

Liquid supported denture: A superlative option for flabby ridge

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Abstract

The clinically significant problems associated with flabby ridge such as insufficient retention, stability of the complete denture and occlusal discrepancy due to tissue rebound require an ideal denture base that would be flexible enough to continuously adapt to the mucosa as well as rigid enough to support the teeth during function. This case report describes the design of a denture in which the characteristics of plasticity and elastic recovery can be combined by the use of a liquid supported denture in a patient with completely edentulous maxillary arch with flabby tissue in anterior region opposing a completely edentulous mandibular arch.

Keywords: Flabby ridge, Liquid supported denture, Hobkirk technique, Polyethylene sheet.

Introduction

A flabby ridge is an area of hyperplastic mobile soft tissue afflicting the alveolar ridges. The advanced bone resorption lead to replacement of the alveolar bone by hyperplastic soft tissue. It is more commonly in found in the anterior edentulous region of both the arches. However, in severe cases it can extend up to the level of the anterior nasal spine.^[1] The prevalence of flabby ridges can vary, occurring in up to 24% of edentulous maxillae and in 5% of edentulous mandibles. The clinically significant problems associated with flabby maxillary ridge are that of insufficient retention and stability of the maxillary complete denture. The masticatory forces can displace this mobile denture-bearing tissue, leading to discomfort, loss of peripheral seal, altered denture

positioning and occlusal discrepancy due to tissue rebound in the flabby ridge area.^[2,3] Although the flabby ridge may provide poor retention for the denture, it may still be better than no ridge at all.^[1]

Flabby ridges can be managed either conservatively by conventional prosthodontics or by surgical intervention that involves removal of fibrous tissue prior to conventional prosthodontics or by surgical placement of implants for fixed or removable implant retained prosthesis.^[4] Many a times, the surgical intervention is not the choice because either patient is not affirmative or his age and health is not reminiscent of surgery. At times, the cost factor precludes implant supported prosthetic rehabilitation. The conventional prosthodontics offer potential solution to these problems. However, the conventional techniques require special considerations in impression making because force exerted during this act can result in distortion of the mobile tissue.^[2] Many authors have proposed selective pressure impression techniques for flabby ridge impressions by modifying custom tray by window cut through, vent holes, and spacer or combination. In these techniques, the non-flabby tissues are compressed to obtain optimal support, and at the same time, the flabby tissues will not be displaced.^[3]

An ideal denture base would continuously adapt to the mucosa and thus should be flexible. However, it also has to support the teeth during function and thus should be rigid. Obviously, these properties cannot be combined in one material. Yet, with combinations of materials, the base can be rigid where it needs to be strong and flexible when, in contact with the soft tissues.^[5] In a flabby ridge condition, an ideal denture should be able to withstand masticatory forces and have flexible tissue surface to reduce stress concentration and trauma on the underlying tissues. A liquid supported denture can hence be a solution for this problem.^[6] This case report describes the design of

a denture in which the characteristics of plasticity and elastic recovery can be combined by the use of a liquid supported denture in a patient with completely edentulous maxillary arch with flabby tissue in anterior region opposing a completely edentulous mandibular arch.^[6]

Case Report

A 63 year old male patient reported to the Department of Prosthodontics, I.T.S. Centre for Dental Studies and Research, Ghaziabad, with the chief complaint of loose fitting upper denture since 1 year. The patient's history revealed that he had become progressively edentulous for last 10 years. He lost his lower posterior teeth first followed by upper anterior and then upper posterior teeth for which he wore an upper complete denture and a lower partial denture for 4 years before converting to a set of complete upper and lower dentures. He was non-smoker and no other systemic illness was elicited. On intraoral examination it was found that maxillary residual ridge was flabby in nature anteriorly (Fig 1). The denture was ill-fitting with worn out occlusal surfaces of acrylic teeth. There were signs of redness and soreness of both maxillary and mandible residual alveolar ridges.

Considering the patient's oral state and economic condition, the treatment plan suggested to the patient was that of a maxillary liquid supported complete denture opposing a mandibular complete denture. To treat the abused tissue, patient was advised to discontinue the use of old denture for a week. Once the tissue returns to a healthy state, the denture fabrication procedure was started.

The procedure for fabrication of modified denture design for flabby ridge can be divided into 2 stages for easy of understanding:

Stage I : Impression making (Hobkirk's technique)^[7]

