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RESEARCH ARTICLE

AN INNOVATIVE METHOD FOR FABRICATION OF AIR RESERVIOUR COMPLETE DENTURE

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ABSTRACT

Denture is an artificial substitute for missing natural teeth and adjacent tissues[1]. Aims and objectives of a denture or a dental prosthesis are good retention, stability, support, maintain the health of the underlying tissues and be comfortable to the patient. It is therefore a responsibility of a dentist to fabricate a prosthesis which will incorporate the entire objective and ultimately provide satisfaction to the patient. If the underlying residual ridges and denture foundation areas are normal and sound, good prognosis can be expected.

INTRODUCTION

Denture is an artificial substitute for missing natural teeth and adjacent tissues[1]. Aims and objectives of a denture or a dental prosthesis are good retention, stability, support, maintain the health of the underlying tissues and be comfortable to the patient. It is therefore a responsibility of a dentist to fabricate a prosthesis which will incorporate the entire objective and ultimately provide satisfaction to the patient. If the underlying residual ridges and denture foundation areas are normal and sound, good prognosis can be expected. But extreme residual ridge resorption of denture bearing areas may lead to the problems during denture fabrication and prosthetic rehabilitation.

Residual ridge resorption is a chronic, progressive & incurable disease of bone remodeling which leads to progressive loss of residual ridge (Atwood & Coy 1971)

Pattern of ridge resorption in maxilla is up-ward and in-ward while in mandible it is down-ward and out-ward. This variation in resorption pattern is due to difference in orientation of teeth and alveolar bone in relation to basal bone which results in smaller maxillary arch and wider mandibular arch

Residual ridges which may be severely resorbed, narrower or more constricted will result in decreased supporting tissues resulting in excessive inter arch space. Sometimes long lip length will further aggravate the problem. These factors will result in heavy (bulky) maxillary and/or mandibular dentures with decreased retention and stability.

Such cases can be prosthetically rehabilitated to overcome the underlying problems by using non-anatomic teeth with balancing ramp[2] and by reducing weight of the prosthesis that will preserve the underlying foundation. M.M De Van stated that aim and objective should be perpetual preservation of what remains rather than meticulous restoration of what is missing.

Historically, weight reduction approaches have been achieved using a solid 3-dimensional spacer, including dental stone[3-12], cellophane wrapped asbestos[13], silicone putty[14,15], or modelling clay[16,17], during laboratory processing to exclude denture base material from the planned hollow cavity of the prosthesis[18].

This article will highlight on the simple method of fabrication of a hollow denture so as to reduce its weight.

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Fig.1 Template from Polyethylene sheet of 1mm fabricated on duplicate stone cast

Fig.2 Trial denture invested in the selected flasks (flask A), and wax elimination carried out

