

A Novel Technique for Fabrication of Hollow Obturator for a Maxillary Defect: A Case Report

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ABSTRACT

Prosthodontic rehabilitation following aggressive infections and malignancies is challenging. Surgical intervention may lead to anatomical defects resulting in oro-antral communication that causes difficulty in mastication, deglutition, impaired speech and facial disfigurement. The role of a Prosthodontist in maxillary defects is to restore these defects with the fabrication of obturators. However, the extent of the obturator into these large defects necessitate bulkier, heavy prosthesis which would likely be non-retentive and uncomfortable for the patient. Hollow bulb obturators are fabricated to reduce the weight of these prostheses. The method of fabrication of hollow bulb obturators with lost salt technique in the maxillary defect is described in this case report.

Key words: Hollow Bulb Obturator, Maxillary Defects, Maxillofacial Prosthesis, Obturator

INTRODUCTION

Maxillary defects may result from congenital malformations, tumors, trauma, infections, burns, and surgical interventions. These defects causes oro-nasal and oro-antral communication, hypernasality, difficulty in mastication, and facial disfigurement¹. An obturator prosthesis is fabricated to improve these defects. Glossary of Prosthodontic Terms defines an obturator as “a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar or soft tissue structures”². At times the defects are so extensive that it demands heavy, bulkier

obturator which would likely be non-retentive and uncomfortable for the patient^{1,3}.

So, a hollow bulb obturator is indicated in such cases. According to Wu and Schaaf, hollowing the obturator reduces the weight of the prosthesis from 6.55% to 33.06%⁴. Several methods⁵ of fabricating a hollow bulb obturator have been described in the literature among which the lost salt technique is widely used. In the lost salt technique, once the obturator bulb is hollowed after the removal of salt the lid is sealed with autopolymerizing acrylic resin. A modification of this technique in which the bulb is lined with heat-cured acrylic resin is presented in this case study.

CLINICAL REPORT

A 42-year-old gentleman, with a known case of Diabetes Mellitus under medication, presented in the Department of Prosthodontics and Maxillofacial Prosthetics, People's Dental College and Hospital, Kathmandu with complaints of nasal tone in voice and leakage of air and water from mouth to nasal cavity while

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eating and speaking. He had undergone subtotal maxillectomy for Mucormycosis one year back. He had been using an interim obturator fabricated in our hospital.

Intraoral examination revealed well-healed defect in the right side of maxilla involving the hard palate, alveolar ridge, and soft palate. All teeth posterior to central incisor were missing in right quadrant of maxillary arch. (Figure 1) According to Aramany's classification, it was classified as a Class II defect.

All the treatment options for the maxillary defect were explained to the patient and considering the ease of manipulation and feasibility one-piece closed bulb hollow obturator was planned as a definitive prosthesis. Informed consent was obtained from the patient.

THE PROCEDURE OF FABRICATION

The primary impression was made with irreversible hydrocolloid impression material in a metallic perforated stock tray (Figure 3). Irreversible hydrocolloid impression material was preloaded on the defect before making an impression and consistency was medium. The stock tray was modified with impression compound on the defect side to support and ensure uniform thickness of alginate. (Figure 2).

Primary impression was poured with Type III gypsum product to obtain a primary cast. Tentative surveying of the primary cast was done and framework designing was done. A 2 mm thickness modeling wax was adapted onto the primary cast and custom tray fabricated. Mouth preparation was done. Complete palatal major connector was planned and distal surface of 11 was planned as guide plane. Direct retainer as embrasure clasp on 14, 15, 16, 17 and rest

seats was prepared on 14, 15, 16, 17 and I clasp in respect to 11. Border molding was carried out with green stick compound on the defect and non-defect side. Final impression was made with regular viscosity addition silicone impression material. (Figure 4)

Final impression was poured in type IV gypsum product to obtain a master cast. (Figure 5) Surveying of the master cast done and design of the cast metal framework was transferred on to master cast. Cast partial framework was fabricated in a conventional manner and try-in of framework was done. (Figure 6) On the master cast, the defect area was blocked out with wax and denture base was fabricated with autopolymerizing acrylic resin with salt placed in between (Figure 7).

Then, vent hole was made and salt was removed to make hollow and vent hole was closed by autopolymerizing acrylic resin. Occlusal rim was fabricated, labial, buccal fullness was checked and bite registration was made. (Figure 8) Upper and lower cast is articulated and teeth arrangement was done and teeth try-in done. After teeth try-in the bulb of the obturator is trimmed 1 mm to make space for heat cured acrylic resin and then half flasking, full flasking and Dewaxing was done. (Figure 9A and 9B)

Packing and curing was done with heat cure acrylic resin. After bench cooling obturator was retrieved and gross trimming finishing, polishing was done. After intraoral adjustment it was inserted into patient mouth. (Figure: 10 and 11) Post insertion instructions were given about insertion, removal, and maintenance of the prosthesis. The patient was recalled after 24 hours and adjustment was done. He was happy with the improved speech and aesthetics.



