

## Minimise Weight, Increase Retention: Hollow Denture - A Case Report

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### Abstract

The increased inter-ridge space due to resorption of residual ridge and long upper lip length makes the prosthetic rehabilitation of such patient a great challenge for a prosthodontist. Retention and stability of complete denture in cases of residual ridge resorption is usually reduced because of minimised denture bearing area. The maxillary denture fabricated in such patients are bulky in nature which further compromise its retention. So, in this case report a simplified technique is described for construction of hollow maxillary denture which being light in weight further improves denture retention.

**Key words:** Hollow denture; Increased inter-ridge distance; Light weight denture; Residual ridge resorption.

### Introduction

A successful rehabilitation with complete denture relies in its good retention, stability and support.<sup>1</sup> Severely atrophic residual ridge with decreased supporting tissue for denture and increased inter-ridge space hampers the retention and stability of a denture. This increased inter-ridge space along with the long upper lip length leads to fabrication of a large and heavy maxillary denture which tends to further complicate the ability of the tissue to hold denture.<sup>2</sup>

So, in patients with large inter-ridge space where the maxillary complete denture is bulky, its weight can be reduced by creating a hollow space within it.<sup>2</sup> Numerous materials have been used to build a 3D hollow space within

a denture such as dental stone,<sup>3</sup> cellophane wrapped asbestos,<sup>4</sup> silicone putty,<sup>5,6</sup> modelling clay,<sup>7</sup> thermocol,<sup>8</sup> play dough,<sup>1</sup> light-body coated guage,<sup>9</sup> salt,<sup>10</sup> or glycerine soap<sup>11</sup> during processing.

Many authors like Holt<sup>12</sup> (1981), Fattore et al<sup>13</sup> (1988), O' Sullivan et al.<sup>2</sup> (2004) have processed hollow denture by using spacer and later luting the two halves with autopolymerising acrylic resin, by using double flask technique and joined the parts together with heat polymerized resin or by modified double flask technique along with putty spacer, respectively.

Whereas this article describes the use of glycerin soap as a spacer for constructing a hollow denture in simplified manner using only a single flask.

### Case Report

A 75 years old male visited Department of Prosthodontics and Crown-Bridge at College of Dental Surgery, BPKIHS, Nepal, with the chief complain of being unable to chew properly with his existing denture along with loss of retention with respect to upper denture. He had been

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edentulous for the past 5 years and had used two sets of complete denture. On examination, we found that the patient had long upper lip (FIG. 1) and his existing denture was hardly visible. Intraorally, his maxillary and mandibular ridge were resorbed thus increasing the inter-ridge distance. The previous dentures appeared heavy with overextended borders.

Treatment options available for patients were to undergo pre-prosthetic surgery followed by conventional complete denture, implant supported complete denture and combination of maxillary hollow denture and mandibular conventional denture. The surgical and economy criteria of the first two options lead the patient to opt for third treatment option of maxillary hollow complete denture with mandibular conventional complete denture.