1. Flabby area of maxillary residual ridge was noted.

- Primary impressions were made with alginate impression material and primary casts were fabricated using Type II dental plaster.
- Custom trays were fabricated using double spacer wax over the flabby tissue area marked on the maxillary primary cast (Fig 2).
- After checking the proper tray extensions, border molding was performed in conventional manner by using low fusing impression compound.
- Spacer wax was removed and final wash impression was made with medium body additional silicone impression material (Aquasil® Ultra+ Smart Wetting®, Dentsply USA) (Fig 3A).
- The tray was then removed from the mouth and impression was evaluated carefully for defects and any excess material on the periphery was removed. Additionally, impression material was removed in the region of flabby tissue using a scalpel.
- Perforations were made (Fig 3B), tray adhesive (Caulk Universal Tray Adhesive, Dentsply USA) was applied and tray was loaded in this region with light body elastomeric impression material (Aquasil® Ultra+ Smart Wetting®, Dentsply USA) to record flabby tissue (Fig 3C).
- Beading and boxing of the final impression was done using plaster pumice method and master cast using Type III dental stone was made on which record bases were fabricated.
- Jaw relation record followed by try-in procedure was done.
- Vacuum heat-pressed polyethylene sheet (Biostar® vacuum sheet, Scheu-Dental, Germany) of 2 mm and 1 mm thickness were fabricated on the maxillary master cast. The 2 mm thick sheet acted as a temporary spacer, and it was made 2 mm short of the vestibular depth (Fig 4A).
- After dewaxing, this sheet was adapted on the maxillary cast, and petroleum jelly was applied over it, so that it can be retrieved easily (Fig 4B).
- The maxillary denture with this sheet was then acrylized (Lucitone 199, Denture Base Resin, Dentsply USA), finished and polished in conventional manner (Fig 5A).
- The dentures were inserted in to the patient's mouth to check for retention, support, stability, and border extension.
- The patient was asked to wear the denture for two weeks to get adjusted to it. After two weeks, the patient was recalled to convert the maxillary denture into a liquid supported one.
- The temporary polyethylene 2 mm thick spacer sheet was removed from the maxillary denture (Fig 5B).
- The 1 mm thick final polyethylene sheet was incorporated in the denture creating a 1 mm space between tissue surface of the denture and permanent polyethylene sheet (Fig 6).
- Cyanoacrylate adhesive and autopolymerizing acrylic resin were used to seal the borders and prevent escape of liquid.
- The space created due to the replacement of the 2 mm thick sheet with a 1 mm thick sheet was filled with viscous glycerine liquid.
- This was done by making two holes drilled on the buccal flange in the molar area of the denture by round bur and injecting the glycerine through these

Stage II : Liquid supported Denture fabrication

- A mandibular conventional complete denture was fabricated and the maxillary denture design was modified to make a liquid-supported denture.

holes, and both holes were sealed with autopolymerizing cure acrylic resin (Fig 7).

The liquid supported denture was delivered (Fig 8) and denture care instructions were given to the patient. The patient was advised to clean the tissue surface using cotton. The patient was recalled for follow-up at regular intervals. The denture was well maintained and patient was quite satisfied with the denture (Fig 9A and 9B).

Discussion

Excessive movable tissue is a prosthodontic challenge because it is easily displaced, affecting the retention, stability, and support of complete dentures.^[8] Conditions, like 'combination syndrome' caused by the presence of opposing natural teeth to an edentulous area as described by Kelly in 1972 may lead to anterior maxillary bone resorption and formation of displaceable hyperplastic flabby tissue in the anterior region.^[9] In the present case, natural mandibular anterior teeth were present opposing maxillary complete edentulous area leading to development of fibrous anterior maxillary alveolar ridge. The management of such conditions may require surgical excision only if there is sufficient bone height, but most of the time it decreases the sulcus depth requiring vestibuloplasty. Ridge augmentation by grafting is another invasive treatment option, but it carries with it the risk of resorption or rejection of graft material along with the need for additional surgery for graft harvesting.

Conservative treatment options that involve conventional denture modification are beneficial in cases where-in the flabby ridge is present with-in an otherwise normal denture bearing area. One of such modifications is in the form of liquid supported denture that preserves the residual ridge by optimal distribution of forces. The retention, stability and support is improved due to liquid hydrodynamics. It optimizes atmospheric pressure, adhesion, cohesion and mechanical interlocking in

undercuts. The chronic soreness from rigid denture bases is prevented and it greatly improved patient tolerance and comfort due to smooth flexible surfaces. Liquid supported denture is based on the theory that when the force applied on the denture is absent, the base assumes its pre-shaped form that is the one during processing. But under masticatory load, the base adapts to the modified form of mucosa due to hydrodynamics of the liquid.^[10]

Certain precautions must be taken during fabrication of liquid supported denture. The thickness of denture base should be at least 3 mm to provide space for incorporation of polyethylene sheet. The seal should be perfect and should be checked for microleakage. The junction between thermoplastic sheet and denture base should be smooth so that it does not cause irritation of the supporting tissues. The patient should be instructed to inform the dentist in case the liquid leaks out. The master cast should be preserved so that sheet can be replaced if it gets ruptured. The main drawback of liquid supported denture is the relining procedure, which is not possible.