Fig.3 Baseplate wax (2 mm thick) adapted over definitive cast in base A

Method of Fabrication

1. Standard clinical procedures of conventional complete denture fabrication are carried out until try-in of waxed-up dentures.
2. Notches are to be made at four to five sites on the land area of the maxillary cast, and the waxed denture should be sealed to the definitive cast.
3. An impression of the waxed denture is to be made with an impression material preferably, irreversible hydrocolloid and poured in Type III gypsum product i.e dental stone to obtain a duplicate stone cast.
4. A 1 mm thick polyethylene sheet is vaccum pressed on the duplicated stone cast to form a template (Fig 1).
5. Two split dental flasks with interchangeable counters A and B are to be selected for processing.
6. Trial denture should be invested in one of the selected flasks (base of flask A), and dewaxing is to be done (Fig.2).
7. Baseplate wax (2 mm thick) should then be adapted over the definitive cast in base of flask A, conforming to the border extensions (Fig.3) and its fit with counter A has to be verified to remove excess wax.
8. The second flask counter (counter B) is then assembled over the base with the waxed-up cast (flask A).
9. Dewaxing and packing done with heat-cure acrylic resin. Trial closure is done to remove the excess and processed to obtain a permanent record base (Fig. 4).
10. The template of the duplicated trial denture is then placed over the prepared permanent record base using the notches in the land area of the cast as guides (Fig.5).
11. A putty elastomeric impression material is mixed and adapted over the ridge crest area of the permanent record base before complete polymerization (Fig.6)
12. Petroleum jelly applied as separating medium over putty that would come in contact with acrylic material.
13. Counter A is then reseated on base of flask A with the permanent record base and putty and verified for complete closure.
14. Heat cure acrylic resin is then packed over teeth in counter A, and base A is assembled and processed.
15. The processed denture is then recovered in the usual manner.
16. Exposed flange material trimmed and putty material retrieved (Fig.7) and filled with modeling wax (Fig.8).
17. Contours of modeling wax are to be checked using acrylic template and excess wax is removed and under trimmed of the contour by 0.5-1mm, which should be filled by auto polymerizing acrylic resin.
18. After self polymerization of resin, windows should be prepared on distal aspect for removal of wax by flowing hot water through it.
19. Once the wax is completely removed, windows should be closed by self curing acrylic resin.
20. Dentures should be then finished, polished, and kept ready for insertion.

Fig.4 Permanent record base

Fig.5 Template of duplicate trial denture placed over the permanent record base

Fig. 6 Putty mixed and adapted over the ridge crest area of the permanent record base

Fig.7. Exposed flange trimmed and putty material retrived

Fig. 8 Modeling wax filled in the exposed flange area

Efficacy of Air Reservoir Denture

Following two tests were performed to evaluate the efficacy of air reservoir denture

1. Air reservoir in the complete denture can be verified by placing denture against light, which will show passing of light through it (Fig.9).
2. Air reservoir denture can also be checked by placing the denture in water. The denture will float in water. (Fig.10).

Fig.9 Air reservoir denture showing passing of light

Fig. 10 Air reservoir denture placed in water

Advantages

1. Weight of the denture is reduced
2. This denture will help to preserve the underlying soft and hard tissue
3. Prevent further ridge resorption.
4. This technique will reduce leakage at the junction of the two portions of the dentures
5. Commonly available denture materials were used.
6. Simple technique

Disadvantages

1. Time consuming procedure
2. Denture are prone to fracture due to hollowness
3. Removal of putty from the cavity is difficult
4. Interarch distance should be more
5. Extra care should be taken for cleaning

6. Peripheral seal around the window if not perfect will lead to leakage.

DISCUSSION

Denture bearing areas of maxilla or mandible will be reduced due to extreme resorption of the ridge. This in turn will affect retention, stability and support for the complete denture. Extreme residual ridge resorption will lead to narrower and more constricted residual ridge causing reduced supporting tissue and also increased interarch restorative space between maxillary and mandibular residual ridge.

In general, a heavy denture whether maxillary or mandibular is likely to cause more resorption of denture bearing area and further decrease in denture bearing ability. Reducing the weight of the denture by making a hollow denture will reduce ridge resorption. Using non-anatomic teeth with balancing ramp and by altering the plane of occlusion to some extent will assist in preservation of the existing residual alveolar ridge.

The advantages of hollow dentures are reduction in the excessive weight of the acrylic resin, resulting in the lighter prosthesis and decreasing the load on the residual alveolar ridge making the patient comfortable.

CONCLUSION

Rehabilitation of severely resorbed ridges is a challenge to the prosthodontist. Even though, the choice of rehabilitation can be over dentures, implant retained over-dentures, ridge augmentation, etc, many a times the patients who comes with such a problem are geriatric patients with many systemic illness. Hence, the best way is to rehabilitate them with unconventional complete dentures so as to maintain the health of the underlying remaining tissues. Apart from modifying the impression technique to get maximum denture bearing area, modifying the type of denture may be a better treatment option for prosthetic rehabilitation.

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