

MANAGEMENT OF ATROPHIC MAXILLA USING A HOLLOW DENTURE – A CASE REPORT

Dental Science

Monila Mohan

PG Student

Sudeep S*

Head Of The Department Of Prosthodontics *corresponding Author

ABSTRACT

Residual ridge resorption refers to the reduction in the size of bony ridge under the mucoperiosteum. Difficulty in fabrication of a maxillary complete denture due to increased resorption of edentulous maxilla. The resorbed ridge leads to increased inter – ridge distance often results in a clinical problem due to heavy – weighted maxillary prosthesis. This article describes a simple, unique, precise single flask technique for hollowing a maxillary complete denture. It utilizes a clear template of the trial denture facilitating the creation of a glycerine soap. This hollow denture makes sure to reduce the bulkiness of the denture and even thickness of denture base resins for structural integrity.

KEYWORDS

Residual ridge resorption, Increased interridge distance, Hollow maxillary denture.

INTRODUCTION

Residual ridge resorption is considered as a major factor that results in functional impairment of stomatognathic system. The loss of bone following the removal of teeth has been characterized as a long term, cumulative and irreversible process that often proceeds at an alarmingly expeditious rate. Infact the degree of Residual ridge resorption is frequently so great that well constructed dentures must be relined/remade for functional and esthetic reasons. This will lead to large restorative space between the maxillary residual alveolar ridge and the mandibular teeth. If the usual techniques of denture fabrication are followed, it may result in a heavy prosthesis, which leads to loss of retention and resistance of the maxillary prosthesis^(1,2).

In case of obturators, the consideration of reducing the weight of the prosthesis has always been beneficial. But whether reducing the weight of conventional complete denture also enhances its retention or not, is still very uncertain^(3,4,16). So it is a well documented fact that the weight of the denture contributes significantly to both the retention and stability of complete dentures. Additional retentive aids used to improve the retention and stability of heavy complete dentures include the use of modified impression techniques, intramucosal inserts, suction disks, lightweight dentures, magnets and dental implants^(4,5,9,12,13).

Two techniques exist to achieve a hollow prosthesis i.e, one flask to fabricate the whole prosthesis and other techniques use two flasks in which prosthesis is processed in two separate halves (intaglio surface in one half and polished and occlusal surfaces in the other), which are later united using self-cured acrylic resin or heat-cured acrylic resin⁽¹⁻⁴⁾.

This article describes a report of an edentulous patient with highly resorbed maxillary ridge and mandibular ridge with increased interridge distance for the fabrication of hollow maxillary complete denture.

CLINICAL REPORT

A 59 year old male patient reported to the department of prosthodontics, PMS College of Dental Science and Research, Vattapara, Trivandrum with chief complaint of difficulty in eating and speaking due to teeth loss. Past medical history was not relevant. Past dental history revealed that he had lost his teeth due to periodontal involvement and had been edentulous for eight years.

On Intraoral examination, severely resorbed maxillary and mandibular edentulous ridges with increased interridge distance (Fig1a,b) were observed. Labial mucosa, buccal mucosa, hard palate, soft palate and floor of the mouth were normal. The treatment options were discussed pre-prosthetic surgery followed by implant supported prosthesis and conventional complete denture. He marked approval of conventional complete denture prosthesis due to the cost and the surgical procedure involved in pre- prosthetic surgery and an implant supported prosthesis.

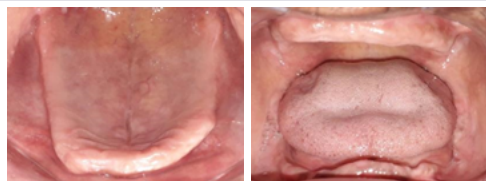


Fig.1 (a) Resorbed maxillary ridge (b) Resorbed maxillary and mandibular ridge with increased interridge

TECHNIQUE

Steps for conventional complete denture fabrication were followed up till the try – in stage. The trial denture was sealed to the definitive cast. The trial denture was duplicated in irreversible hydrocolloid impression material (dentsply zelgan 2002) and poured in type III dental stone (Gyprock) to obtain a working cast (fig2). On the working cast with the help of a vacuum press a template of 1mm thick transparent thermoplastic sheet (Scheu Dental GmbH, Iserlohn, Germany) was fabricated to obtain the trial denture external contours (fig3). The maxillary trial denture was invested and de-waxed in the conventional manner.

