# Prosthetic Rehabilitation of Patient with Total Maxillectomy with Hollow Bulb Closed Obturator and Cast Partial Denture: A Clinical Report

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## Abstract

Total maxillectomy is the complete resection of one of the two maxillae or resection to the midline. Surgical intervention creates communication between the oral cavity, nasal cavity and maxillary sinus. Postsurgical maxillary defects predispose the patient to hypernasal speech, leakage of food bolus and liquids into the nasal cavity, impaired mastication and various degrees of cosmetic deformities. Prosthodontic rehabilitation with obturator prosthesis restores the missing structures and acts as a barrier between the communications among the various cavities. Hollow bulb obturator with the maximum coverage of the defect aids in retention, stability, support with improved speech resonance and reduced weight on the unsupported side.

This clinical report presents the prosthetic management of a patient having total maxillectomy on left side with definitive hollow bulb closed obturator and cast partial denture on the maxilla.

**Key words:** Defects; Definitive hollow bulb closed obturator; Prosthetic rehabilitation; Total maxillectomy.

## Introduction

Total maxillectomy is the complete resection of one of the two maxillae or resection to the midline.[1] Patient with acquired maxillary defect should be provided with obturator prosthesis that is comfortable, restores adequate speech, deglutition, mastication, and acceptable cosmetically.[2] Prosthodontist plays an important role in rehabilitation of such defects, as good functional results have been reported for patients provided with obturator prostheses postsurgically.[3]

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The Glossary of Prosthodontic Terms defines obturator as "a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/soft tissue structures".[4] Bulb portion, which accommodates the defect area must add retention, stability, adequate seal, so it should be made hollow considering the defect. Superior surface of obturator can be either left open or closed. If obturator is left open, nasal secretions accumulate leading to odor and added weight.[1]

This case report describes the fabrication of one piece closed hollow bulb definitive obturator prosthesis for a patient with acquired maxillary defect (Aramany's class I) on left side.

## Clinical Report

A 64-year-old male, was referred to the Department of Prosthodontics, Kathmandu University School of Medical Science, Dhulikhel Hospital, Dhulikhel for the prosthetic

rehabilitation of postmaxillectomy defect done before a year resulting from squamous cell carcinoma of left maxillary sinus extending into oral cavity. Patient complained of difficulty in chewing food, leakage of fluid into nasal cavity, impairment of speech and compromised facial appearance. A complete review of patient's history and oral examination was done (Fig. 1). Intra-oral examination revealed a well healed surgical defect in the maxilla involving part of the hard palate, alveolar ridge, and maxillary tuberosity creating an oroantral communication extending from the mesial of right central incisor to left second molar which indicated Aramany class I defect.[5]

The treatment plan was made to rehabilitate this patient with a definitive obturator with a cast metal framework.

***Procedure***

A stock metal perforated impression tray (Samit, New Delhi, India) of proper size was selected. Modification was done by using impression compound (Samit, New Delhi, India). Primary impression of maxillary and mandibular arches were made with alginate (Coltene, India) (Fig. 2 and Fig. 3) and poured with Type II dental plaster (Kaldent,India) to obtain primary cast (Fig. 4).The undercut of the defect over the cast was blocked using modelling wax (Pyrex, India) (Fig. 5).

Diagnostic casts were surveyed, and a cast partial framework was planned of tripodal configuration with the following components.[6] Embrasure clasps in relation to 14, 15 and 16, 17, cingulum rest on 11 and 13, I- bar and proximal plate in relation to 11, modified unilateral palatal type of major connector extended till middle third of palatal surfaces of teeth.

After the fabrication of custom tray on primary cast with autopolymerizing acrylic resin (Dentsply, India), border molding of defect area was done with green stick impression compound (DPI pinnacle tracing sticks, India). Mouth preparation for cast partial framework was done before making final impression with putty (Aquasil, Dentsply, Germany) and light body polyvinylsiloxane impression material (3M ESPE, Germany) (Fig. 6) and master cast was then poured in die stone (Kalrock, kalabhai,Mumbai) (Fig. 7). Wax pattern was adapted on refractory cast (Fig. 8) and casting of metal framework was carried out. Trial of finished and polished framework using Fit checker (Xantopren VL plus, polysiloxane, Germany) was done. Autopolymerizing acrylin resin was adapted to extend into the defect area with cast partial framework in master cast (Fig. 9) for border molding (Fig. 10) and final impression was made with light body polyvinyl siloxane (3M ESPE, Germany) (Fig. 11) of the defect for the altered cast technique (Fig. 12 and Fig. 13). Boxing of the impression was done and poured with the die stone (Fig.14). Jaw relation was done along with the bite record using polyvinyl siloxane bite registration material (3M ESPE,Ramitec,Germany) after fabrication of occlusal rim with modeling wax (Orchid,Nepal) on the denture base made using autopolymerizing acrylic resin. (Fig. 15).Upper and lower casts were mounted on the Hanau wide vue semiadjustable arcon articulator with these records (Fig. 16). Teeth arrangement (Fig. 17), wax try-in (Fig. 18) was done by conventional manner. After try-in, waxed up obturator was processed.

