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AN INNOVATIVE TECHNIQUE FOR FABRICATION OF MAXILLARY HOLLOW DENTURE – A CASE REPORT

Dental Science

Dr. Rupal J. Shah Professor & Head Of Department, Department of Prosthodontics and Crown & Bridge, Government Dental College & Hospital, Ahmedabad, Gujarat.

Dr. Sanjay B. Lagdive Professor, Department of Prosthodontics and Crown & Bridge, Government Dental College & Hospital, Ahmedabad, Gujarat.

Dr. Sherin Cherian* 3rd year Post-graduate student, Department of Prosthodontics and Crown & Bridge, Government Dental College & Hospital, Ahmedabad, Gujarat. *Corresponding Author

Dr. Abhay H. Machchhar 3rd year Post-graduate student, Department of Prosthodontics, Government Dental College & Hospital, Ahmedabad, Gujarat.

ABSTRACT

The success of a complete denture depends on the application of the principles of retention, stability and support. Rehabilitation of patients with resorbed ridges with increased vertical dimension poses a challenge in terms of the weight of the denture which directly influences the retention and stability. This article describes a modified technique for fabricating a hollow maxillary denture taking note of the drawbacks of few of the previous techniques.

KEYWORDS

Residual ridge resorption, hollow denture, dental flask

INTRODUCTION

Residual ridge resorption is an inevitable and unavoidable consequence of edentulism. Rehabilitation of patients with severely resorbed ridges has been a challenge. Although in today's era of implants this seems to be an understatement, the choice of removable complete dentures as a treatment modality for the same cannot be overemphasized. The resorption process is generally a more serious clinical problem in the mandibular arch, nevertheless, significant loss of alveolar bone in the maxilla can prove equally problematic. Rehabilitating patients with atrophic maxilla accompanied with increase vertical dimension, may result in heavy dentures that consistently lose its peripheral seal. Hence, the key to success in such cases lies in the construction of hollow denture.

Hollow dentures have been constructed using a solid three-dimensional spacer made of dental stone,[1-11] cellophane wrapped asbestos,[12] silicone putty,[13,14] or modelling clay[15,16] to exclude the denture base material from the planned hollow cavity of the prosthesis. The solid spacer is subsequently removed during the polymerisation process or later and individual pieces of the prosthesis are then joined using autopolymerising acrylic resin repair techniques[17].

Alternatively, multiple pieces of prosthesis are fabricated separately and then joined using heat cure resin. This article describes an innovative technique to fabricate a hollow denture using silicone putty impression material as the spacer wherein the integrity of the final denture is maintained.

Case Report

A 65-year-old male patient reported to the Department of Prosthodontics, Government Dental College and Hospital, Ahmedabad, with the chief complaint of difficulty in eating and speaking due to loss of teeth. The patient had been edentulous for seven years and had an unsatisfactory denture experience. On intraoral examination the maxillary and mandibular residual alveolar ridge were severely resorbed. After a thorough evaluation of the patient's history, medical condition, radiographs, and existing clinical conditions, treatment options were explained to the patient. The patient was acquainted with the treatment options of implant supported prosthesis and conventional complete denture. He decided in favor of a conventional complete denture prosthesis due to the cost.

Clinical Procedure

The conventional steps in denture construction were followed until the final tryin stage. Increased vertical height of the maxillary occlusal rim was observed during jaw relation as a result of increased interridge space. Hence a hollow denture was planned in the maxillary arch.

Technique

1.Orientation notches are carved on the land area of the maxillary cast. Putty index of the polished surface of the trial denture is made upto the bucco-occlusal half of the posterior teeth and the incisal edges of the anterior teeth including the land area of the cast. This index is later used as a reference to determine the thickness of the polished surface of the hollow denture. (Figure 1)

Figure 1. Putty Index Of The Polished Surface Of The Trial Denture

2. In this technique the lower half (drag) and upper half (cope) of one full flask A and the upper half (cope) of another flask B is used.

3.The maxillary waxed trial denture is flasked in the usual manner using flask A. The orientation notches, carved before, are blocked out with polyvinylsiloxane impression material of putty consistency. Elimination of wax is done using boiling water. (Figure 2)

Figure 2. Drag Of Flask A With Maxillary Cast After Elimimation Of Wax, Orientation Notches Blocked Out With Putty

4.Two layers of baseplate wax are adapted on the surface of the master cast conforming to its sulcus. This will later form the intaglio surface of the final denture. Notch the surface of the wax at three points.