## Materials and Methods

1. Preliminary and secondary impression was made in conventional manner followed by facebow transfer and Gothic arch tracing for proper jaw relation. The long lip length of upper lip was taken into consideration while adjusting the height of upper occlusal rim. Try-in of the teeth arranged in balanced occlusion were carried out (Fig.2A).
2. Before processing, duplication of maxillary waxed up denture with irreversible hydrocolloid impression material (Algitex, Dental Products of India) was done and poured with Type III dental stone (Kalstone, Kalabhai Pvt. Ltd.) to obtain a cast for template (Fig.3).
3. A transparent template of 1.5 mm (Fig.4A) thick BIO-ART (Brazil vacuum forming sheet) was then adapted over the duplicated cast with the help of Erkopress 300 TP to obtain external contour of maxillary trial denture.
4. The maxillary and mandibular trial / waxed up dentures were invested and dewaxing was carried out in conventional manner.
5. After dewaxing, 2mm thick modelling wax of uniform thickness (Fig.4B) was adapted all over the maxillary master cast which forms the tissue surface of hollow cavity in final denture.
6. Then a temporary putty spacer (Fig. 5A) was fabricated and adjusted for the approximate dimension of hollow cavity. The BIO-ART template was placed over putty spacer (Fig.5B) and endodontic files with rubber stopper (Fig. 6) was used to measure the space between the template and putty spacer in all aspect for uniform space around the putty spacer. Then Vaseline was applied on putty spacer for trial closure.
7. A replication of putty spacer was hand carved using Le Cron carver on glycerine soap (Pears, Hindustan Unilever Ltd., Mumbai, India) to make the final soap spacer (Fig. 7A, B, C). The soap spacer dimension was measured with Vernier caliper for approximate dimension to putty spacer.
8. Trial closure was carried out with putty spacer (Fig. 8A). The putty spacer was removed and assessment of mold space for adequate resin around the hollow cavity was checked. The hollow spacer was then replaced by soap spacer (Fig. 8B) and final closure was done.
9. The mandibular denture fabrication was carried out in conventional method.
10. Both the dentures were acrylised in conventional manner. The dentures were retrieved carefully (Fig. 9A) and was checked for any area of exposure of soap spacer. On the denture base distobuccal to 2<sup>nd</sup> molars opening were made on both sides (Fig. 9B and 9C) for removing soap spacer. Warm water was passed through the opening and soap spacer was removed easily and completely. After drying the

hollow cavity the openings were sealed with autopolymerising acrylic resin.

11. The hollow denture was then placed in a jar of water and was found to float (Fig.9A) in comparison to the previous denture which being heavy sunk to the bottom of the jar (Fig. 9B).

12. Final finishing and polishing was done after checking it on patient's mouth and delivered to the patient (Fig.10A, C). Follow up was done after 48 hour and minor adjustments were done.



Figure 1: Pretreatment extra-oral frontal view showing long lip length.



Figure 2A: Try-in, Figure 2B: Articulated dentures



Figure 3: Duplication of maxillary waxed-up



Figure 4A: 1.5 mm thick polyethylene sheet pressed on duplicate stone cast of waxed maxillary complete denture.

Figure 4B: 2mm thick modelling wax adapted over the master cast to ensure adequate and uniform resin thickness in the complete denture.

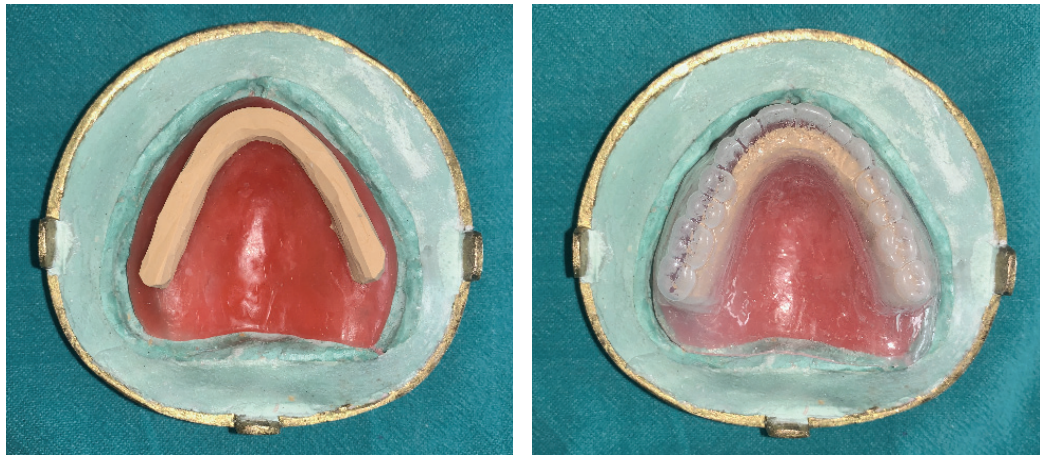


Figure 5A: Temporary putty spacer placed over master cast with 2mm thick modelling wax adapted to it.