**Processing of obturator**

The method is based on the use of two flasks with interchangeable parts.[7, 8, 9]

Two identical flasks are required with their upper and lower halves interchangeable and should fit accurately. Maxillary denture in the lower half of the flask was invested. (Fig. 19.) Upper half of the flask was positioned on the lower half and invested. Dewaxing was done in the usual manner (Fig. 20).

*Waxing the impression surfaces of the prosthesis in the lower half of the flask*: Undercuts along the floor and walls of the defect area was blocked out with wax to minimal thickness of 3 mm. Area of the palate and retentive portion of framework was covered with a 3 mm layer of wax (Fig. 2). Waxing a ledge around the periphery of the defect to leave an opening to the defect area and also over teeth was made.

*Investing for the second half of the obturator:* Upper half of another flask was placed onto the waxing of the hollow defect and invested with plaster and wax was boiled out. The flask was separated and plaster index of the hollow section was smoothened (Fig. 22). Putty impression material (Vinyl polysiloxane, Extreme putty, Germany) was placed over teeth to prevent the acrylic flow into it and trial closure was done (Fig. 23). Packing and processing of the hollow section and palate was done with heat-polymerized acrylic resin (Pyrax, India) (Fig. 24).

The processed flasks were separated. Two halves of first flask was joined. This unites the two previously processed segments (lower half of flask with hollow cavity lined by heat cure acrylic resin and upper half of flask with teeth) ensuring metal to metal contact. The center space was then filled with table salt to fill the concavity (Fig. 25). Upper portion of the cavity was also fabricated with heat cure acrylic resin extending from the margins covering over the salt in second processing. New mix of heat cure acrylic resin was made and placed along the edges of the two parts and over the region where salt was placed. Trial closures were done to ensure sufficient acrylic resin (Fig. 26). Curing was completed in usual manner. Deflasking was done. And prosthesis was removed out. Hole was made in the superior/ impression surface of the defect in acrylic resin using a bur (Fig. 27). Table salt inside the space was removed by flushing water under high pressure by syringe. This access holes was then sealed with autopolymerizing acrylic resin. Finishing and polishing of the obturator prosthesis was done.

It was then inserted into the patient's mouth after intraoral adjustments (Fig.28 and Fig.29) Occlusal adjustments were done to make passive contacts on defect side. The patient was happy and satisfied with his improved function, speech, and esthetics. The patient was trained to do insertion and removable of the prosthesis and instructed to masticate on the non-resected side only. The patient was instructed about the maintenance of the prosthesis and periodic recall check-up. Follow up was done after 1 week, 1 month, 3 months and 6 months. Pressured and painful areas were checked with fit checker. And relining was also done with soft reliner (GC-COE-SOFT, America). During his follow-up visits, functional, esthetic and psychological comfort of the patient could clearly be discerned.