5. Mix putty consistency addition silicone material into a horseshoe

shape and adapt on the baseplate wax. Close the cope A over it. Ensure complete closure. Open the flask A once the putty spacer is set.(Figure 3)

Figure 4. Putty spacer of the desired thickness is adapted over the base plate wax

6. Carve the putty spacer such that it is only 2-3 mm away from the polished surface of the denture and 1mm away from the tooth portion of the denture. Confirm with the putty index taken before.(Figure 5)

Figure 6. Putty spacer is carved such that it is 2-3 mm away from the surface of the index

7. Orientation notches may be placed on the occlusal surface of the putty spacer for reorientation in the subsequent steps. Reorient the carved out putty spacer on the base platewax using the notches placed before and build up its medial and lateral wall with modelling wax. Ensure the absence of undercuts. (Figure 7)

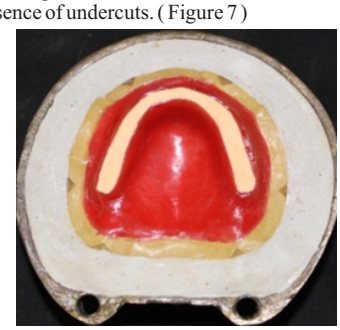

Figure 5. Medial and Lateral walls are built up with single layer of base plate wax

8. Invest using the cope of flask B. Elimination of wax is done using boiling water.

Figure 6. Drag of flask A after wax elimination

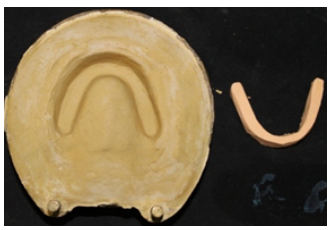

Figure 7. Cope of flask B with the putty spacer after wax elimination

9. Apply separating medium. Orient the putty spacer in the cope of the flask B (previously placed orientation grooves will be helpful). Pack the flask with heat polymerized polymethylmethacrylate resin and process in the conventional manner.

10. Separate the drag from the cope.. The intaglio surface along with other two walls (medial and lateral) of the hollow space are thus formed.

Figure 8. Hollow space with putty spacer in place surrounded by acrylic resin walls

11.Cope of the flask A is packed with heat cure polymethyl methacrylate resin. Trial closure is done over its corresponding flask A using a cellophane sheet. The flask is bench cured until the resin attains a firm consistency. Flask is opened to remove the cellophane sheet and the spacer. A new mix of heat cure acrylic resin is taken and sealed all around the edges of both the denture parts. The flask is the closed and processed in the conventional way.

Figure9. Drag and cope of flask A following trial closure and subsequent removal of the putty spacer

12. The hollow denture is retrieved, finished and polished.

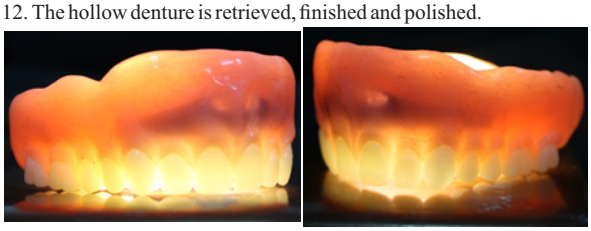

Figure 11. Maxillary complete denture filled with betadene solution to demarcate the hollow space

DISCUSSION

This technique is an adaptation of the double-flask technique that is well-known for the fabrication of the hollow bulb portion of a maxillary obturator by Ashok Jhanji et al[17]. It can be used for patients with both an atrophic maxillary alveolar ridge and a greater than usual interridge space. This technique is advantageous in certain ways. The thickness of the hollow portion can be estimated by the operator. This increases the predictability of the final product leaving nothing to imagination. It requires only the drag and cope of one full flask and a cope of another. The indentations helps orient the spacer, completely, precluding the need for an adhesive viz cyanoacrylate leaving no questions for biocompatibility issues. It ensures maximum strength through heat processing of acrylic resin while minimizing porosity and increasing durability. Lastly, this technique results in a seamless denture. Thus leaving no opportunity for leakage and staining that co-exist with the use of cold cure polymethylmethacrylate for sealing the denture.

The fact that a part of an additional flask is used can be considered a disadvantage of this technique. And for the same reason, it can be deemed time consuming.

SUMMARY

An innovative technique for fabricating maxillary hollow denture has been described. The series of steps that lead to the culmination of a seamless heat polymerized acrylic denture is the highlight of this technique.

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