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Case Report

Hollow denture fabrication using putty index: A case report

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ABSTRACT

Severely atrophic ridges are a challenge to prosthodontist for rehabilitation. Severe resorption leads to increased inter-arch space, long lip length, increased weight, and height of maxillary denture. These situations disrupt the retention, stability, and support of denture. Overloading of soft and hard tissues leads to further resorption. Hollowing of prosthesis reduces its weight. By reducing weight of the prosthesis, these severely atrophic ridges can be handled in a better way. This article describes a technique of fabricating a hollow maxillary complete denture.

1. Introduction

Atrophic maxillary ridge poses a clinical challenge to fabricate a successful complete denture. Increased interridge distance results in heavy maxillary complete denture that compromises its retention.[1,2] Weight of a maxillary prosthesis can be decreased by making it hollow, Numerous materials and methods have been used to construct a light weight denture. These include using silicone putty, modelling clay, thermocol, salt solid 3D spacer, cellophane wrapped asbestos and fabricating dentures in two halves. The advantage of a hollow maxillary denture is the reduction of excessive weight of acrylic resin, which normally replaces lost alveolar ridge in the interridge space of the denture wearer enhancing the retention of prosthesis.[3]

2. Case Report

A male patient of 63 years reported to Department of Prosthodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, India with the chief complaint of difficulty in eating and speaking. History revealed that the loss of teeth was due to periodontal problem and he had been edentulous for eight years.

On examination, maxillary and mandibular ridges were found to be atrophic. A medical and dental history was drawn out from the patient. History was followed by thorough clinical and radiographic examination. Treatment options given to the patient were Conventional Complete denture, Hollow maxillary complete denture with conventional mandibular complete denture and Implant supported complete denture. Pros and cons of all were discussed with the patient. Economic conditions, available interarch space and retention factor led to acceptance of option of hollow maxillary denture and conventional mandibular complete denture.

2.1. Technique

1. Followed the steps of conventional complete denture fabrication technique till try-in. During jaw relation stage, vertical dimension at occlusion (VDO) and vertical dimension at rest (VDR) were found to be greater than average. Increased inter arch space and

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Fig. 1: Temporary putty spacer and spacer hand carved out of glycerine soap.

Fig. 2: Temporary putty spacer placed over master cast with 2mm thick modelling wax adapted to it and space left between temporary putty spacer and template.

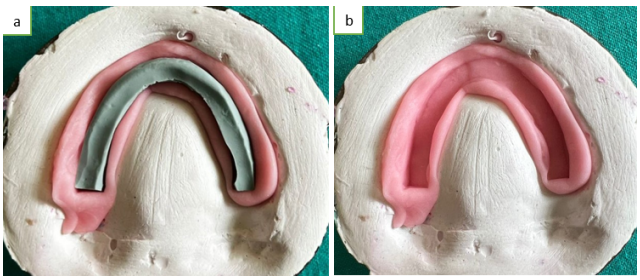

Fig. 3: a: Trial closure carried out using temporary putty spacer; **b:** Visual assessment of mould space for adequate resin thickness all around the hollow cavity.

decreased tissue resiliency contributed to increased weight of the maxillary prosthesis and decreased retention. Hence, it was decided to hollow maxillary denture for reducing its weight.

2. Maxillary trial denture adapted on master cast was duplicated with reversible hydrocolloid to get a working cast. Thermoplastic resin was adapted on this working cast to create a template. The maxillary trial denture was then invested and de-waxed in the conventional manner.

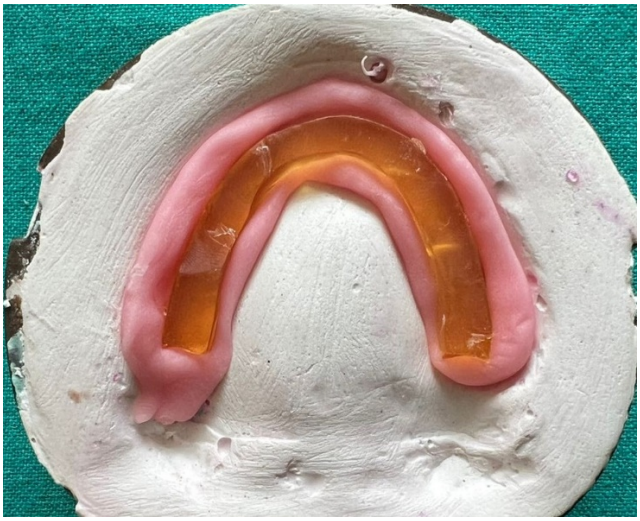

Fig. 4: Placement of soap spacer

Fig. 5: Hollow denture floating in water.

