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Liquid-Supported Denture- A Boon To Flabby Ridges

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Case Report

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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 retention and stability of dentures is more problematic to achieve in severely resorbed ridges. The factors, such as the position and quantitative changes in the morphology of denture bearing areas of maxilla and mandible decide the future design of the prosthesis. The concept of liquid supported prosthesis helps in distribution of stresses uniformly and evenly 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.

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 flexible material on the fitting surface of the removable prosthesis to condition the irritated and abused mucosa. However, this was a temporary solution and might, also cause candidal growth. Chase and Kakade [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, incorporation of elastic fitting surface allows in reducing stresses and trauma on the mucosal soft tissue as well makes it suitable to withstand masticatory forces [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 case presentation explains the method of fabricating a removable prosthesis based on liquid-supported concept in a severely resorbed maxilla with flabby tissue in anterior region.

CASE REPORT

A 55-year-old male patient reported the Department of Prosthodontics and Crown and Bridge, for prosthodontic rehabilitation of the edentulous maxilla and mandible. The patient was wearing a set of complete dentures since last 5 years that were loose and ill-fitting. Intraoral examination revealed edentulous maxillary and mandibular residual ridges. After removal of dentures,

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underlying soft tissue seemed to be inflamed in general and flabby in maxillary anterior region. The mandibular ridge was very poor and needed equal attention like maxillary ridge **(Figure 1)**. The overall health of the patient was debilitating and frail. Hence, the complete denture treatment planning was discussed and modified according to the need of the patient. The final treatment plan was decided including maxillary and mandibular complete dentures based on liquid-supported and neutral zone concepts, respectively.

Figure 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 and definitive impressions were performed in a conventional manner. 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) **(Figure 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.

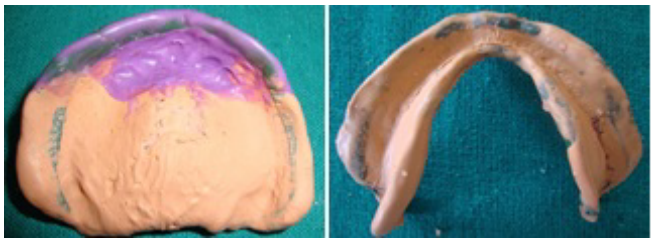

Figure 2. Definitive maxillary and mandibular impressions.

LABORATORY PROCEDURE

Before packing heat cured acrylic resin, a polyethelene sheet (Biostar, Scheu-dental, Germany) of 1 mm thickness was placed on the maxillary final cast and it was vacuum heat pressed **(Figure 3)**. The adapted sheet was cut approximately 2 mm short from the denture-limiting borders of the maxillary cast. This sheet was incorporated in the denture during the packing of heat cured acrylic resin and the dentures were processed. The processed dentures were finished and polished and checked in patient's mouth for necessary adjustments. After delivering dentures, the patient was instructed to wear it at least for 2 weeks. The patient was then recalled to proceed further for conversion of existing maxillary denture into a liquid-supported one. The patient's comfort with that of the denture with polyethylene sheet was evaluated and checked for any inconvenience. The sheet was then removed from the fitting surface of the maxillary denture **(Figure 4)**. This removal left multiple crevices throughout the denture borders that were used as guides for placing new sheet of 0.5 mm thickness. Fitting surface of denture was then recorded with putty consistency elastic material and the impression was poured in dental stone to obtain a duplicate cast. This step transferred the same duplication of sheet-denture junction. Another sheet of 0.5 mm thickness was placed on this cast and adapted under heat vacuum so that a hollow space of 0.5 mm is created. The sheet was cut and adjusted according to the putty index and sealed to the crevices using cyanoacrylate and auto-polymerizing acrylic resin. This prevented the escape/or seepage of liquid in and out of the hollow **(Figure 5)**. The glycerine was then syringed into hollow cavity through the holes created in buccal flanges in molar area. The vertical dimension at occlusion was verified and the holes were sealed with auto-polymerizing acrylic resin. The seal was checked for any leakage. The narrowing of 0.5 mm that created in this way does not appear problematic for the fit of the denture8. The denture was delivered to the patient after polishing and the proper instructions were given towards the cleanliness of prosthesis **(Figure 6)**. Patient was advised to clean the tissue surface using soft cloth and recalled at an interval of 1 day, 1 month and 3 months.

