

# Rehabilitation of a partial maxillary defect with magnet retained two-piece hollow bulb obturator

Suryakant C Deogade, Sneha S Mantri,

Department of Prosthodontics, Hitkarini Dental College and Hospital, Jabalpur, Madhya Pradesh, India

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## ABSTRACT

A restricted mouth opening in hemimaxillectomy patients can create a significant problem with insertion and removal of the obturator prosthesis. A two-piece obturator is an alternative management for such patients. The treatment of a patient with a hemimaxillectomy due to squamous cell carcinoma is presented in this clinical report. A sectional obturator prosthesis retained by magnets was fabricated to deal with trismus, fibrosis, and microstomia. The patient's esthetic and functional expectations were satisfied. The new generation of magnets with improved technology provides sufficient denture retention for clinical application. However, further follow-up may be necessary to ascertain the long-term usefulness of the magnet-retained obturator prosthesis, because of corrosion and further loss of magnetism.

**KEYWORDS:** Auto-polymerizing resin, hemimaxillectomy, magnets, maxillofacial prosthodontics, microstomia, sectional prosthesis

## Introduction

Cancer of head and neck region can bring a drastic decline in patient's quality of life (QOL).<sup>[1]</sup> Rehabilitation of such patients requires a well coordinated multidisciplinary approach to restore their physical, functional and psychological needs.<sup>[2-4]</sup> Maxillectomy or maxillary resection causes an anatomic defect that allows the oral cavity, maxillary sinus, nasal cavity and nasopharynx to become one confluent chamber. Lack of anatomic boundaries creates disabilities in speech and deglutition. Prosthetic intervention, with maxillary obturator prosthesis is necessary to restore the contours of the resected palate and to recreate the functional separation of the oral cavity and sinus and nasal cavities.<sup>[5]</sup>

Patients with microstomia due to pathology or extensive surgical procedures often exhibit severely limited ability to open the mouth. Making prostheses for such patients is

difficult or almost impossible and leads to compromised prostheses. A two-piece obturator retained with a magnet is an alternative treatment modality for such conditions.<sup>[6-10]</sup>

Magnets are efficient means of providing adequate retention and stability in such sectional prosthesis because of their small compact size and strong attraction forces. Magnets are fixed to the basic prosthesis and the sectional one, in such a way that the opposite poles are attracted towards each other retaining both the sections.

This clinical report describes the prosthetic treatment for a head and neck cancer patient with a partial maxillary defect having a limited mouth opening by a magnet retained two-piece hollow bulb obturator.

## Case Report

A 70-year-old man visited the Department of Prosthodontics, for the fabrication of definitive obturator prosthesis. The patient was wearing interim obturator prosthesis for four months. He underwent a right hemimaxillectomy procedure to treat squamous cell carcinoma. The patient presented with an obvious and typical nasal twang and he was experiencing difficulty in speech and deglutition. Besides, the patient needed a denture to restore his lost teeth and an obturator

### Address for correspondence:

Dr. Suryakant C Deogade,  
Flat No-502, Block-D, Apsara Apartment, South Civil Lines,  
Jabalpur - 482001, Madhya Pradesh, India.  
E-mail: dr\_deogade@yahoo.co.in

which would overcome his defect and make things easier in terms of mastication, deglutition, and communication.

On extraoral examination, it was found that the right half of the patient's face was disfigured, thereby, stretching the right labial and the nasal regions. Intraoral examination revealed a large but well healed defect on the right side of the maxilla along with loss of dentition on the same side [Figure 1]. The patient had a severely restricted mouth opening of 18-20 mm due to post-surgical scar formation and radiation therapy. It was clearly evident that the oral tissues, the palatal bone and the remaining residual ridge were incapable of supporting the prosthesis. Owing to such unfavorable conditions, it was necessary to plan a definitive prosthesis that would be light and easy to wear. The weight of the prosthesis could jeopardize the health of the tissues and compromise the function of the prosthesis. Hence, the fabrication of a definitive prosthesis was planned in the form of a two-piece hollow bulb obturator retained with magnets. The fabrication was carried out into the following steps: (1) fabrication of the hollow bulb, and (2) fabrication of the oral part of the prosthesis.