Figure 1 : Intraoral preoperative photograph

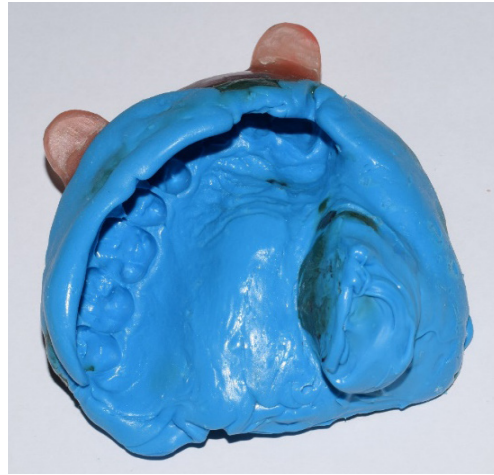


Figure 4: Border molding and final impression



Figure 2: Modified stock tray



Figure 5: Master cast



Figure 3: Primary impression of maxillary arch

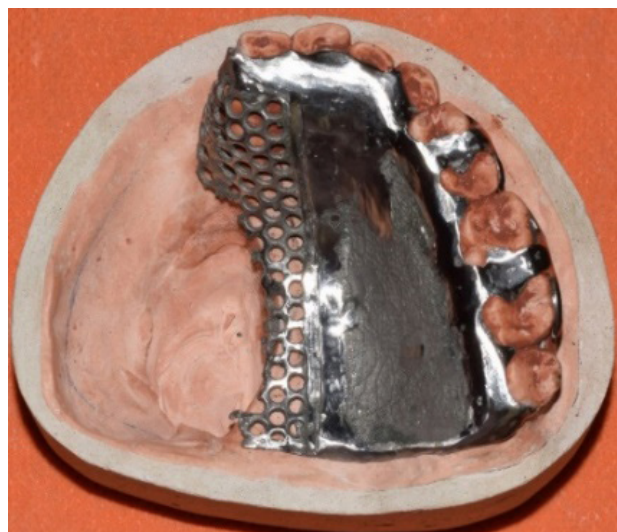


Figure 6: Cast metal framework in master cast



Figure 7: Fabrication of hollow bulb



Figure 8: Bite registration



Figure 9(b): Dewaxing



Figure 9(a): dewaxing



Figure 10: Final Prosthesis



Figure 11: Insertion of Obturator

DISCUSSION

Obturator prosthesis plays an important role in the recovery of oral functions in congenital and acquired maxillary defects. Prosthodontic rehabilitation of such defects using an obturator is successful yet challenging and unpredictable if the defects are extensive because there is a lack of bone and supporting tissue 6.

Conventional cast partial denture was planned in this case rather than other alternatives like implant-supported prosthesis. Cast partial dentures would provide immediate rehabilitation improving the patient's psychological status with limited finances. In addition, the nature of mucormycosis would preclude the use of implant-supported prosthesis due to increase recurrence rate 6.

The stock tray with irreversible hydrocolloid was used for the primary impression as its viscosity could be altered depending on the requirement. Considering the extent of the defect the stock tray was modified with impression compound to support and ensure uniform thickness of alginate. Irreversible hydrocolloid impression material was preloaded on the defect before making an impression to record the undercut. Consistency of irreversible hydrocolloid was kept medium to ensure proper flow of impression material on the defect.

Various materials like caramel, ice, and sugar, ballon have been used to occupy the hollow section for the obturator which would eventually be removed and sealed 7. Alternatively, the two halves of the obturator would be processed separately and later joined 8. Regardless of the techniques used, autopolymerizing acrylic resins were used to seal or join the final prosthesis.

There is always a potential of monomer leaching out from this autopolymerizing acrylic resins which is cytotoxic to living cells 9. In addition, greater porosity, compromised mechanical properties has been reported when compared to

heat cure acrylic resin. Hence, heat cure acrylic resin was used to relin the final prosthesis.

CONCLUSION

Although the method in the case study presented was a variation of some previously described methods, its uniqueness is justified by its ability to fabricate a durable cast partial denture and a single-piece closed hollow bulb obturator. The added benefits of this technique included its simplicity in fabrication, shorter production times, and lower costs. The patient was given an obturator, which improved function by enhancing mastication, phonetics by introducing resonance, and aesthetics.

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REFERENCES

1. Singh M, Limbu IK, Parajuli PK, Singh RK. Definitive Obturator Fabrication for Partial Maxillectomy Patient. *Case Rep Dent.* 2020;2020:6513210.
2. The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent.* 2017;117(5S):e1-e105.
3. Rani S, Gupta S, Verma M. Hollow Bulb One Piece Maxillary Definitive Obturator - A Simplified Approach. *Contemp Clin Dent.* 2017;8(1):167-70.
4. Wu YL, Schaaf NG. Comparison of weight reduction in different designs of solid and hollow obturator prostheses. *J Prosthet Dent.* 1989;62(2):214-7.
5. Krishna CH, Babu JK, Fathima T, Reddy GV. Fabrication of a hollow bulb prosthesis for the rehabilitation of an acquired total maxillectomy defect. *BMJ Case Rep.* 2014;2014.
6. Aeran H, Sehwat N. Reconstructing post covid mucormycosis maxillary defect using

- a closed hollow bulb obturator: a case report. *Guident* 2022;15(9):24-27
7. Chincholikar S, Lalwani G. Rehabilitation of post Covid mucormycosis maxillectomy defect with hollow obturator: a case series. *IP Ann Prosthodont Restor Dent.* 2022;8:38-41.
 8. Srivastava N. A two-piece sectional definitive obturator: a clinical report. *J Dent Health Oral Disord Ther.* 2016;4(6):5.
 9. Raszewski Z. Influence of polymerization method on the cytotoxicity of three different denture base acrylic resins polymerized in different methods. *Saudi J Biological Sci.* 2020;27(10):2612-6.