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Figure 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.

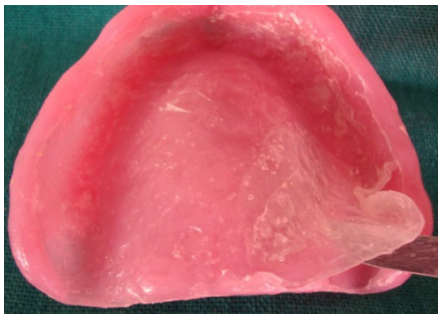

Figure 4. At recall appointment, 1 mm thick sheet is removed from the processed denture.

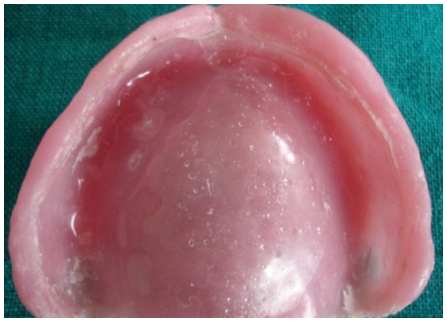

Figure 5. Fitting surface of completed liquid-supported denture.

Figure 6. Intraoral view of prosthesis.

DISCUSSION

The flabby tissue in maxillary anterior region was the prime concern in this case which might have led to an uneven distribution of forces from prosthesis while in function. This problem was solved by altering the conventional impression and denture processing techniques. In liquid-supported prosthesis, the denture base assumes its pre-shaped form in absence of any applied force, however; it adapts to the modified form of denture-supporting tissue when functioning under masticatory load. The hydrodynamics of mucosa plays an important role in providing support, retention and stability [14]. This also, prevents overloading of soft tissue due to uniform stress distribution over all dentures bearing area. Liquid-supported concept enhances comfort level and prevents soreness [14,15]. In this clinical report, polyethylene thermoplastic clear sheet (Biostar, 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 tissue surface of liquid-supported denture was lined with a close-fitting flexible sheet that provided hollow inside for liquid. This acts as a relining for the prosthesis and possesses significant benefit to the existing denture designs. In the absence

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of occlusal forces, the sheet remains in the pre-formed form and behaves as a soft liner. However, in occlusal loading the forces are uniformly distributed throughout the denture bearing area resulting in optimal stress distribution. This concept of liquid-supported denture works better in extremely resorbed/flabby or abused/inflammed ridges. Even, it is indicated in patients with lichen planus, erythema multiforme, pemphigus and diabetes mellitus [2].

For this case a soft, flexible and dense polyethylene sheet was employed that possessed excellent physical and mechanical properties. The cyanoacrylate used in this case is usually used in surgery as an alternative to suturing. The glycerine used is clear, odourless and has good thermal stability, water repellency and low surface tension. It also, acts as a vehicle or a preservative in various liquid medications proving it's *in vivo* safety [11].The patient was given proper instructions to maintain denture care and to clean the fitting surface with soft cloth or cotton. He was recalled back after 24 h, 1 week and 3 weeks for regular check-up and follow-up. The biggest advantage of this technique is that we can refill the hollow cavity with glycerine in case of leakage. However, the major drawback was to achieve a complete seal at the junction of polyethylene sheet and tissue surface of the denture. Additionally, the future relining is not possible in liquid-supported dentures.

CONCLUSION

Flabby ridges, often, causes problems in denture retention as well in stability 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 because of uniform distribution of masticatory forces.

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