

Liquid-supported denture- a boon to flabby ridges

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Abstract

Extreme resorption of edentulous maxilla and mandible often poses a challenge to a prosthodontist while fabrication of successful complete dentures in such clinical cases. Optimum denture stability is difficult to achieve in conventional dentures and the problem is more magnified in severely resorbed ridges. The design of prosthesis to restore the lost structures is largely determined by the position and amount of morphological change in the denture bearing area of the jaws. Liquid supported denture allows better stress distribution due to its flexible nature and provides an alternative treatment approach in flabby ridges. This article presents a case report which describes the fabrication of liquid supported complete denture to aid in the management of these compromised conditions.

Keywords: Cushioning effect, Liquid supported dentures, Resorbed ridges.

Introduction

'Flabby tissue' is a hyperplastic growth of soft tissue that replaces alveolar bone and is seen most commonly in long-term denture wearers.⁽¹⁾ This superficial growth affecting the maxillary and mandibular edentulous ridges is often mobile that interferes with the denture wearing. A constant trauma from ill-fitting denture is the probable cause for this entity.⁽²⁾ In an edentulous mouth, this condition is more often seen in the anterior area.⁽³⁻⁵⁾ This hyperplastic growth is comprised of loose fibrous and dense collagenised connective tissue.⁽⁶⁾ Rehabilitation of patients with such flabby ridges poses a great amount of difficulty for a prosthodontist. As the flabby tissues are easily distorted while impression making steps, the dentures fabricated on such foundations are often compromised in its retention and stability. Several treatment modalities offered in such patients include surgical excision of flabby mass, implant-supported dentures or conventional prosthesis without surgery.⁽¹⁾ Selection of a particular therapy depends on systemic health and need of the patient, extent of flabby mass, financial burden on patient and skill of the prosthodontist. In many cases, surgical procedure is not worthwhile, hence the most conservative methods is approached.

Chase⁽⁷⁾ suggested the use of elastic impression material on the mucosal side of the rigid base to relieve traumatized soft tissue. However, this was a temporary solution and might, also cause candidal growth. Several authors^(7,8) have given stress on the concept of tissue conditioning which is gaining momentum as dental clinicians become aware that conditioned tissue will support a denture more comfortably. This concept of oral mucosa conditioning may also prove in preservation of alveolar bone. In recent scenario of dentistry, this concept is not new.

In patients with flabby ridges, complete denture prosthesis should be able to withstand masticatory forces and incorporate flexible tissue surface to minimize stress concentration and trauma on the underlying denture bearing surface.⁽⁸⁾ A provision incorporating liquid within such prosthesis can make out a better solution for such clinical situations.⁽⁹⁻¹³⁾ The limitations in previously reported techniques have led to the introduction of an alternative approach to conventional prosthesis, called liquid-supported dentures. This clinical report describes the fabrication of a liquid-supported maxillary complete denture in a patient with completely edentulous maxillary arch with flabby tissue in anterior region opposing a completely edentulous mandibular arch.

Case Report

A 55-year-old male patient reported the Department of Prosthodontics and Crown & Bridge, for prosthodontic rehabilitation of the edentulous maxilla and mandible. The patient had a history of wearing complete dentures for 5 years which were loose and ill-fitting. Intraoral examination revealed edentulous maxillary and mandibular residual ridges. The overlying mucosa of maxillary ridge was flabby in the anterior region of the hard palate and the mandibular ridge was severely resorbed (**Fig. 1**). The general condition of the patient was debilitated and frail. Keeping the various challenges associated with the case, clinical steps and treatment plan was modified to suit the patient's need. The treatment plan included the fabrication of a liquid-supported maxillary complete denture opposing a mandibular complete denture based on neutral zone concept.