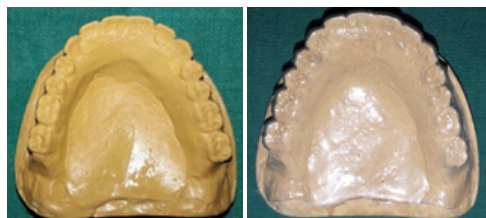


Fig. 2 Duplicated trial denture base Fig. 3 Template adapted on duplicated trial denture base

After deflasking the clear matrix was placed on the definitive cast in its correct position. An endodontic file with a rubber stop was used to measure the space between the matrix and the crest of the cast (fig 4). Vinyl polysiloxane putty [Aquasil, Dentsply Corporation, Germany] was mixed and adapted on the base and shaped to the approximate contours of the matrix for the purpose of achieving the hollow cavity and it was used for all the steps of denture fabrication up till the trial closure (fig5). A glycerine soap (Pears, Hindustan Unilever Ltd., Mumbai, India) replica of the putty spacer was hand carved using a Le Cron carver for use during the final closure and acrylization. This was the exact replication of vinyl polysiloxane putty (fig 6).



Fig4 endodontic file with a rubber stop Fig 5. Vinyl polysiloxane putty contours of matrix

After this, a trial closure was carried out using the temporary putty spacer and then the flasks were opened and a temporary putty spacer was retrieved (fig7). The hollow space left by the temporary putty spacer was visually assessed for adequate resin thickness and then filled with the soap spacer and final closure of the flasks was achieved (fig8). The denture was acrylized in a conventional manner. After finishing and polishing the denture two openings were cut into distal to the most posterior tooth of the denture base with a bur (fig9).

The denture was then dipped in a bowl of water to allow dissolution of soap and using brush cleaning was done by pushing in and out through the openings to aid in mechanical removal of the soap. Water spray was used for flushing traces of soap completely and the hollow cavity was air dried, and using autopolymerizing acrylic resin openings were sealed (fig10). The seal was verified by immersing the denture in water. That means a water test was executed to assess the hollow space as evident by the floating denture (fig11).



Fig6 Glycerine soap replica of the putty spacer



Fig 7 Trial closure was carried out using the temporary putty spacer



Fig8 Soap spacer filled the hollow space left by putty spacer



Fig 9 openings made after denture finishing fig10 using autopolymerizing acrylic resin openings were sealed after cleaning



Fig11 verification of denture by water test

DISCUSSION

The goal of prosthodontic treatment is to alleviate the anatomical and functional deficiencies resulting from edentulism. Tooth loss leads to residual ridge resorption which is a nexus phenomenon driven by various anatomic, prosthetic, functional and metabolic factors⁽¹¹⁻¹⁵⁾. Prosthetic rehabilitation in such cases results in increased weight of the prosthesis that leads to overloading the residual ridges and further compromising the retention and stability of the prosthesis^(2,7). The reduction in prosthesis weight may be achieved by making the denture base hollow. Hollow denture helps in reducing the extra loads on underlying tissues and remaining amount of bone by minimizing the weight of the denture. Weight reduction other approaches for reduction have been achieved by using a silicone putty, light-body coated gauze,

thermocool, solid three dimensional spacer, including cellophane-wrapped asbestos, dental stone, play dough and salt during laboratory processing to exclude denture base material from the planned hollow cavity of the prosthesis⁽²⁻⁵⁾.

The biggest disadvantage of these techniques is the monotonous retrieval of the three dimensional exceptionally from the anterior region of the prosthesis between the canines due to the curvature of the arch^(1,7,8). While using salt, the main problem encountered is its inability to sustain pressures produced during flask closure resulting in a failure to achieve a hollow cavity inside the prosthesis. Hence, no considerable difference in weight of the prosthesis can be achieved⁽¹⁷⁾. The technique narrated in this article is a soap spacer, due to its easy retrievability that can be allocated to a high content of glycerine and other humectants in it. Compared to other soaps, glycerine soap provides high water solubility and can sustain curing temperatures (boiling point of glycerine 290°C) and doesn't interfere with the polymerization of heat cure acrylic resin or leave behind any residues inside the hollow cavity. So while removing the soap spacer leaving behind a clean hollow cavity, does not produce any concern regarding its biocompatibility in the oral cavity⁽⁶⁾.

