

Case Report

A hollow complete denture for severely resorbed mandibular ridges

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This article presents a case report of a severely resorbed mandibular ridge situation treated with a hollow complete lower denture, states the rationale behind the treatment and highlights on a technique for the fabrication of a hollow complete lower denture with the objective of emphasizing the use of a hollow complete denture in situations where there is excessive resorption of the residual alveolar ridges and implant treatment is not a realistic option.

Key words: Hollow bulb prosthesis, hollow denture, severe ridge resorptions

INTRODUCTION

Severe atrophy in the residual alveolar ridges poses a clinical challenge for successful prosthodontic rehabilitation. Conventional restoration of the severely atrophied mandibular residual alveolar ridge has sparked a number of different designs to accommodate patients who have difficulty wearing a mandibular denture. For more than 150 years, it was believed that the weight of the denture contributes to both the retention and stability of mandibular complete dentures. Even today, a number of clinicians still recommend 'weighted' mandibular dentures for the management of severely resorbed ridges.^[1,3] However, studies have shown that denture stability can be obtained without the addition of extra weight to the denture by improving the fit of the denture base.^[2,4] Ohkubo and Hosoi^[5] concluded from their study that the weight of a mandibular denture may not affect its retention or stability. Some criticism also arose that extra weight may in fact cause accelerated resorption of the residual ridges.^[6,10] Given the extensive volume of the denture base material in prostheses provided to patients with severe residual ridge resorption, reduction in prosthesis weight may be achieved by making the denture base hollow.

The following case describes the laboratory technique where a hollow complete lower denture was provided for a patient with severe ridge resorption.

CASE REPORT

A 74 year- old male patient reported with a presenting complaint of heavy, ill-fitting lower denture. The patient

gave a history of being a denture wearer for the past 5 years. Within this span his dentures were replaced twice. Medical history revealed that there was no underlying systemic disorder. Intraoral examination revealed a severely resorbed lower ridge [Figure 1]. The patient was assessed with a view of providing him with an implant retained complete lower denture in order to minimize the rate of resorption. But the patient was reluctant to be subjected to surgical procedures. So as an alternative the patient was treated with a hollow complete lower denture.

Laboratory procedure

Two split dental flasks with interchangeable top halves [Figure 2] were used to construct the hollow denture. A processed record base was made on the definitive cast by following conventional laboratory procedures [Figure 3]. The maxillomandibular relationship was recorded and transferred to the articulator [Hanau H2, Teledyne Hanau, Buffalo, New York]. The artificial teeth [Rolex cross-linked acrylic teeth, Ashoosons, Delhi, India] were arranged. After trial insertion, the waxed mandibular denture was invested in the first flask with dental plaster [Dentex, Prevest Denpro Ltd., Jammu, India], the wax was boiled out the two halves of the flask were separated [Figure 4].

A wax shim consisting of two layers of base plate wax (Hindustan Modelling Wax, HDP, Hyderabad, India) was then applied over the denture teeth area of the flask [Figure 5] ensuring that the lid of the flask containing the invested definitive cast and the processed record base closed completely with the wax shim in place. The wax shim was thinned down in areas of



Figure 1: A severely resorbed mandibular ridge



Figure 4: First flask after boilout. Heat polymerized processed base in place in bottom half of flask



Figure 2: Two split dental flasks with interchangeable lids



Figure 5: Wax shim has been placed over the denture teeth area of first flask



Figure 3: Processed base fabricated on definitive cast



Figure 6: First flask [right] with lid of second flask [left], wax shim has been boiled out and flask has been separated

interferences. The processed record base in the top half of the flask was set aside to be used later in the

procedure.

The bottom half of the first flask containing the denture teeth with the wax shim in place was then topped and flaked using the lid of the second flask, the wax shim



Figure 7: Notches made along the borders of 2 acrylic resin parts to be fused



Figure 8: Denture floated in water to ensure a complete seal

boiled out, separating media (Cold-mold seal, DPI Products, Mumbai, India) was applied and heat polymerized acrylic resin (Acralyn H, Asian Acralyn H, Mumbai, India) was packed and processed as usual [Figure 6]. This resulted in two halves i.e., the processed record base and the half containing the denture teeth, which had to be then fused together. Notches were made along the borders of the two halves to be fused [Figure 7]. Any excess acrylic resin on the inner surface of the half containing the denture teeth that would constrict the hollow cavity was reduced. Care was taken to avoid uneven reduction of the acrylic resin by estimating the acrylic resin thickness using a Boley gauge (Buffalo Dental Manufacturing Co, Brooklyn, NY, USA).