*Figure 1: Intraoral view*

*Figure 2: Primary impression (maxilla)*

*Figure 3: Primary impression (mandible)*

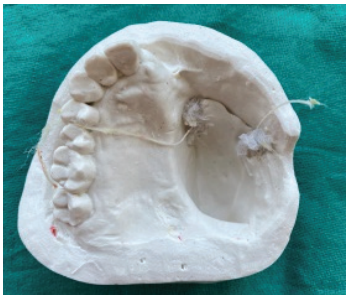

*Figure 4: Primary cast*

*Figure 5: Undercuts blocked with modelling wax*

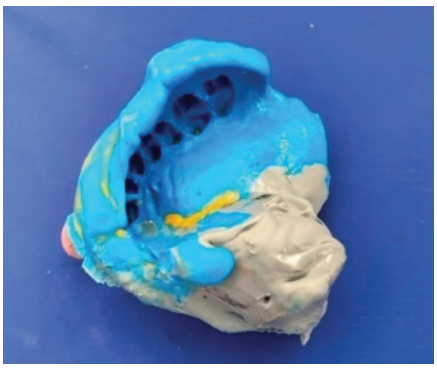

*Figure 6: Final impression*

*Figure 7: Master cast*

*Figure 8: Wax pattern for cast partial denture*

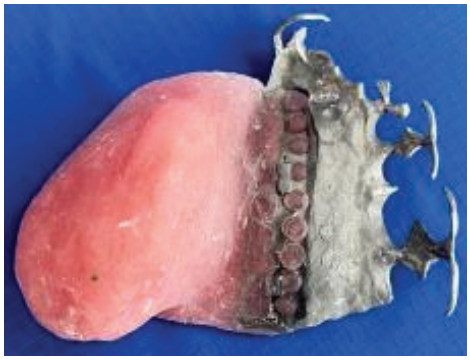

*Figure 9: Metal framework with acrylic resin covering the defect*

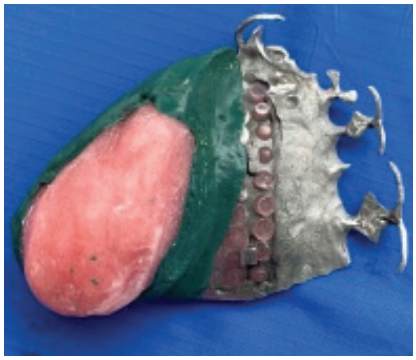

*Figure 10: Border molding*

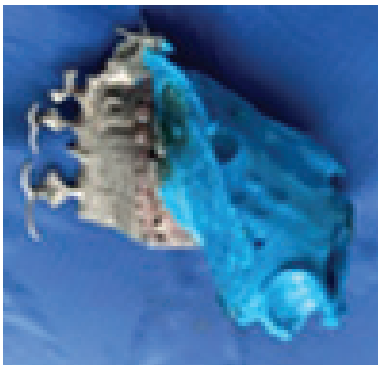

*Figure 11: Final impression with cast partial framework*

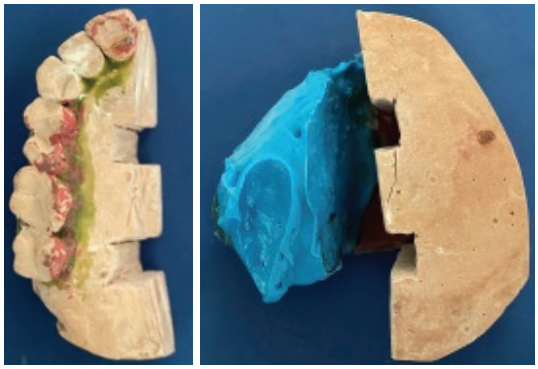

*Figure 12 and 13: Altered cast technique*

*Figure 14: Cast obtained from altered cast technique*

*Figure 15: Jaw relation and bite record*

*Figure 16: Casts mounted on hanau wide vue articulator*

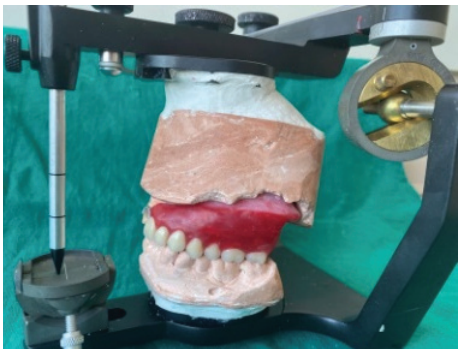

*Figure 17: Teeth arrangement*

*Figure 18: Try-in*

*Figure 19: Investing in lower flask*

*Figure 20: Dewaxing of first flask*

*Figure 21: Wax adapted in the defect area, retentive portion of framework and over surfaces of teeth*

*Figure 22: Dewaxing done after second investing by placing top of another flask on lower part of first flask*

*Figure 23: Putty placed and trial closure done*

*Figure 24: After first processing with heat cure acrylic resin, lower part of flask and upper part of both flasks*

*Figure 25: Concavity of defect in lower flask filled with table salt*

*Figure 26: Final processing with heat cure acrylic resin in lower and upper part of first flask*

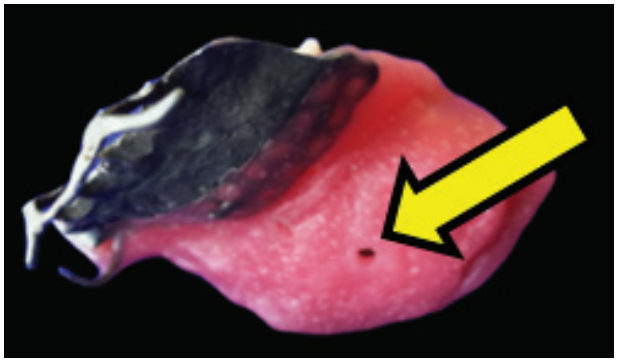

*Figure 27: Hole (indicated by arrow) made on impression surface of obturator acrylic resin*

