CASE REPORT

SALVATION OF RESORBED RIDGE BY FLUID FILLED DENTURE

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Introduction
The dimensions of residual alveolar ridge are not stable due to bone resorption, mucosal changes and tissue irritation, thus the complete dentures seldom remain in close adaptation to the adjacent mucosa. An ideal denture base would continuously adapt to the mucosa and thus it 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, but can be done by using a combination of materials and techniques. Fluid filled dentures are one of such innovative techniques which allow continued adaptation of the denture –base to the mucosa in the resting and functional state.

History
In 1961, Chase reported on the application of elastic impression materials on the mucosal side of the rigid denture base to relieve the traumatized soft tissue. Since then a variety of tissue conditioning materials have been introduced. Another group of materials called soft liners has been used to relieve denture sore mouth problems. They exist either in the form of 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.

Liquid supported dentures

Indications:
• Flabby ridges
• Atrophic alveolar ridges
• Bruxism
• Allergic patients

Advantages
• This design acts as a continuous reline for the denture
• The close adaptation of the denture base to the soft tissue improves the retention
• Uniform distribution of masticatory load.
• Vertically directed forces will also be distributed in other directions by the liquid, which minimizes local stressing of the supporting tissues.
• The spreading of pressure might also reduce problems at the mental foramen in a resorbed mandible.
• Slower and more even resorption of the residual ridges.
• Improved patient tolerance because of great comfort due to smooth flexible surfaces.
• Prevention of chronic soreness from rigid denture base.

This case report describes the fabrication of a complete denture with design characteristics of plastic and elastic recovery. A 65 year old male patient was referred to the department of prosthodontics for prosthodontic rehabilitation of the maxillary and mandibular ridges. The patient complained of ill fitting and loosen denture and he had been wearing dentures since the past 8 years even at night. On intra oral examination the mucosa over the anterior region of the maxillary ridge and the palatal rugae was flabby and compressible, maxillary and mandibular ridges were moderately resorbed. (FIG 2) In order to reduce the stresses over the flabby tissue and to improve the retention, maxillary fluid filled denture and mandibular conventional denture was planned2,3. Primary impression is made by mixing impression compound and green stick compound in 3:7 ratio (Mc cord's technique)4.

• Custom tray:
  • Relief was provided in the anterior maxillary ridge and mid palatine raphae , spacer was provided
  • Custom tray was fabricated with self cure tray resin.

• Border molding was done with addition silicone putty impression material and final impression was made with light body addition silicone. Master cast was obtained. Denture base and occlusal rims were fabricated. Jaw relation and mounting procedures were carried out in a conventional manner. Try-in of waxed-up dentures was done. The master casts were demounted from the articulator. Flashing and de waxing procedures were carried out in a conventional manner. A line was drawn on the master cast which was 2 mm short of the borders (FIG 3).

A polyethylene foil of 0.5 mm thickness was adapted and heat pressed on the master cast and it was cut 2 mm short of the borders.

• Packing was done with heat cure acrylic resin.
• Curing, Finishing and polishing of the denture were done. The polyethylene foil is separated and removed from the denture base (FIG H).
• The thickness of denture was reduced by 0.5 mm from the tissue surface of the denture -base 1 mm short of the junction between the foil and denture base.
• Two inlets were made in the denture buccially in the molar region for injecting liquid.
• The foil was incorporated in the denture base with cyanoacrylate adhesive (used in surgery as an alternative to suturing). The seal was checked properly by blowing air around it , in areas of leakage it was resealed until a perfect seal was obtained at the junction.

A viscous liquid (glycerin) was filled through the inlets and one inlet is sealed with cold cured acrylic resin (FIG 5).
• Occlusal vertical dimension was checked in patient mouth, the second inlet was closed.
• The patient was instructed about the cleaning and maintenance of denture. (FIG 6)

Discussion
• The principle of this design was that a fluid-filled denture is flexible and continuously adapts itself to the mucosa, however, it is also rigid enough to support the teeth during actual use. Thus, the denture base is covered with a pre-shaped, close-fitting, flexible foil to keep a thin film of liquid in between the rigid denture base and the plastic foil. This design will act as a continuous reliner for the denture and thus has an advantage over the existing denture designs.
• The adhesive used is n-butyl-2-cyanoacrylate which is used in surgery as an alternative suturing and as a protective covering over the ulcers etc.
• For cushioning effect, glycerin was used which is a clear, colorless, odorless liquid with a good pharmaceutical placation.
• It has good thermal stability, water repellency, low surface tension and low vapor pressure.
• It acts as a vehicle, solvent, sweetening agent and a preservative in some liquid medications, so it has proven in vivo safety.
• Dimethyl polysiloxane/silicone liquids also can be used.

Precautions
• The thickness of denture base should be at least 3 mm
• Seal should be perfect and should be checked for microleakage.
• Denture care instructions should be given to the patients.
• 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 the preserved stone replica.

Advantages over conventional acrylic dentures
• Preservation of residual ridge by optimal distribution of masticatory forces.
• Better retention, stability, support and comfort due to close adaptation.
• Optimized atmospheric pressure, adhesion, cohesion and mechanical interlocking in undercuts.
• Improved patient tolerance due to smooth flexible surfaces.

Conclusion
• An important requirement for retention is the close adaptation of the denture-base to the soft tissues, a fluid-filled, pre-shaped foil will fulfill this requirement. When no forces are applied, the foil remains in resting position, which acts as a soft liner and when the dentures are in use the vertically directed forces are distributed in all directions by the liquid resulting in optimal stresses distribution. This helps in the long-term preservation of bone and soft tissues.
• Load from biting forces and even in Bruxism, will be distributed over a large surface area, thus the pressure spots and overloading of supporting tissues may be reduced.
• The polyethylene foil (drufolen) was used due to its compatibility and excellent physical and mechanical properties. It is flexible, soft and dense and protects the mucosa from bacterial and biomechanical irritation.
• Days and nights change, so do men, so do tissues, so do our treatments. Ultimately, Devan’s dictum holds true. “Our objective should be perpetual preservation of what remains, rather than meticulous replacement of what is lost.”

References