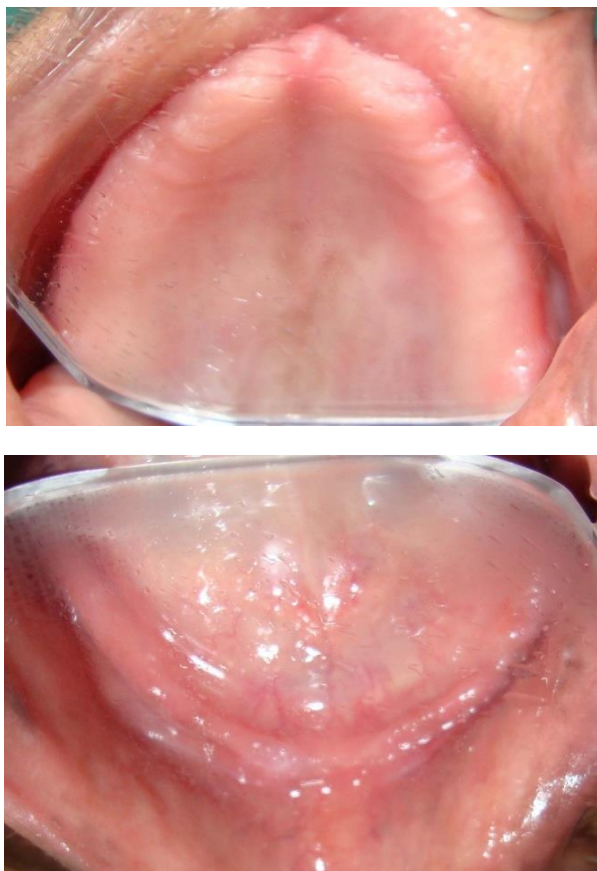


Fig. 1: Intraoral view of maxillary and mandibular edentulous arches

Clinical Procedure: The preliminary impressions of both the arches were made with irreversible hydrocolloid (Dentalgin; Prime Dental Products, Mumbai, India). Special trays were fabricated and border molding performed using low fusing impression compound (DPI Pinnacle tracing sticks, Dental products of India). The definitive impressions were made with Zinc Oxide Eugenol impression paste (DPI Impression Paste, Dental Products of India, The Bombay Burmah Trading Corporation Ltd., Mumbai, India). For maxillary, the flabby area was marked in the patient's mouth and transferred on the tray. Later, this area was cut forming a window to expose flabby mass and recorded by syringing light body addition silicone material (Aquasil, Dentsply/caulk) (**Fig. 2**). Jaw relations were recorded and face bow transfer was completed. The master casts were mounted by using centric relation record on a semi-adjustable articulator (Hanau Wide Vue). For mandibular, an acrylic tissue stops were prepared that maintained the established vertical height. Then, the neutral zone was recorded using tissue conditioner (Viscogel) by asking the patient to perform various functional movements. A putty index was formed around the recorded neutral zone into which the molten modelling wax was poured to duplicate the neutral zone. The teeth arrangement was carried within the limits of neutral zone and the

waxed-up trial dentures were tried intraorally to check the appearance and occlusion.



Fig. 2: Definitive maxillary and mandibular impressions

Laboratory Procedure: Prior to packing step, a 1 mm thick polyethylene sheet (Biostar vacuum forming machine, Scheu-dental, Germany) was vacuum heat pressed on the maxillary master cast (**Fig. 3**). The care was taken to keep the borders of adapted sheet approximately 2 mm short of the sulcus including posterior palatal seal area. The same sheet was planned to incorporate in the denture at the time of packing. After finishing and polishing, both the dentures were delivered after making necessary occlusal adjustments. The patient was advised to wear the dentures for 2-weeks. He was then recalled to convert the conventional maxillary denture into a liquid-supported one. The 2-weeks period was evaluated for the comfort level of the patient to the polyethylene sheet. At this appointment, the 1 mm thick sheet was removed from the tissue surface of the denture (**Fig. 4**). This caused the creation of crevices all along the denture borders, which were further utilized during the final placement of 0.5 mm thick sheet. Then, an impression of tissue surface of denture was made by using a putty addition silicone and cast was poured. This helped to record the exact junction of the sheet to the denture surface. After

this, a 0.5 mm thick polyethylene sheet was adapted on this cast which will create a 0.5 mm hollow space. The sheet was trimmed using the putty index as guide. The borders of the 0.5 mm sheet were placed in the crevice formed due to removal of 1 mm thick sheet. Cynoacrylate adhesive and auto-polymerizing acrylic resin was used to seal the borders and prevent escape of liquid (**Fig. 5**). The 0.5 mm hollow space created was filled with glycerine. For this, two holes were drilled in the buccal flange especially molar area of the denture and glycerine was syringed through these holes. The vertical dimensions were checked simultaneously and the holes were sealed using self-cure acrylic resin. The seal was checked properly. In areas of leakage, it was resealed till a perfect seal was obtained at the junction. Theoretically, the foil narrows the fit of the denture by approximately 0.5 mm, which does not appear to be a problem.⁽⁸⁾ After completing polishing, the maxillary liquid-supported denture was delivered to the patient (**Fig. 6**). Proper instructions were given to him regarding denture care. Patient was advised to clean the tissue surface using soft cloth and recalled at an interval of 1 day, 1 month and 3 months.



