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**Dr. Gopika KK**

Final Year MDS student,  
Department of Prosthodontics,  
Government Dental College,  
Trivandrum, Kerala, India

**Dr. Harsha Kumar K**

Professor and Head, Department  
of Prosthodontics, Govt. Dental  
College, Trivandrum, Kerala,  
India

**Dr. R Ravichandran**

Professor, Department of  
Prosthodontics Govt. Dental  
College, Trivandrum, Kerala,  
India

**Dr. Kavitha Janardanan**

Associate Professor, Department  
of Prosthodontics, Govt. Dental  
College, Trivandrum, Kerala,  
India

**Corresponding Author:**

**Dr. Gopika KK**

Final Year MDS student,  
Department of Prosthodontics,  
Government Dental College,  
Trivandrum, Kerala, India

## **Fabrication of a hollow open bulb obturator prosthesis using double investment technique: A case report**

**Dr. Gopika KK, Dr. Harsha Kumar K, Dr. R Ravichandran and Dr. Kavitha Janardanan**

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### **Abstract**

Surgical treatment of head and neck neoplasms has a major impact on patients in terms of their quality of life. Maxillary defects can result in speech impairment, mastication and swallowing difficulties as well as can affect facial esthetics. A prosthodontist can successfully provide a solution to all these problems that hamper the social well-being of a patient by delivering a well-fitting prosthesis. The clinician must also give special emphasis to the reduction of weight to enhance retention and stability. A case report on rehabilitating a hemi-maxillectomy patient with a definitive cast partial obturator is presented here.

**Keywords:** Hemi-maxillectomy, cast partial obturator, prosthesis

### **Introduction**

Surgical therapy of benign or malignant tumors as well as trauma can result in maxillofacial defects. Prosthetic rehabilitation of such defects has been experimented with for many years. The early maxillofacial obturators were meant to close congenital rather than acquired defects and aimed at just adequate retention. The innovative designs of early initiators took care of these objectives. Eventually, newer and better concepts evolved. A comfortable, cosmetically admissible prosthesis that restores the impaired physiologic activities of speech, deglutition, and mastication constitute the basic objectives of prosthodontic care. The most important objective of prosthetic rehabilitation as highlighted by De van is the preservation of the remaining teeth and tissues.

These fundamental objectives must be applied to the patient requiring maxillofacial rehabilitation. A maxillary defect can create increased problems in prosthesis design that challenges the prosthodontist's capability to attain primary prosthodontic objectives. The achievement of these objectives will be affected greatly by both size and location of the defect as well as the integrity of the remaining structures. The preoperative prosthodontic evaluation of patients who are to undergo maxillary resection is very crucial. Proper communication between the surgeon and the prosthodontist would result in the fabrication of a functionally superior obturator. Rehabilitation of the form and function in patients with maxillary defects can be attained by an obturator or by surgical reconstruction. Owing to the ease of fabrication and maintenance, the maxillary obturator prosthesis is preferred over the other.

A definitive obturator can be fabricated approximately 3-6 months following surgical resection if no tissue changes are anticipated. This article presents the rehabilitation of a patient with Aramany Class 1 defect where definitive prosthetic rehabilitation is carried out with a hollow open bulb obturator.

### **Case Report**

A 63-year-old male patient presented to the Department of Prosthodontics in Government Dental College, Thiruvananthapuram with a defect on the posterior right side of the palate. On intraoral examination of the patient, a maxillary defect was seen on the right side of the palate. The defect showed its extension from the central incisor region to the posterior aspect of the hard palate. The mediolateral extension was from midpalate region to the buccal mucosa. The patient had a partially dentate maxillary arch with 7 teeth (22, 23, 24, 25, 26, 27, 28).

The patient had a completely set of dentition in the mandibular arch. A maxillary hollow bulb cast partial obturator was planned for this patient.



Fig 1: Preoperative photographs

**Procedure**

Diagnostic impressions of both maxillary and mandibular arches were made using irreversible hydrocolloid impression material (Vignette chromatic alginate, Dentsply Sirona). A wet gauze was placed in the defect to prevent the inadvertent flow of impression material into unwanted anatomical sites. The impression of the maxillary arch including the defect was made using irreversible hydrocolloid impression material. The relevant intraoral structures on the non-resected side and part of the resected defect were recorded in the primary impression. The impressions were poured in dental stone to obtain the primary casts. Surveying of the cast was done and the design of the future prosthesis was decided. As per the planned design, the obturator prosthesis was to be retained by 2 embrasure clasps and canine extension. Rest seats were prepared on molars and premolars before making secondary impressions for the fabrication of the metal framework. A secondary impression was made using putty and light body impression material along with admix compound to record the borders of the defect. The master cast was poured in Type IV stone. The metal framework was fabricated and inserted into the patient's mouth to evaluate the fit.



