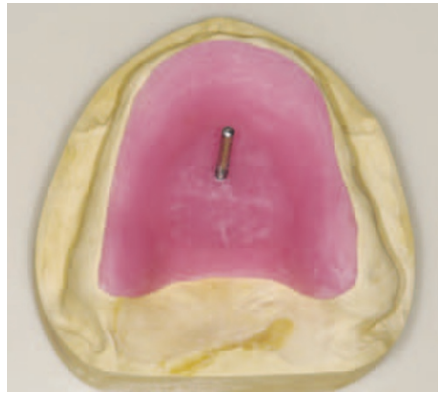


Fig. 5 Palatal tray with proclined guidance rod and stop

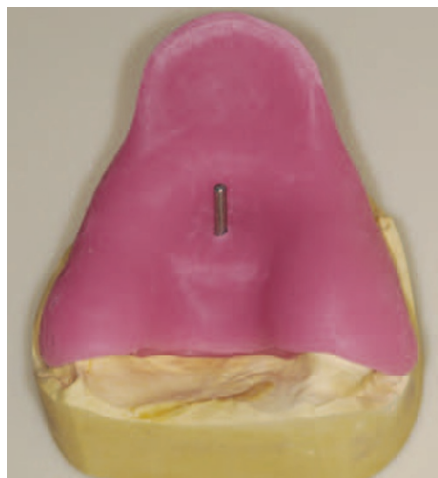


Fig. 7 Both trays seated on cast



Fig. 9 Second encompassing impression using silicone impression material

of metaplastic cartilage and/or bone have been reported.⁷

MANAGEMENT

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

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

Surgical removal of the fibrous tissue

The advantage of this approach is that a firm denture-bearing area is produced, which enhances the stability of the

prosthesis. As with any surgical treatment option, the health of the patient must be taken into consideration. Removal is contraindicated in circumstances where little or no alveolar bone remains.⁵ It can be argued however that 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.^{4,6} For conventional prosthodontics, it is argued that although the flabby ridge may provide substandard retention for the denture base, it may be more desirable than no ridge at all.^{3,5}

Implant retained prostheses

- a) Fixed prosthesis
- b) Implant retained overdenture.

Fixed and removable implant retained prostheses offer potential benefits to many of the problems encountered with conventional prosthodontics. These may be an attractive alternative due to the enhanced stability, retention and oral function. An implant retained overdenture, in comparison to a fixed prosthesis, is initially economic and the surgery is often more straightforward as usually fewer implants are required. However, the recurrent cost due to maintenance can be considerable.⁸

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%.⁹ It is thought that this could be due to the placement of shorter implants into highly vascular, poor volume, low-density bone.¹⁰ The diminished alveolar bone volume in this subject group may result in restrictions on suitable implant sites or the need for bone augmentation.⁴

In terms of both time and finance, the initial cost and long-term maintenance costs of these restorations can be high.¹⁰⁻¹² Other factors that must be considered include: surgery, discomfort and inconvenience, general health of the patient and risk of surgical complications or implant failure.

Conventional prosthetic management

Uncontrolled displacement of the mobile fibrous tissue from its resting position, by forces exerted during conventional impression taking, results in a record of a distorted denture bearing area. There are two impression principles which are reported to overcome this problem:

- Mucodisplacive impression technique, with the aim of compressing the loose flabby tissue to allow functional support from it by replicating the contour of the ridge during compression by occlusal forces.
- Mucostatic impression technique, which aims to achieve support from the other firm areas of the arch and maximises retention.

At present, the published evidence does not clearly support the superiority of either of these techniques over the other. The following techniques have been described.

One part impression technique (Selective perforation tray)

It has been suggested that if the degree of mucosal displacement is minimal, then this modified conventional technique may be considered.¹⁸

1. Preliminary impressions are taken in stock trays using low-viscosity alginate after appropriate border correction.
2. A spaced special tray 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, displaceable soft tissue can be minimised further by the use of perforations in the tray overlying these areas (Figs 1-3).

Controlled lateral pressure technique

This technique was advocated by many authors for use with a fibrous (unemployed) posterior mandibular ridge.¹³⁻¹⁵ They describe a technique in which tracing compound (green stick) is used to record the denture bearing area using a correctly extended special tray. A heated instrument is then used to remove the greenstick related to the fibrous crestal tissues and the tray is perforated in this region. Light bodied silicone impression material is then syringed onto the buccal and lingual aspects of the greenstick and the impression gently inserted. The excess material is extruded through the perforations and theoretically the fibrous ridge will assume a resting central position having been subjected to even lateral pressures.

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 displaceable anterior ridges.¹⁶ The aim of this technique is to maintain the contour of the easily displaceable tissue while the rest of the denture bearing area is recorded.

A primary model is constructed using the fitting surface contour of a previous



Fig. 11 Undisplaced maxillary ridge



Fig. 13 Impression Compound



Fig. 15 Marking of fibrous tissue boundaries

denture. From this a palatal tray is fabricated with wax being used to create space 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 taken 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, and the presence of the supporting zinc oxide should prevent backward displacement of the mobile ridge.

A neat modification of this approach was described by Devlin¹⁷ 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. The palatal tray accurately locates the second part special tray using a stop, thereby allowing for a pre-planned even thickness

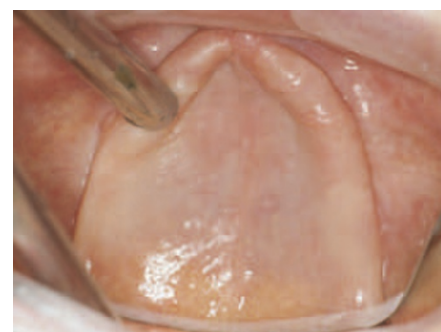


Fig. 12 Displaced maxillary ridge



Fig. 14 Impression of primary cast

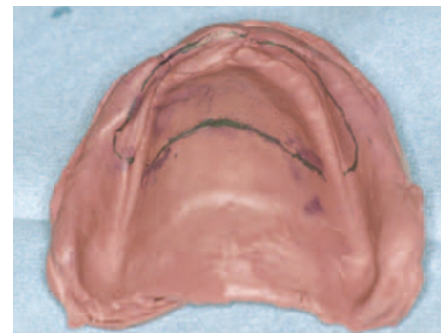


Fig. 16 Transfer to compound impression

of impression material. This technique is illustrated in Figures 4-10.