Fig. 3: A 1 mm thick polyvinyl sheet adapted on the invested master cast prior to packing and kept 2 mm short from the denture-limiting structures

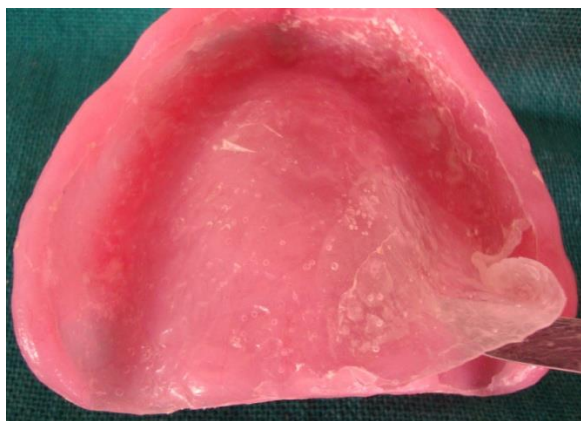


Fig. 4: At recall appointment, 1 mm thick sheet is removed from the processed denture



Fig. 5: Fitting surface of completed liquid-supported denture



Fig. 6: Intraoral view of prosthesis

Discussion

The main concern in this case was the presence of flabby tissue in anterior maxilla that might have caused an unfavourable distribution of masticatory forces. This problem was solved by modifying the impression technique and by fabricating maxillary liquid-supported denture. Liquid-supported denture is based on the concept that when the force applied on the denture is absent, the base assumes its pre-shaped form. But under masticatory load, the base adapts to the modified form of mucosa due to hydrodynamics of the liquid improving support, retention and stability.⁽¹⁴⁾ Also, tissue overloading is minimized due to optimum stress distribution of masticatory forces on maximum denture coverage area. The prime benefits of the liquid-supported denture includes: prevention of soreness and increased comfort level.^(14,15) In this clinical report, polyethylene thermoplastic clear sheet (Biostar vaccum forming machine, Scheu-dental, Germany) was employed due to its softness, flexibility and biocompatibility. The liquid used was glycerin because of its clearness, viscosity and biocompatibility. Glycerin is also used, as a vehicle in liquid medications.

The denture base was covered with a close-fitting flexible foil to keep a thin film of liquid in its place. This design will act as a continuous reliner for the

denture and thus has an advantage over the existing denture designs. When no forces are applied, the foil remains in the resting position, acting as a soft liner and when the dentures are in use, vertically directed loads are distributed in all directions by the liquid resulting in optimal stress distribution. The concept of liquid-supported denture is indicated in severely resorbed maxillary and mandibular ridges, inflamed or flabby tissues, vesicubullous lesions like pemphigus, pemphigoid, erythema multiforme, oral lichen planus, and patient with systemic disorders like diabetes mellitus.⁽²⁾

For this case polyethylene sheet was used due to its compatibility and excellent physical and mechanical properties. It is soft, flexible and dense and protects the mucosa from bacterial and biomechanical irritation. The adhesive used is n-butyl-2-cyanoacrylate which is used in surgery as an alternative to suturing and as a protective covering over ulcers. Glycerine is used as the liquid cushion as it is clear, colorless, odorless with good pharmaceutical properties. It has good thermal stability, water repellence, and low surface tension, low vapour pressure. Furthermore, it acts as a vehicle and solvent, a sweetening agent, a preservative in some liquid medications so it has proven in vivo safety.⁽¹¹⁾

Denture care instructions were given to the patient. Patient was told to clean the tissue surface using soft cloth or cotton. Patient was recalled after 24 hrs, 1 week, and 3 weeks for follow up. Although there was no need to change the glycerine from the denture but we can refill the denture if any leakage is present. The problem faced in fabrication of complete denture was difficulty in achieving complete seal at the junction of polyethylene sheet and denture base. The main drawback is relining is not possible in fluid retained dentures.

Conclusion

Flabby ridges, often, causes difficulty in retention and stability of the denture bases and poses a real challenge to a prosthodontist for achieving the basic objectives of impression making. Surgical intervention and implant-supported dentures may not be possible to be applied in all those clinical conditions. Liquid supported denture can stand a better option in such situations while considering conventional prosthodontics. This concept can further improve the patient's comfort and acceptance due to more uniform distribution of occlusal forces.

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