3. Modelling wax (2mm thick) was adapted over the master cast to ensure uniform layer of resin of adequate thickness in the completed denture, all around the planned hollow cavity and subsequently to be eliminated during a second de-waxing cycle prior to packing.
4. Firstly, a putty spacer was fabricated for the purpose of creating the hollow cavity, adjusted for suitability, and used for all the steps of denture fabrication up till the trial closure. [Figure 1]
5. Replica of the putty spacer was hand carved from a glycerine soap using a Le Cron carver to be used during the final closure and acrylization [Figure 1].
6. Accuracy of the 3D spacer was checked by placing it between the master cast (with 2mm modelling wax adapted to it) and the template [Figure 2].
7. Trial closure was carried out using the temporary putty spacer [Figure 3a]. The flasks were opened and temporary putty spacer was taken out. The mould space was visually checked for adequate resin thickness all

around the hollow cavity [Figure 3b]. The hollow space left by the temporary putty spacer was now filled with the soap spacer and final closure of the flasks was achieved [Figure 4]. The denture was then acrylized in conventional manner.

8. The denture was retrieved in the usual manner after processing. Using a micromotor handpiece, openings were cut into the denture base distal to the second molar.
9. To dissolve soap, denture was immersed in a bowl of water, a cleaning brush was pushed in and out through the openings for mechanical removal of the soap. Traces of soap were flushed completely by water spray. The hollow cavity was then dried and the openings were sealed using autopolymerizing acrylic resin.
10. A water test was then performed to evaluate the effectiveness of technique. The hollow denture floated on surface, while conventionally made denture sank to the bottom. [Figure 5]
11. Upper and Lower dentures were finished, polished, and delivered to the patient. The patient was reviewed after a week, and minor adjustments were made.

3. Discussion

Residual ridge resorption is a complex phenomenon caused by various anatomic, functional, metabolic, and prosthetic factors. The goal of prosthodontic treatment is to relieve the anatomical and functional deficiencies resulting from tooth loss.[4,5] Extreme resorption of ridge will lead to a reduced denture-bearing area that will affect retention, stability, and support of the complete denture. Furthermore, large restorative space is created between the maxillary and mandibular residual ridges. This leads to increase in height and weight of denture complicating the situation further.[6]

Different studies used different solid three-dimensional spacer for incorporating hollow cavity in the prosthesis to reduce weight, including dental stone (Ackermen, 1955), cellophane, silicone putty (Holt 1981) wrapped asbestos (Worley & Kniejski, 1983), modelling clay (DaBreo, 1990). Sharma R et al (2014)[7] used plaster pumice mix as spacer along the vacuum formed sheet and endodontic file, Patil PR et al (2015)[8] modelling wax enclosed in layer of self-cure acrylic, glycerine soap was used by Qanungo A et al (2016),[9] Fulari DS et al (2016)[10] used surgical catheter with 19-gauge orthodontic wires and Shetty V et al (2018)[11] incorporated thermocol as spacer which was left inside after processing.

The technique used in this case report incorporated hand carved out of a glycerine soap spacer due to its easy retrievability. Glycerine soap is more water soluble as compared to others due to high content of glycerine and other humectants in it, other advantages of glycerine soap are that it can sustain curing temperatures (boiling point of glycerine 290ºC), the polymerization of heat cure acrylic resin is not affected and no residue is left inside the hollow cavity.[12] A clean hollow cavity is left behind after removing the soap spacer eventually dismissing any concern regarding its biocompatibility in the oral cavity.

Most authors have used double flask technique for fabricating hollow dentures. The accuracy of fit between the base of one flask and the counter of other flask is critical as an inaccurate fit may lead to alteration of vertical dimension. The technique described in this manuscript by using a single flask for fabrication of hollow denture overcomes this problem. Using a single flask technique eliminates the extra steps of investing, packing and acrylization of a permanent record base.[9]This technique enables the operator to achieve a trial closure with the temporary putty spacer creating space for the final soap spacer avoiding any extra pressure over it during the final closure. The trial closure allows verification of adequate resin thickness all around the spacer or hollow cavity. The small window in the surface distal to the second molar allows recovery of three-dimensional spacer. This area does not need adjustment after denture insertion and has a small margin along which leakage can occur.

Finished and polished maxillary denture was duplicated to a solid prosthesis also to determine the difference in weight of two dentures. The difference in weight was found to be 9.55 grams.

4. Conclusion

The glycerine soap spacer has many advantages like ease of carving, easy retrievability and it does not adhere to acrylic resin. The single flask technique does not require two identical flasks and the extra step to fabricate permanent record base is eliminated. It is simple, economical, time-saving and a predictable technique.

Hollowing of maxillary denture helps in preventing residual ridge resorption. It improves the retention. Hollowing of maxillary denture is always advantageous over heavy weight conventional denture.

5. Conflict of Interest

None.

6. Source of Funding

None.

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