*Figure 28: Post- insertion, frontal view*

*Figure 29: Post- insertion, palatal view*

*Figure 30: Extraoral frontal view, pre and post insertion of obturator*

## Discussion

Maxillary defects are created by surgical treatment of benign or malignant neoplasms, congenital malformation and by trauma. The size and location of the defects infuence the degree of impairment and difficulty in prosthetic rehabilitation. Lack of support, retention, and stability are common prosthodontic treatment problems for patients who have had a maxillectomy. Obturator prosthesis plays a crucial role in the recovery of oral function in postsurgical maxillectomy patients. It should be made hollow to aid speech resonance, to reduce the weight on the unsupported side, possibly to provide facial aesthetics and to act as a foundation for a combination of extraoral prostheses in communication with the intraoral extension.[11] Wu and Schaaf found that hollow maxillary obturator prosthesis reduced the weight of the prosthesis from 7% to 33%. Superiorly it can be open or closed. If the obturator is left open, nasal secretions accumulate leading to odour and added weight, inability to obtain support from the superior aspect in the defect area.[1]

A closed hollow bulb obturator was fabricated in this patient since primary closure of the defect with surgical reconstruction was not feasible .Hollow bulb obturator was more hygienic, enabled easy maintenance with reduced weight of the prosthesis and more importantly, maximum coverage of the defect which further aided in retention, support and stability. Lost salt technique has been utilized to achieve the hollow part of the obturator since it is less technique sensitive, easy and economical with assurance of approximate wall thickness. Cast partial framework was planned for prosthesis as it increases longevity and durability of the prosthesis.

## Conclusion

In the presented case report, a method to provide long- lasting cast partial denture along with one piece closed hollow bulb obturator is described. The obturator provided to the patient increased function by providing better masticatory efficiency, phonetics by adding resonance, and also improved the esthetics. Though it is difficult to improve the quality of life for hemimaxillectomy patients compared with patients with conventional prostheses, this can be achieved with skill, knowledge, experience of specialists, if a team approach is adopted and if the patient is kept under regular review.

## References


1. Beumer J, Curtis TA, Marunick MT. Maxillofacial Rehabilitation: Prosthodontic and Surgical Consideration.Third Edition
2. Desjardins RP. Obturator prosthesis design for acquired maxillary defects. J Prosthet Dent.1978; 39(4):424-35. doi: 10.1016/s0022-3913(78)80161-9. PMID: 273694.
3. M. M. Buzayan, Y. T. Ariffin, and N. Yunus. Closed hollow bulb obturator-one-step fabrication: a clinical report.J. Prosthodont.2013; 22(7):591–5. https://doi.org/10.1111/jopr.12036
4. K. J. Ferro, S. M. Morgano, C. F. Driscoll et al.The glossary of prosthodontic terms: Ninth Edition. J Prosthet Dent.2017;117(5S):e62. doi: 10.1016/j.prosdent.2016.12.00. PMID: 28418832
5. Aramany M.A. Basic principles of obturator design for partially edentulous patients. Part I: classification. J Prosthet Dent.1978; 40(5):554–7. https://doi.org/10.1016/0022-3913%2878%2990092-6
6. Aramany M.A. Basic principles of obturator design for partially edentulous patients. Part II: design principles. J Prosthet Dent.1978; 40(6):656-62. doi: 10.1016/0022-3913(78)90065-3. PMID: 364026.
7. Brown K.E. Fabrication of a hollow-bulb obturator. J Prosthet Dent.1969; 21(1):97-103. https://doi.org/10.1016/0022-3913(69)90035-3
8. El Mahdy A.S. Processing a hollow obturator. J Prosthet Dent.1969; 22(6):682-6. https://doi.org/10.1016/s0022-3913(69)80013-2
9. Karen S. McAndrew, Sandra Rothenberger, Glenn E. Minsley.An innovative investment

method for the fabrication of a closed hollow obturator prosthesis. J Prosthet Dent.1998; 80(1):129-32. https://doi.org/10.1016/S0022-3913(98)70098-8

10. Keyf F. Obturator prostheses for hemimaxillectomy patients. J.Oral Rehabil.2001; 28(9), 821–9.