For the fabrication of hollow dentures many authors utilized a double flask technique^(4,9,10). Double flask technique means these techniques utilized a pair of split dental flasks with replaceable counters where one set of flasks was used to first obtain a permanent record base followed by using a second set of flasks to pack heat cure acrylic resin over the teeth. The precision fit between the base of one flask and the counter of other flask is unfavourable as an inaccurate fit may lead to alteration of vertical dimension⁽¹⁻⁴⁾. So the procedure reported in this article gets the better of this problem by using a single flask for fabrication of hollow denture. Using a single flask technique abolishes the additional steps of investing, packing and acrylization of a permanent record base. As opposed to others this technique allows fabrication of maxillary hollow denture as a single unit around the 3D soap spacer which is later eliminated⁽⁶⁾. By using this technique, the thickness and uniformity of the acrylic resin can be controlled by the precise placement of the indexed spacers. Without an "indexed" spacer there are possibility of movement of the spacer in the cavity at the time of packing, which may lead to non uniform thickness or perforations of the surrounding acrylic⁽³⁾.

CONCLUSION

In all cases due to systemic diseases or cost, preprosthetic surgeries and implant-retained prostheses may not always be possible. In such case hollow maxillary complete denture reduces the weight of the prosthesis which in turn prevents transmission of detrimental forces which would otherwise be transmitted from a conventional heavy prosthesis to the underlying tissues. The clear matrix of the trial denture helps to facilitate shaping of silicone putty spacer which was later replaced by glycerine soap during acrylization to ensure an even thickness of acrylic.

REFERENCES

- Deogade SC, Patel A, Mantri SS. An alternative technique for hollowing maxillary complete denture. *J Indian Prosthodont Soc* 2016;16:412-5.
- Bhushan P, Aras MA, Chitre V, Ashwin R, Mascarenhas K, Kumar S. The Hollow Maxillary Complete Denture: A Simple, Precise, Single-Flask Technique Using a Caramel Spacer. *ACP* 2017;13:17.
- Kalra A, Dhull KS, Iyer SR, Mittal M, Kalra S, Yadav S. Does Hollowing of Complete Denture Enhance Retention? – A Pilot Study. *JCDR* 2015;44:47.
- Radke U, Mundhe D. The hollow denture: An alternative treatment for atrophic maxillae. *J Prosthet Dent* 1988;59:514-516.
- Caculo SP, Aras MA, Chitre V. Hollow dentures: treatment option for atrophic ridges. *A Clinical Report*. *ACP* 2012;1-6.
- Qanungo A, Aras MA, Chitre V. An Innovative and Simple Technique of Hollow Maxillary Complete Denture Fabrication. *JCDR* 2016;23:25.
- O'Sullivan M, Hansen N, Cronin RJ, Cagna DR. The hollow maxillary complete denture: A modified technique. *J Prosthet Dent* 2004;91:591-4.
- Kalra LS. Maxillary hollow denture: A case series. *J Orofac Res* 2012;2:109-12.
- Fattore LD, Fine L, Edmonds DC. The hollow denture: an alternative treatment for atrophic maxillae. *J Prosthet Dent* 1988;59:514-516.
- Holt RA. A hollow complete lower denture. *J Prosthet Dent* 1981;45:452-454.
- Manoj SS, Chitre V, Aras MA. Management of compromised ridges: A case report. *J Indian Prosthodont Soc* 2011;11:125-129.
- McCord JF, Tyson KW. A conservative prosthodontic option for the treatment of edentulous patients with atrophic (flat) mandibular ridges. *Br Dent J* 1997;182:469-472.
- Guaccio R. Intramucosal inserts for retention of removable maxillary prosthesis. *Dent Clin N Am* 1980;24:585-592.
- Shetty V, Gali S, Ravindran S. Light weight maxillary complete denture: a case report using a simplified technique with thermocool. *J Interdiscip Dentistry* 2011;1:45-48.
- Gundawar S, Zamad A, Gundawar S. Light weight dentures: An innovative technique. *Contemp Clin Dent* 2014;1:134-37.
- Browning JD, Kinderknecht J. Fabrication of a hollow obturator with fluid resin. *J Prosthet Dent* 1984;52:891-895.
- Aggarwal H, Jurel SK, Singh RD, Chand P, Kumar P. Lost salt technique for [14] severely resorbed alveolar ridges: An innovative approach. *Contemp Clin Dent* 2012;3:352-55.