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Case Report

Innovative Approach – Liquid Supported Denture: A Case Report

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Abstract: Conventional complete denture lacks retention and stability in patients with fibrous hyperplasic tissue. The ideal properties of a denture are adequate rigidity of polished surface to bear masticatory forces and at the same time, flexibility and softness for better stress distribution. In conventional denture, there is uneven distribution of load due to rigidity of tissue surface, especially in the case of flabby, atrophic ridge. A Liquid supported denture allows uniform stress distribution due to its flexible tissue surface and improve the patient's acceptance.
Keywords: Liquid Supported Denture, Flabby ridge, Glycerine.

INTRODUCTION

Flabby ridge is a superficial area of mobile soft tissues affecting the maxillary and mandibular alveolar ridges. It can be developed when soft tissue replaces the alveolar bone and it is a common finding, particularly in long term denture wearers [1]. Complete Denture prosthesis being the fixed entity in dynamic oral environment does not remain closely adapted to underlying soft tissues owing to residual ridge resorption and constantly occurring mucosal changes from muscle dynamics and tissue irritation [2]. An Ideal denture base be rigid enough to withstand the masticatory loads and flexible enough so that it continuously adapts to underlying soft tissues during function thus enhancing retention, better force distribution and patient comfort [3].

In 1961, Chase [4] reported application of elastic impression material on intaglio surface of denture to relieve abuse soft tissues. Since then, several materials including tissue conditioners and soft liners have been used on tissue surface of denture in cases with flabby ridges, atrophic residual alveolar ridges, denture sore mouth, xerostomics and diabetic patients. But these materials has proved to be a temporary alternative due to loss of by-products(plasticizers, alcohol) and encouragement of candidal growth over a period of time, thus requiring several relining visits and follow ups.

Prosthetic rehabilitation in these patients can be challenging because of easily distorted flabby tissue during impression making. Treatment options for these patient's include surgery, implant retained prosthesis or conventional prosthodontics without surgical intervention. Treatment plan has to be chosen depending on patient's state of health and need, extent of flabby tissue, financial capacity and skill of dentist.

This article 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 tissues in anterior region.

CASE REPORT

A 62 years Old male patient reported to Prosthodontia Department, Government Dental College & Hospital, Ahmedabad for replacement of missing teeth. The patient had a history of wearing maxillary and mandibular complete dentures since the past 5 years. His chief complaint was the poor fit of the dentures and it felt loose while eating. Patient had a history of diabetes since last 8 years. The patient was also using denture adhesive. By intraoral examination, a completely edentulous maxillary arch with flabby tissue existing in maxillary anterior region was observed (Fig. 1).

Keeping the various challenges associated with the case, clinical steps and treatment plan was modified to suit the patient's need. It was decided to give a conventional mandibular complete denture opposing a Liquid-supported maxillary denture.

Primary impressions were made with Alginate (Zelgan, Dentsply / caulk). Border molding was

performed by using low fusing impression compound (DPI, pinnacle) and final impression made with Zinc Oxide Eugenol paste. Jaw relation and teeth were set and the Try-in procedure of the waxed dentures was done. The maxillary denture design was modified to make a Liquid-supported denture. Mandibular denture was acrylised using conventional procedure.

Steps for fabricating a Liquid-supported denture:

- Vaccum heat-pressed polyethylene sheet (Biostar vaccum forming machine, Scheu-dental, Germany) of 1.5 mm thickness was adapted on the maxillary master cast (Fig. 2). The sheet acted as a temporary spacer, and it was made 2 mm short of the sulcus. After dewaxing vaseline was applied over temporary sheet, so it can be retrived easily. Now, the denture was acrylised using heat cure resin with the sheet.
- Finishing and polishing of the denture was done and it was checked in patient's mouth for retention, stability, support and border extension (Fig.3). Patient was asked to wear the denture at least of two weeks so he can get adjusted to new denture.
- At recall appointment, the 1.5 mm thick sheet which was used as a spacer was removed from the denture (Fig.4). Due to removal of sheet crevices were formed all along the denture borders. These crevices were helpful in final placement of 0.5 mm thick sheet. An addition silicone putty impression was made of the tissue surface of denture and cast was made of it (Fig.5). This was done to record the exact junction of the sheet to the denture. On this cast a 0.5 mm thick polyethylene sheet was vaccum pressed which was used in place of 1.5 mm thick sheet creating 1 mm space.
- The borders of the 0.5mm thick sheet were placed in the crevice formed due to removal of 1.5 mm thick sheet. Cyanoacrylate adhesive and autopolymerizing acrylic resin were used to seal the borders and prevent escape of liquid (Fig.6).
- Two holes of about 2 mm diameter were made in disto-buccal region of denture and glycerine was injected using needle and syringe. Holes were sealed off using cold cure resin.(Fig.7)
- Finally the upper liquid supported denture was delivered (Fig.8). Follow up was carried out after 1 day, and then on weekly basis. Patient comfort was verified and dentures were regularly checked for any glycerine leakage, retention, stability.

