

Management of Atrophic Mandibular Ridge Using Hollow Denture: An Innovative Technique

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Abstract: Severe atrophy of residual alveolar ridges poses a serious clinical challenge for successful prosthodontic rehabilitation. Increased inter-ridge space due to resorption of alveolar ridges results in fabrication of heavy complete dentures. Heavier dentures exert continuous pressure upon the residual ridges even at rest and cause accelerated resorption of the residual ridges. This article presents a new technique for fabricating hollow mandibular denture for a completely edentulous patient with severe mandibular ridge resorption. Fabrication of hollow dentures which is of light weight aids in preservation of the existing residual alveolar ridge. The technique used for fabrication of hollow denture overcomes the disadvantages of other methods.

Keywords: Complete denture, Hollow mandibular denture, Severely resorbed ridges.

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I. Introduction

Severe atrophy of the residual alveolar ridges poses a serious clinical challenge for successful prosthodontic rehabilitation. Pain, mucosal intolerance to loading, difficulties with mastication and speech, loss of soft tissue support, altered facial appearance etc., are encountered as usual complaints. Furthermore a severely resorbed mandibular ridge results in more constricted residual ridge, decreased supporting tissue bed and a resultant large restorative inter-ridge space.¹⁻⁵ In such clinical conditions denture often replaces more bone than teeth to restore the proper dimensions of the face. This results in fabrication of heavy complete dentures. Heavier dentures, whether maxillary or mandibular are likely to cause poor denture bearing ability and excessive and constant pressure leads to bone resorption.^{2,5,6} Reducing the weight of the denture by making it hollow, aids in preservation of the existing residual alveolar ridge.

Numerous methods and materials have been used to fabricate a hollow denture.^{7,8} These methods include using a solid 3D spacer, cellophane wrapped asbestos⁹, silicone putty¹⁰, modelling clay, thermocol, salt, and fabricating the denture in two halves. This article describes a new technique for fabricating hollow mandibular denture for completely edentulous patient with severely resorbed mandibular ridge.

II. Technique

Preliminary impression of maxillary and mandibular arches were made using impression compound. Border molding and final impression were done in conventional manner. Permanent denture base were fabricated using heat cure acrylic resin and verified in the mouth for extension, retention and stability. Jaw relation and try in of dentures were done, followed by processing of trial dentures in the standard method till the wax elimination stage (figure 1).

Strips of base plate wax of two sheet thickness (2mm), were adapted on the ridge lap area of acrylic teeth including buccal and palatal surface in the second half of the flask (figure 2). This will provide uniform thickness of heat cure resin with adequate strength encompassing the hollow space. Volume of upcoming hollow space is simulated in addition silicone impression material of putty consistency (figure 3). This is achieved by placing unset putty impression material over the permanent denture base on the first half of the flask and closed with second half containing teeth and wax spacer. After reopening of the flask, thickness of the wax was assessed with the help of the wax gauge and necessary modifications were done by scraping the putty spacer wherever the wax was exposed or thinned out. This process ensured uniform space of 2mm for the heat cure acrylic resin. After removing the putty spacer, melted glycerin based soap is poured into the wax spacer on the

second half and closed with first half containing denture base (figure 4). Soap spacer is retrieved once it becomes completely solidified (figure 5).

Surfaces of two halves of flask were cleaned with hot water to remove any remnants of soap and separating medium is applied for packing with heat cure acrylic resin. During the trial closure, space is created with putty spacer and it is replaced with soap spacer during final closure (figure 6). After curing, two small openings were made with a bur into the denture base distal to the most posterior teeth to remove soap by placing it in water or injecting with syringe and needle. The cavity was cleaned and disinfected. Later, these openings were closed with the autopolymerizing resin in dough stage. The dentures were then polished in usual manner. The sealing of the cavity was then verified by placing it in water and checked for any bubbles. Reduction in weight can be attributed by floating of denture in water (figure 7).

III. Discussion

Bulky mandibular dentures were advocated as treatment modality for the management of severely resorbed mandibular ridges, as it contributes to both the retention and stability of mandibular prosthesis, aided by gravitational forces.¹¹ However, studies have shown that stability as well as retention of mandibular denture is not at all augmented by weight of the prosthesis.¹² Instead it causes accelerated resorption of the residual ridges, owing to continuous pressure being exerted upon the residual ridge, even at rest.^{13,14} Whereas restoring the lost dimensions of face require extensive volume of the denture base material in prosthesis provided to patients with severe residual ridge resorption. Reduction in weight of such prosthesis can be achieved by making the denture bases hollow while maintaining the volume.

An innovative technique for fabricating hollow denture has been described in this article, with the principal advantage of creating an optimal hollow space without compromising the overall strength of the mandibular denture. This is achieved by adapting an even thickness of wax sheet all around the spacer and thus ensuring uniform and adequate thickness of resin around the hollow space. In addition, even depth of resin prevents seepage and deformation, under pressure of flask closure. Soap spacer used in the final closure of this technique readily dissolves in water and can be easily removed, unlike the tedious efforts needed to remove other forms of spacers used. Moreover, the openings required for spacer removal are also small compared to other techniques.