The two parts were then fused with auto polymerizing resin [Rapid Repair, Pyrax Polymers, Roorkee, India] during the lab remounting stage (for proper orientation of the two parts) and then tested for a complete seal by placing it in water [Figure 8]. The denture floated ensuring a complete seal. The denture was then finished and inserted [Figure 9]. On review the patient was very satisfied with the function and comfort of the denture.

DISCUSSION

A severely atrophic mandible poses a clinical challenge for the fabrication of successful complete denture prosthesis. This may be due to a narrower, more constricted residual ridge; decreased supporting tissues and a resultant large restorative inter ridge space. The latter may result in a heavy mandibular complete denture. Although a number of clinicians recommend 'weighted' mandibular dentures for severely resorbed lower ridges, studies^[1,3] have shown that weight may not contribute to the retention and stability of a lower



Figure 9: Denture inserted

denture. Extra weight may in fact cause accelerated resorption of the residual ridge.^[6,7] This may be due to the continuous pressure exerted on the residual ridge by the heavy denture even at rest.^[8-10] In order to avoid this problem the case reported was treated with a hollow mandibular complete denture, which resulted in approximately 25% of reduction in the weight of the denture in comparison with the conventional denture. This may be applicable to situations where there is severe atrophy of the residual alveolar ridges and placement of implants is not a realistic option.

The technique described in this article is modified from a technique described by Holt^[11] and has several advantages over the previously described techniques in literature^[12-26] [Table 1]. It is a simple, economical, time saving procedure that eliminates the need for a spacer for creating the hollow cavity, allows control of the thickness of the acrylic resin occupying the hollow portion. Also, fusing the sections with autopolymerizing

Table 1: Summary of literature on various techniques for the fabrication of a hollow prosthesis

Author	Technique	Drawbacks
Chalian and Barnett (1972)	Use of 3-dimensional spacer to create the hollow cavity Autopolymerized acrylic resin seam	Time consuming complex procedures +Add weight to the prosthesis and thickness to the hollow portion +Use of asbestos poses a risk of health hazard
Tanaka <i>et al.</i> (1977)	Polyurethane foam	
Worley and Kniejski (1983)	Asbestos	
Matalon and Fuente (1976)	Sugar	
Parel and Fuente (1978)		
Schneider (1978)	Ice	
Elliot (1983)	Modelling clay	
Da Breo (1990)		
Andrew Rothenbergerand & Winsley (1998)	Dental plaster	
Blair and Hunter (1998)	Plaster and pumice mix	
Holt (1981)		
Jhanji (1991)	Silicon Putty	
Sullivan <i>et al.</i> (2004)		
Mahdy, 1969	Double-flask technique	Additional laboratory steps. Additional curing cycle involved may cause warpage of the prosthesis.
Fattore <i>et al.</i> 1988		
Benington 1989		
Da Breo 1990	Techniques using visible light polymerized resin	Strength and long term durability of these prosthesis is questionable
Polyzois 1992		

resin minimizes processing errors that would occur with heat cure acrylic resin. However, the technique has its limitations. The junction between the two halves of the denture is fused with auto polymerizing resin, which poses a risk of microleakage and discoloration over a period of time.

SUMMARY

A technique for fabricating a hollow complete mandibular denture is described with the objective of emphasizing the need to preserve the remaining alveolar bone by the use of a hollow denture in situations where there is excessive resorption of the residual alveolar ridge and implant treatment is not a realistic option. The advantage of a hollow denture for severely resorbed lower residual alveolar ridges is the reduction in the excessive weight of the acrylic resin that may load the residual alveolar ridge. The technique described in this article eliminates the need for a spacer and also controls the thickness of acrylic resin occupying the hollow portion, which results in a lighter prosthesis.

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