Fig 2: a) Secondary impression, b) Metal framework trial

Wax occlusal rims were fabricated after evaluating the proper fit of the framework. Occlusal vertical and horizontal dimensions were determined and the casts were articulated. Artificial teeth were arranged to contours established by the wax rims. The waxed-up denture was tried and checked for retention, stability, and comfort in the mouth. Phonetics was a cause of concern, so the denture movements were rechecked during phonation, and corrections were made accordingly.



Fig 3: Wax try in

**Double investment method**

Before commencing the laboratory procedures two same-size transposable flasks were selected.

**Steps of making open bulb obturator**

- Modelling wax was adapted to the walls of the defect.
- Following this, dental plaster was poured into the defect.
- After the complete set of plaster, the wax was removed and space was created for the open bulb obturator. The framework was kept on the cast and wax up was done for processing of the obturator.
- Then flasking and dewaxing were carried out in the usual manner in one of the two transposable flasks.
- After dewaxing, the counter flask had the teeth and the base flask contained the defect in the cast along with the framework.
- One layer of modelling wax was adapted over the metal framework and invested with a similar counter flask.
- Dewaxing and packing were done followed by acrylization with heat-cured acrylic resin. Thus, the open bulb was cured initially.

**Hollowing Procedure**

A layer of modelling wax was adapted over the teeth present in the counterpart. A putty impression is made and the area over the teeth was replicated. The putty impression of the space to be hollowed out was duplicated in soap. A soap spacer was placed and packing was done with the base flask containing the cured open bulb, ensuring proper flask closure without the soap getting displaced. Processing was done with heat-polymerized denture base resin. The maxillary hollow open bulb obturator was trimmed and polished.

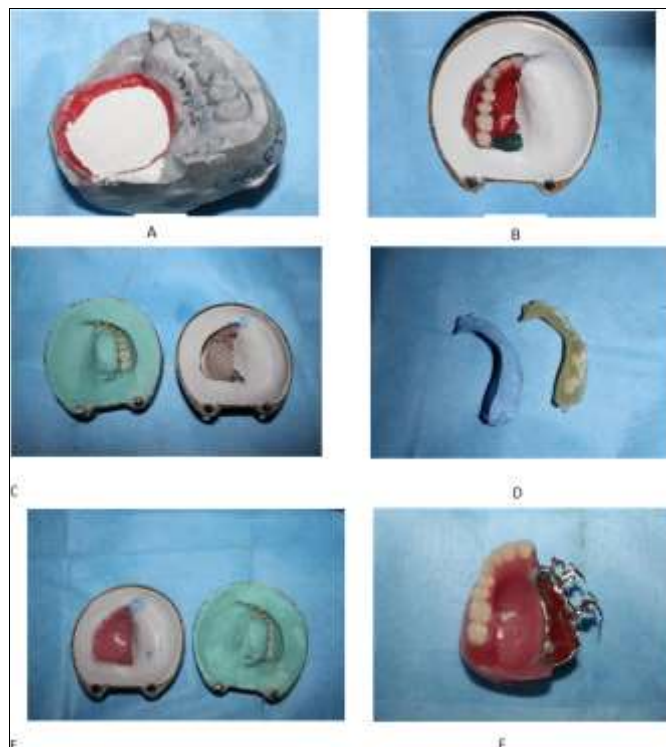


Fig 4: Double investment method and hollowing of obturator

The evaluation was done intraorally and necessary adjustments were made. Oral hygiene instructions were given and the patient was advised to follow them regularly. Follow-up appointments were recommended every 3-6 months to evaluate the fit of the prosthesis.



**Fig 5:** Postoperative photographs: Frontal and Profile views

### Discussion

The case presented here had a well-healed defect. Therefore, a definitive hollow bulb obturator was planned for rehabilitation. A cast partial framework was planned as it increases the longevity and durability of the prosthesis. The double investment technique described here offered a superior approach to other methods due to its simplicity and economic feasibility from the patient's perspective. This method maintains the integrity of the obturator during final closure. As the defect is huge, the weight of the prosthesis can affect the retention and stability. Hollowing significantly reduces weight and provides better patient comfort. Also, the decreased weight of the prosthesis improves the physiologic function as it does not cause excessive atrophy in muscle balance. An open bulb was planned to attain better phonetics.

### Conclusion

This technique provides a durable cast partial denture along with a one-piece hollow open bulb obturator justifying its novelty among other techniques. The obturator provided to the patient improved the function by increasing its resonance and also enhanced the aesthetics.

### Conflict of Interest

Not available

### Financial Support

Not available

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