Selective composition flaming

Illustrated in Figures 11-16.

1. A preliminary impression in a fluid material such as alginate is cast producing a model of a relatively undistorted ridge.
2. A 3-4 mm spaced rigid special tray is constructed and used to take a composition impression of the primary cast (Fig. 14).
3. The impression periphery is carefully softened and functionally trimmed. The fibrous part of the ridge can be outlined on the impression surface (Figs 15 and 16).
4. The composition overlying the firm denture bearing areas is softened with a flame before the tray is seated under heavy pressure, attempting to replicate functional force.

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 in a displaced state.¹⁸



Fig. 17 Rim handle design special tray



Fig. 18 First stage impression



Fig. 19 Second stage Plaster of Paris record of anterior ridge

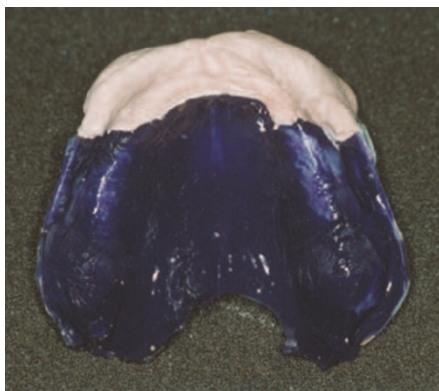


Fig. 20 Final impression

Two part impression technique: Mucostatic and mucodisplacive combination

First described by Osborne in 1964 for use in the mandible, this is a popular technique described by many authors as it ensures that pressure exerted by the tray does not cause distortion of the mobile tissues (Figs 17-20).^{15,16,18,19}

1. The preliminary impressions are taken and cast. The displaceable tissue can be marked on the impression and transferred to the primary cast.

2. A close fitting cold-cured or light-cured acrylic base is constructed so that the flabby ridge area is left uncovered. An alternative, described by Hobkirk, McCord and Grant, involves removal of acrylic from a complete special tray creating a window over the displaceable area.^{13,19}
3. Appropriate border correction is then carried out before an impression of the firm, supported mucosa is recorded in zinc oxide-eugenol or medium-bodied silicone (Fig. 18).
4. An impression of the displaceable mucosa is then recorded by applying or syringing a thin mix of impression plaster or light-bodied silicone (Fig. 19). The latter having preferential use in cases involving undercut.

Modification of the special tray after the more viscous impression material has been used to record the whole of the denture bearing area (including the displaceable area) previously described by McCord and Grant, could conceivably cause a degree of distortion in adjacent areas.¹³

The design of this modified special tray can vary from a completely uncovered section of the arch (as shown in Figs 17 and 18) to a window overlying the unsupported mucosa. In the fibrous anterior maxilla, modification of the handle position is often required. A rim handle design has the benefit of aiding prevention of unset impression material falling to the back of the mouth when the patient is supine. The advantage of a window design means that the appropriate border correction can be undertaken and checked around the entire sulcus before the second stage of the impression is completed.

DISCUSSION

There appears to be a consensus in the literature that surgical removal of the fibrous areas often results in a greater prosthodontic challenge. Implant retained prostheses may offer a solution to the problems of stability and retention in fibrous ridge cases. However, they are not without their disadvantages ie surgery, treatment time, cost, etc. A conventional prosthodontic solution may avoid these problems associated with surgery.

Due to the obvious difficulties in analysis of the success of prostheses constructed using the various impression techniques described, the clinical choice has fallen mainly to personal preference, based on analysis of theoretical principles. Various techniques have been recommended and there is controversy as to whether a mucodisplacive technique which compresses the mobile tissue aiming to achieve maximum support from it, or whether a

mucostatic technique with the aim of achieving maximum retention should be employed.

The following theoretical impression technique selection criteria for flabby ridge may be considered of relevance:

1. The patient's presenting complaint, for example, instability during mastication or lack of retention during rest, speech, etc.
2. The amount and position of displaceable tissue should be considered. Where distortion is minimal, the use of perforations of the special tray overlying the fibrous region may be all that is required. Where distortion is significant, either a compressive impression, such as the selectively flamed composition, or a passive technique, either through palatal splinting or two stage could be considered.
3. The importance of optimising other design factors, for example, correct border extension, occlusion, tooth positioning, etc.

Using the palatal splinting technique it is conceivable that a degree of distortion, although minimal, may occur by anterior distortion during the first stage and compression of the ridge at second impression stage. The two stage technique is the closest of the described techniques to recording the fibrous ridge in its undisplaced position and would appear to have the highest number of advocates in the literature reviewed.^{4,13-19} Indeed, the use of mucostatic impression techniques for the majority of normal cases were advised following a review of prosthodontic standards carried out in 1989.²⁰ The difficulty in researching this area is not surprising when the multifactorial complexity of denture satisfaction is considered.

CONCLUSIONS

Fibrous ridges pose a prosthodontic challenge for the achievement of stable and retentive dental prostheses. Emphasis has moved away from surgical removal of the fibrous tissue. Implant retained prostheses may not be 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 unsupported tissue during denture construction, 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 unsupported tissue, as well as the patient's presenting complaint.

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