Fig.1: Intra Oral View of Flabby Maxillary Edentulous Ridge

Fig. 2: 1.5 mm Thick Polyethylene Sheet Vaccum Adapted Over the Master Cast

Fig. 3: 1.5 mm Thick Polyethylene Sheet Incorporated in the Upper Denture

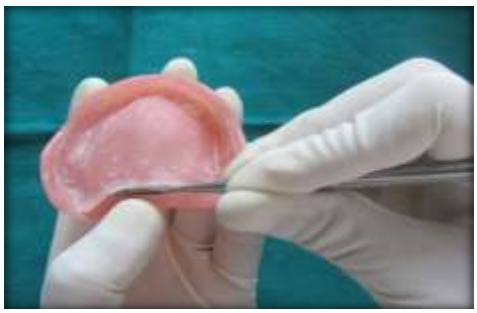

Fig. 4: Temporary Sheet (1.5 mm) removed from the denture

Fig. 5: Putty Index of Tissue Surface of Upper Denture

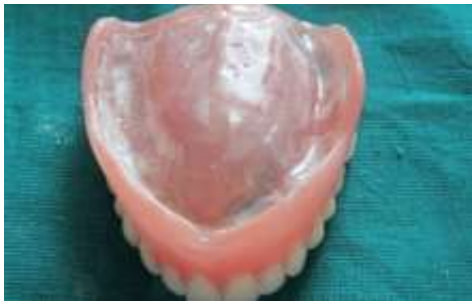

Fig. 6: 0.5 mm Polyethylene Sheet Adapted to Intaglio Surface using Cyanoacrylate adhesive

Fig. 7: Injection of Glycerine in Prosthesis

Fig. 8: Post Operative Intra-Oral View

DISCUSSION

In this case, the presence of flabby tissues in maxillary anterior region was treated by Liquid-supported denture. Liquid supported denture is based on the theory that when the force applied on the denture is absent; the base assumes its preshaped form that is the one during processing. The principle of design was that a Liquid-supported denture is flexible and continuously adapts itself to the mucosa. However, it is also rigid enough to support the teeth during actual use [5]. Thus, the denture base is 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 existing denture. The foil remains in the resting positions in the absence of forces acting as a soft liner and when the dentures are in use, masticatory loads are distributed in all directions by the liquid resulting in even stress distribution. This help in long-term preservation of bone and soft tissues. Apart from the combined benefits of tissue conditioners and soft liners, load from biting forces and even bruxism, will be distributed over a large surface [6].

Advantages of Liquid-supported denture are preservation of residual ridge by optimal distribution of forces**,** better retention, stability, support, and comfort due to close adaptation**.**

Precautions:.

- Thickness of denture base should be at least 3 mm
- Junction of foil and denture surface should be hermatically sealed and regularly checked for leakage of liquid on follow up visits.
- Post insertion instructions and denture hygiene should be reinforced and followed strictly.
- Preserve the positive stone replica so that quickly sheet can be vacuum pressed on it in case of sheet damage or worn out.

To prevent the liquid from leakage, a dense foil must be used. This dense surface texture has another advantage because it protects the denture from contamination of Candida albicans and other micro-organisms, thus protecting the mucosa from bacterial or biochemical irritation, often observed with the existing materials [7].

In this case, Polyethylene thermoplastic clear sheet (Biostar vaccum forming machine, Scheu-dental , Germany) was used because of its softness, flexibility and biocompatibility. Glycerin was used because it is colorless, odourless, viscous and biocompatible [8]. The adhesive used is n-butyle-2-cyanoacrylate, which is used in surgery as an alternative to suturing and as a protective covering over ulcers etc.

CONCLUSION

Flabby ridges pose a prosthodontic challenge for the achievement of stable and retentive dental prosthesis. Surgical removal of fibrous tissue and implant retained prosthesis may not be possible to be used in all cases. Liquid supported denture with its combining rigidity and flexibility provides comfort, stability, retention and uniform distribution of forces. De Van dictum holds true in Liquid supported denture cases as it provides long term preservation of hard and soft tissues.

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