An impression technique that compresses the non-flabby tissues to obtain optimal support and at the same time, does not displace the flabby tissues is required.^[7] Different impression techniques have been proposed to record the excessive movable tissue in its undisplaced form. However, some of the techniques such as 2-part custom trays with or without attachments are technique sensitive and time consuming. They can involve painting impression material over the excessive movable tissue, extra laboratory support and impression materials such as impression plaster, which may not be easily accessible in clinical practice. An alternative impression technique (Hobkirk's technique) proves to be advantageous as it is simple with the use of single custom tray, ease of custom tray fabrication and minimal laboratory support and armamentarium requirement. Pressure on the unsupported,

displaceable soft tissue is further minimised by the use of perforations in the tray overlying flabby areas. The execution of this technique involves no additional chair-side time and is also patient friendly and economical.^[8,11]

To conclude, flabby ridges are challenge for prosthodontic management to achieve stable and retentive dental prostheses. There are a variety of techniques available to address the problems caused by the unsupported tissue during denture construction. The liquid supported denture can definitely improve the patient's acceptance due to its shock absorbing effect and improved comfort level.

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Legend Figure



Figure 1: Intraoral view with flabby region outlined.



Figure 2: Double spacer wax adapted on flabby ridge area over the primary cast. B.

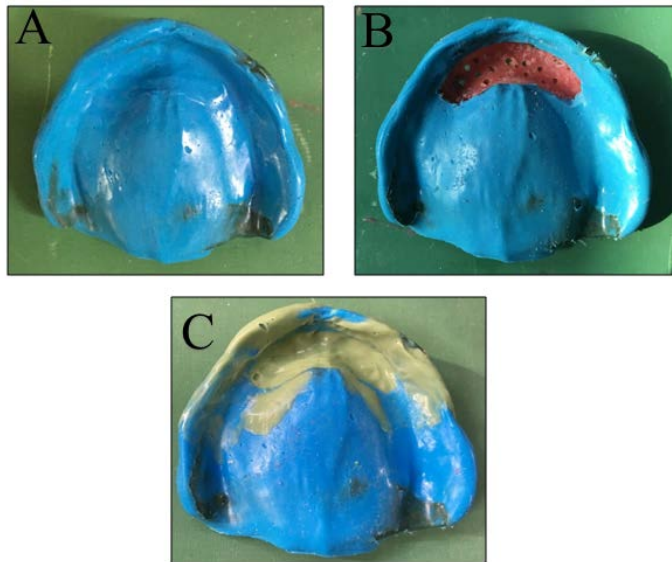


Figure 3: A- Final impression made with medium body additional silicone impression material.
B-Perforations made in custom tray after removing impression material from the region of flabby tissue.
C-Light body additional silicone impression material used to record flabby tissue.

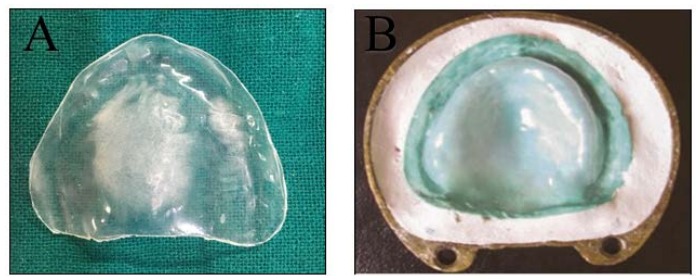


Figure 4: A-Vacuum heat-pressed polyethylene sheet of 2 mm thickness.
B - Adaptation of polyethylene sheet on the maxillary cast after dewaxing.

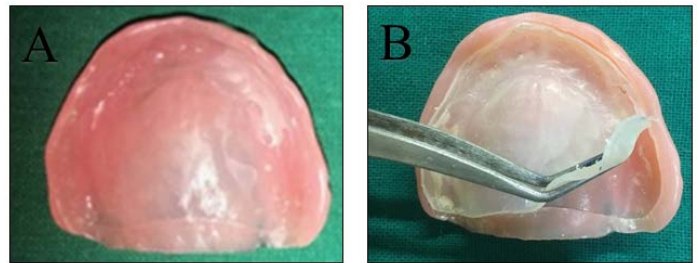


Figure 5: A-Maxillary denture cured with 2 mm polyethylene sheet.
B-Removal of 2 mm thick sheet after 2 weeks.



Figure 6: Polyethylene sheet of 1 mm thickness ready for incorporation in the space created after removal of 2 mm thick polyethylene sheet.



Figure 7: Hole created on buccal flange of the denture for injecting glycerine liquid.



Figure 8: Liquid supported denture.

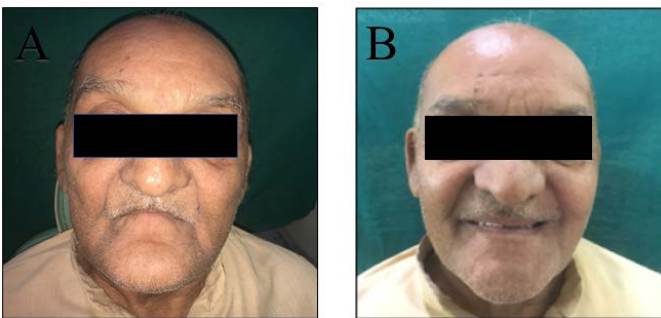


Figure 9: A-Pre-treatment frontal view of the patient.

B-Post-treatment frontal view of the patient.