Figure 5B: 2mm space left between temporary putty spacer and BIOART template.

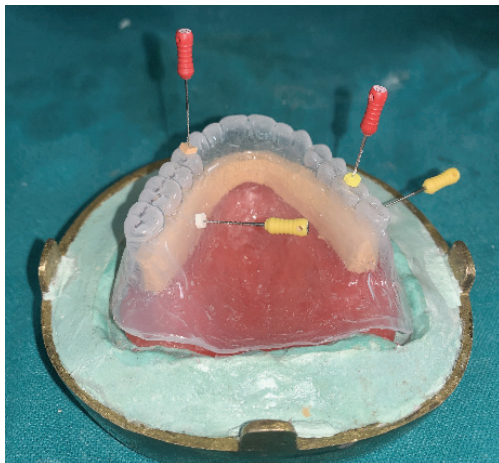


Figure 6: Endodontic files with rubber stopper were used to confirm the uniformity of space around the putty spacer.



Figure 7A, B and C: A replication of putty spacer hand carved out of glycerine soap.



Figure 8A: Trial closure carried out using temporary putty spacer.

Figure 8B: Placement of soap spacer after removal of soap spacer from the maxillary denture.



Figure 9A: maxillary denture retrieved.

Figure 9B and 9C: Opening made distobuccal to 2nd maxillary molar on both sides.



Figure 10A: Maxillary hollow denture float on water.

Figure 10B: Comparison of old maxillary denture which sunk on water to hollow maxillary denture which floats on water.



Figure 11A: Insertion of complete denture.

Figure 11B: Pre-treatment, Figure 11C: Post-treatment.

## Discussion

The use of soap spacer for constructing hollow denture has greater advantage over methods that uses other spacers (such as dental stone,<sup>3</sup> cellophane wrapped asbestos,<sup>4</sup> silicone putty,<sup>5</sup> modelling clay,<sup>7</sup> thermocol,<sup>8</sup> play dough,<sup>1</sup> light-body coated guage<sup>9</sup>) due to its easy and complete elimination. As glycerine soap has higher water solubility and the boiling point of glycerine being 290°C can withstand higher curing temperature without interfering the polymerisation of heat cured acrylic resin.<sup>10</sup>

This method uses single flask for the processing of denture so the alteration of vertical dimension of final denture as seen in double flask technique is not present. When using double flask technique, the inaccuracy of fit between the drag of one flask to coup of another flask leads to change in vertical dimension of final prosthesis. Also double steps of processing (investing, packing, and acrylisation) is exclude when using this technique.

Since, the hollow denture is built not in parts but as a whole so there is no risk of seepage of fluid into the denture from the joined area as seen in cases where, hollow dentures are fabricated in parts and joined by autopolymerising resin. Also, the area where the denture is joined is the site for post insertion adjustment which further increases the risk of exposure of hollow cavity.

This method utilises the vacuum formed transparent template which ensure the 2 mm thickness of resin around the cavity. The trial closure used in this technique will further confirm the uniform thickness of resin all around the hollow cavity.

The small window for removal of soap made distobuccal to the second molar can easily closed and may rarely cause leakage into the cavity.

The final denture when compared with the previous denture had good retention and the

old denture drowned in water but the hollow denture remained afloat thus, confirming its light weight.

## Limitation

Since the soap spacer is hand carved by using the dimension which was measured free hand by vernier caliper, spacer dimension may not be accurate leading to deficit acrylic in the body of the hollow denture. So, the duplication of soap spacer must be done with utmost accuracy.

## Conclusion

This technique is simple, economical and time-saving in comparison to double flask technique, and technique where dentures were fabricated in parts. The easy removal of glycerine soap spacer and its non-adherence to the denture makes this process an optable approach.

Patient's medical condition and socioeconomic status may not allow treatment like implant retained prosthesis or pre-prosthetic surgery but the one described in this article can be very beneficial to fabricate a light weight denture with feasible approach for adequate retention and stability.

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