Liquid supported denture—management of flabby ridges

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Abstract

The ideal properties of a denture are adequate rigidity on polished surface to bear masticatory forces and at the same time, flexibility and softness on the tissue surface for proper and even distribution of masticatory forces. The problem with conventional denture is rigidity of tissue surface; leads to uneven distribution of load. This drawback even worsens in the case of flabby, atrophic and unemployed ridges with excessive bone resorption. The liquid supported denture allows continued adaptation and eliminates the disadvantages of denture designs based on the application of temporary tissue conditioners or soft liners.

Keywords: Flabby ridge, flexible tissue surface, liquid supported denture

Introduction

The dimensions of the edentulous residual ridge are not stable because of bone resorption and mucosal changes from muscle dynamics or tissue irritation.[1] Thus, complete dentures seldom remain in close adaptation to the adjacent mucosa. 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.[2]

In 1961, Chas reported on the application of elastic impression materials on the mucosal side of the rigid base to relieve the traumatized soft tissue. Since then a variety of tissue-conditioning materials has been introduced.[3] Another group of materials called soft liners has been used to relieve “denture sore mouth” problems. They essentially differ from the tissue conditioners because they are plastic and, therefore, flow continuously under masticatory pressures; until ultimately no material is left where it is required. Consequently, soft liners are also only temporary provisions because due to loss of plasticizer over period of time they lose their plastic properties.[4]

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 tissue in anterior region opposing a partially edentulous mandibular arch.

Case Report

A 52 year old female patient reported to K. V. G. dental college and hospital for replacement of missing teeth. The patient had a history of wearing a maxillary complete denture for 4 years. Her chief complaint was the poor fit of the denture and it felt loose while eating. She was also using denture adhesive. Missing mandibular teeth were not replaced by any prosthetic treatment. By intraoral examination, a completely edentulous maxillary arch with flabby tissue existing in the anterior region [Figure 1] and a partially edentulous mandibular arch (Kennedy’s Class II) were observed.

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 maxillary complete denture (liquid supported) opposing a mandibular cast partial denture.

Primary impressions were made with irreversible hydrocolloid (Zelgan 2002; Dentsply DeTrey GmbH, Konstanz, Germany). On the maxillary cast, a special tray was made. Border molding was performed by using low fusing impression compound (DPI pinnacle tracing sticks, Dental products of India) and medium body addition silicone wash impression (Aquasil, Dentsply/caulk) was made. The flabby tissue was marked in the mouth and transferred on the tray. This area on the tray was cut to form a window to expose the flabby tissue. It was recorded in rest position by injecting light

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bod      body addition silicone material (Aquasil, Dentsply/caulk).

Jaw relation record and trial of waxed up denture was done by conventional method.

For the mandibular impressions, a cast framework replacing the missing teeth was fabricated, tried and adjusted. An altered cast impression technique was used to get the master cast. Jaw relations were recorded. Face bow transfer was made and casts were mounted. Teeth were set and the try in procedure of the waxed denture was done.

The upper denture design was modified to make a liquid supported denture. Lower cast partial denture was acrylised using conventional procedure.

Steps in fabricating a liquid supported denture
1. Vacuum heat pressed polyethylene sheet (Biostar vacuum forming machine, Scheu-dental, Germany) of 1.5 mm thickness was adapted on the master cast. The sheet was cut 2 mm short of the sulcus and was not extended in the posterior palatal seal area [Figure 2].

2. Now denture was acrylised using heat cure resin along with sheet.
3. Finishing and polishing of the denture was done and its checked in patient’s mouth for retention, stability, support and border extension. Patient was asked to wear the denture for at least of two weeks so she can get adjusted to new denture.
4. At recall appointment, the 1.5 mm thick sheet which was used as a spacer was removed from the denture. Due to removal of the 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 the denture and cast was made of it. 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 vacuum pressed which was used in place of 1.5 mm thick sheet creating a 1 mm space.
5. The borders of the 0.5 mm 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 [Figure 3].
6. Glycerine was filled in this space by making two holes in the buccal flange area of the denture and injecting it through these holes and checking the vertical dimensions simultaneously. The holes were sealed using self-cure acrylic resin.

7. Finally the upper liquid supported denture was delivered [Figure 4]. Denture care instructions were given to the patient. Patient was told to clean the tissue surface using soft brush and recalled for follow up.

**Discussion**

Major problems associated with this case were the presence of combination syndrome due to unfavorable distribution of forces that can cause unfavorable tissue changes. These problems were solved by modifying the impression procedures and by fabricating upper liquid supported denture and lower cast partial denture.

Liquid supported denture is based on the theory that when no forces are applied, the foil assumes the form in which it was pre-shaped during the processing phase. The liner acts as elastic “tissue conditioner” by which the original contours, when the impression was made, are being preserved.

If masticatory loads are applied, the foil can adapt to the modified form of the mucosa because of the hydrodynamic plasticity of the supporting liquid beneath the foil. In this situation, the liner acts as a “soft liner.” Proper selection of the viscosity of the liquid ensures the desired inertia of the movements and thus stability.[2]

There are following advantage of liquid supported denture.[3]
- Preservation of residual ridge by optimal distribution of forces.
- Better retention, stability, support and comfort due to close adaptation.
- Optimized atmospheric pressure, adhesion, cohesion and mechanical interlocking in undercuts.
- Improved patient tolerance because of great comfort due to smooth flexible surfaces.
- Prevention of chronic soreness from rigid denture bases

**Precautions**
- Thickness of denture base should be at least 3 mm.
- Seal should be perfect and should be checked foe micro leakage
- Denture care instructions should be given to the patient.
- In case the liquid leaks out, the patient should inform the dentist and the denture should be refilled.
- Repair is possible if the sheet gets ruptured and can be replaced over preserved stone cast.

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.[6]

In this case, polyethylene thermoplastic clear sheet (Biostar vacuum forming machine, Scheu-dental, Germany) was used because of its softness, flexibility and biocompatibility. Glycerin was used because it is colorless. Odorless, viscous, and biocompatible.[7] 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 prostheses. Surgical removal of the fibrous tissue and implant retained prostheses may not be possible to be used in all cases. Considering conventional prosthodontics, the use of liquid supported denture can further improve the patient’s acceptance due to more uniform distribution of forces and due to the improved comfort level.

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