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A hollow denture 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 height and weight of maxillary denture. These critical situations lead to a compromised denture retention, stability, and support. Soft and hard tissues get overloaded leading to further resorption. By reducing the weight of the prosthesis situation can be handled a bit. It can be achieved by making hollow prosthesis. This article depicts a technique of fabricating a hollow maxillary complete denture.

Keywords: Hollow maxillary complete denture, interarch distance, light weight prosthesis, retention.

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]

Case report

A 63-year-old male patient reported to Department of Prosthodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, India with the chief complaint of difficulty in eating and speaking due to loss of teeth. History revealed that he had lost his teeth due to periodontal problem and 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 thoroughly followed by clinical and radiographic examination. Treatment options available for the patient were Implant supported complete denture, Conventional Complete denture, and Hollow maxillary complete denture with conventional mandibular complete denture. Pros and cons of all were discussed with the patient. Considering the economic conditions, available interarch space and retention factor, option of hollow maxillary denture was accepted.

Technique

1. Fabricated the denture following conventional technique till try-in. During jaw relation stage, it was noted that vertical dimension at occlusion (VDO) and vertical dimension at rest (VDR) was more than average. Increased inter arch space and decreased tissue resiliency contributed to increased weight of the maxillary prosthesis and decreased retention. Hence, it was decided to be made hollow.

2. Maxillary trial denture adapted on master cast was duplicated with reversible hydrocolloid to get a working cast on which a thermoplastic resin was adapted. [Fig. I]

Fig. 1: A 1mm thick polyethylene sheet pressed on duplicate stone cast of waxed maxillary complete denture

3. The maxillary trial denture was invested and de-waxed in the conventional manner.

4. Modelling wax (2mm thick) was adapted over the master cast to make uniform and adequate thickness of resin in the completed denture, all around the planned hollow cavity and subsequently eliminated during a second de-waxing cycle prior to packing. [Fig.II]

Fig. 2: 2mm thick modelling wax adapted over the master cast to make adequate and uniform thickness of resin in the complete denture

5. First temporary 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.

[Fig. III]

Fig. 3: Temporary putty spacer and spacer hand carved out of glycerine soap.

6. 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 [Fig-III].

7. Accuracy of the 3D spacer from was checked by placing between the master cast (with 2mm modelling wax adapted to it) and the template [Fig- IV].

Fig. 4: Temporary putty spacer placed over master cast with 2mm thick modelling wax adapted to it and space left between temporary putty spacer and template.

8. Trial closure was carried out using the temporary putty spacer [Fig. V]. The flasks were opened and temporary putty spacer was taken out. The mold space was visually checked for adequate resin thickness all around the hollow cavity [Fig-VIa, VIb]. The hollow space left by the temporary putty spacer was now filled with the soap spacer and final closure of the flasks was achieved [Fig-VII]. The denture was acrylized in conventional manner.

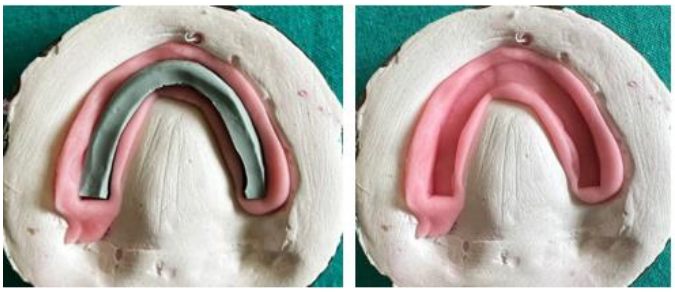

Fig 5: (a) - Trial closure carried out using temporary putty spacer (b)- Visual assessment of mold space for adequate resin thickness all around the hollow cavity

Fig 6: Placement of soap spacer

9. 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.

10.To allow dissolution of soap, denture was then immersed in a bowl of water, a cleaning brush was pushed in and out through the openings for mechanical removal of the soap. Water spray was used to flush traces of soap completely. The hollow cavity was dried and the openings were sealed using auto polymerizing acrylic resin.

11.. A water test was performed to evaluate. The hollow denture floated on surface, while conventionally made denture sank [Fig- VIII].

Fig 7: Hollow denture floating in water.

Fig 8: Difference in the weight of conventional and hollow maxillary complete denture.

1. Upper and Lower dentures were finished, polished, and delivered to the patient. The patient was reviewed after a week, and minor adjustments were made.

Discussion

Residual ridge resorption, resulting from tooth loss, is a complex phenomenon driven 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 affecting retention, stability, and support of the complete denture. Excessive ridge resorption results in a large restorative space between the maxillary and mandibular residual ridges. This increases height and weight of denture further compromising the situation.

Different studies used different solid three-dimensional spacer for weight reduction, including dental stone (Ackerman, 1955), cellophane, insta mold silicone putty (Holt 1981), wrapped asbestos (Worley & Kniejski, 1983), silicone putty (Holt 1981) or modelling clay (Da Breo, 1990) for incorporating hollow cavity in the prosthesis. Sharma R et al (2014)[7] plaster pumice mix as spacer along the vacuum formed sheet and endodontic file to assess hollow space, Patil PR et al (2015)[8] modelling wax enclosed in layer of self-cure acrylic, Qanun go A et al(2016)[9] used glycerine soap, Fulari DS et al (2016)[10] 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 here uses a hand carved out of a glycerine soap spacer due to its easy retrievability. High content of glycerine and other humectants in it, makes it more water soluble as compared to other soaps. Other advantages of using a glycerine soap spacer are that it can sustain curing temperatures (boiling point of glycerine 290ºC) and does not interfere with the polymerization of heat cure acrylic resin or leave any residues inside the hollow cavity [12]. The soap spacer is eventually removed leaving behind a clean hollow cavity, any concern regarding its biocompatibility in the oral cavity is dismissed.

Most authors have used a double flask technique for fabrication of 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 permits the verification of adequate resin thickness all around the spacer or the planned hollow cavity.

The small window in the cameo surface distal to the second molar allows recovery of three-dimensional spacer in an area that is not adjusted after denture insertion commonly and has a small margin along which leakage could occur. Finished and polished maxillary denture was duplicated into a solid prosthesis to determine the difference in weight if it had not been hollowed. The difference in weight was 9.55 grams.

Conclusion

The glycerine soap spacer has the advantages of ease of carving, easy retrievability and it doesn't adhere to acrylic resin. The single flask technique does not require two identical flasks and the extra step to fabricate permanent record base. It is simple, economical, time-saving and a predictable technique. Hollowing of maxillary denture prevents residual ridge resorption, compensates and improves the retention lost due to heavy weight of otherwise a conventional denture.

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