However, this technique also accompanies some inherent drawbacks like additional laboratory steps involved and it is technique sensitive.

IV. Conclusion

Modifying the type of denture in the conventional way of management of atrophic mandibular ridge by making the denture hollow is found to be more acceptable by the patients. In addition, hollow mandibular complete denture considerably reduces the weight of the prosthesis, which in turn prevents transmission of detrimental forces to the atrophic residual alveolar ridge. This ultimately results in increased retention and stability and up to some extent it is also possible to preserve the existing residual alveolar ridge. This technique to hollowing out the mandibular complete denture is simple to execute and allows control of spacer thickness.

References

- [1]. Bhat AM. A hollow complete denture for severely resorbed mandibular ridges. *The Journal of Indian Prosthodontic Society*. 2006 Jul 1;6(3):157.
- [2]. Aggarwal H, Jurel SK, Singh RD, Chand P, Kumar P. Lost salt technique for severely resorbed alveolar ridges: An innovative approach. *Contemporary clinical dentistry*. 2012 Jul;3(3):352.
- [3]. Caculo SP, Aras MA, Chitre V. Hollow dentures: Treatment option for atrophic ridges. A clinical report. *Journal of Prosthodontics: Implant, Esthetic and Reconstructive Dentistry*. 2013 Apr;22(3):217-22.
- [4]. Shetty V, Gali S, Ravindran S. Light weight maxillary complete denture: A case report using a simplified technique with thermocol. *Journal of Interdisciplinary Dentistry*. 2011 Jan 1;1(1):45.
- [5]. O'Sullivan M, Hansen N, Cronin RJ, Cagna DR. The hollow maxillary complete denture: A modified technique. *The Journal of prosthetic dentistry*. 2004 Jun 1;91(6):591-4.
- [6]. Ohkubo C, Hosoi T. Effect of weight change of mandibular complete dentures on chewing and stability: A pilot study. *The Journal of Prosthetic Dentistry*. 1999 Dec 1;82(6):636-42.
- [7]. McAndrew KS, Rothenberger S, Minsley GE. An innovative investment method for the fabrication of a closed hollow obturator prosthesis. *The Journal of prosthetic dentistry*. 1998 Jul 1;80(1):129-32.
- [8]. Buckner H. Construction of a denture with hollow obturator, lid, and soft acrylic lining. *Journal of Prosthetic Dentistry*. 1974 Jan 1;31(1):95-9.
- [9]. Worley JL, Kniejski ME. A method for controlling the thickness of hollow obturator prostheses. *The Journal of prosthetic dentistry*. 1983 Aug 1;50(2):227-9.
- [10]. Gardner LK, Parr GR, Rahn AO. Simplified technique for the fabrication of a hollow obturator prosthesis using vinyl polysiloxane. *The Journal of prosthetic dentistry*. 1991 Jul 1;66(1):60-2.
- [11]. Hurtado AJ. Internally weighted mandibular dentures. *Journal of Prosthetic Dentistry*. 1988 Jul 1;60(1):122-3.
- [12]. Ohkubo C, Hosoi T. Effect of weight change of mandibular complete dentures on chewing and stability: A pilot study. *The Journal of Prosthetic Dentistry*. 1999 Dec 1;82(6):636-42.
- [13]. Carlsson GE. Responses of jawbone to pressure. *Gerodontology*. 2004 Jun;21(2):65-70.

- [14]. Oki K, Sato T, Hara T, Minagi S. Histopathological changes in the tissues under a denture base in experimental osteoporosis with a non- pressure covering or bearing continuous pressure. Journal of oral rehabilitation. 2002 Jun;29(6):594-603.



Fig 1. Invested flask halves after wax elimination



Fig 2. Base plate wax adapted on the ridge lap area of acrylic teeth including buccal and palatal surface



Fig 3. Spacer made in addition silicone impression material of putty consistency



Fig 4. Soap spacer



Fig 5. Soap spacer similar to the putty spacer



Fig 6. Soap spacer is placed during final closure

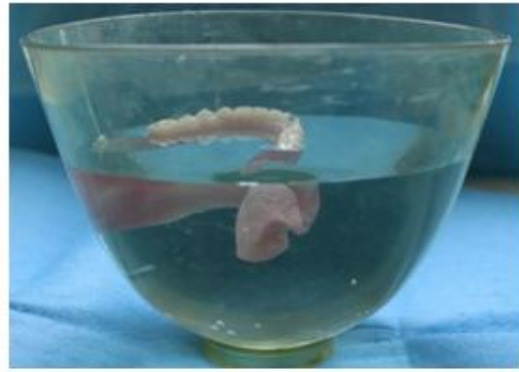


Fig 7. Floating denture without any bubbles

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