#### **Fabrication of the hollow bulb**

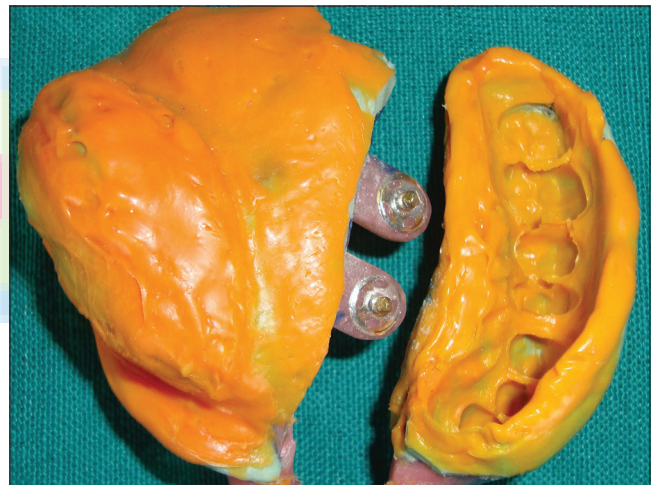
A suitable perforated stock tray was selected whose flange on the defect side was shortened until it could be inserted in the patient's mouth and the impression was made with irreversible hydrocolloid (Dentalgin; Prime Dental Products, Mumbai, India). The depth of the defect could not be recorded sufficiently due to restricted mouth opening. After retrieval of the tray, the cast was poured with type II gypsum material. A sectional impression tray was designed with the help of an auto-polymerizing acrylic resin (DPI cold cure; Dental Products of India, Mumbai, India). The definitive impressions of each half of the arches were carried out separately with the combination of medium and light viscosity poly (vinyl siloxanes) impression material (Reprosil; Dentsply De Trey GmbH, Konstanz, Germany) [Figure 2]. Conventional prosthodontics protocols of boxing and pouring the impression were used with type III gypsum material (Kalstone; Kalabhai Karson, Mumbai, India) to create a definitive cast. A duplicate cast is also made for the fabrication of closed hollow bulb separately.

A 19-gauge hard, round, stainless steel orthodontic wire (KC Smith and Co., Monmouth, UK) was manipulated to make "C" clasps on the left maxillary central incisor and second molar. A provisional record base was fabricated with autopolymerizing acrylic resin using a wax template technique.<sup>[1]</sup> The base plate wax was used to make an occlusion rim and to contour the palate arbitrarily [Figure 3]. A maxillomandibular relation record was made and mounted on a semi-adjustable articulator (Hanau H2; Teledyne Technologies, Los Angeles, CA) with the help of face-bow. Denture teeth (Acryrock; Ruthenium Group Dental Manufacturing, Badia Polesine, Italy) were arranged. The

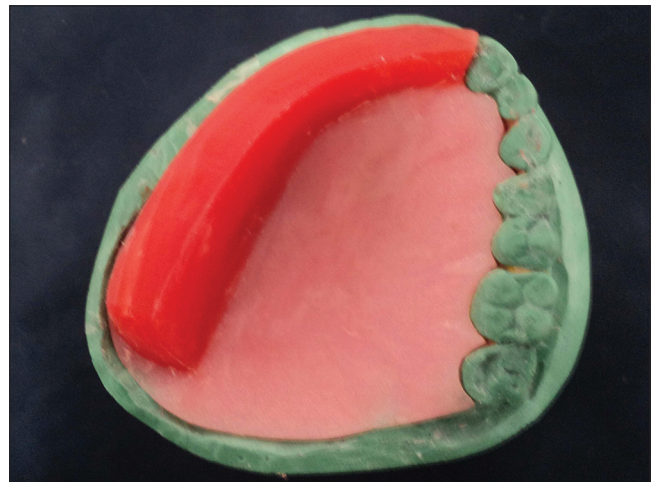
waxed-up denture was evaluated intraorally. Pressure indicating paste (Mizzy Inc, Cherry Hill, NJ) was placed on the arbitrarily contoured wax palate, and the vault was adjusted based on phonetics and swallowing. Though



**Figure 1:** Intra-oral defect



**Figure 2:** Sectional impression



**Figure 3:** Occlusal wax rim



the surgical defect was completely healed, the chance of recurrence of the lesion was suspected hence a cast metal framework was not planned.

A 2-mm thick base plate wax was then adapted over the defect part of the duplicated cast. Next, modeling clay is put into the defect area and the wax lid is prepared by keeping a tinfoil on the clay as a separating medium. The waxed-up denture then tried to seat over this, and then, the clay is removed and the wax lid then sealed on it [Figure 4]. The bulb is then removed carefully. After that, flasking and dewaxing procedures were completed. The mold space was packed with heat-polymerizing acrylic material (DPI, Mumbai, India), along with a pouch of salt to hollow the bulb by lost salt technique and curing procedures were performed according to manufacturer's instructions. After deflasking, the cured bulb was retrieved.

### Fabrication of oral part of the prosthesis

The hollow bulb and the waxed-up denture were then tried to seat on the definitive cast. The waxed-up denture was then sealed and the prosthesis was then processed in heat-polymerizing acrylic. Care was taken to glue a cellophane sheet over the oral part of the bulb before packing to keep the separation from the oral prosthesis. Trimming, finishing, and polishing procedures were performed.<sup>[12]</sup>

The hollow bulb was adjusted to seat on the duplicated cast and the salt was removed by drilling a hole in the lid. Then a pair of commercially available cobalt-samarium magnet (Jobmasters, Randallstown, MD, USA), 5 mm in diameter and 2 mm in thickness [Figure 5] was positioned with the help of autopolymerizing resin and finishing and polishing carried out. The oral part of prosthesis was tried to seat on the definitive cast and the space to accommodate the counter-magnets was created. The bulb and the prosthesis were tried in the patient's mouth [Figures 6-8]. Occlusal errors were checked and corrected. Speech, comfort, retention and esthetics were examined. The patient was taught to insert and remove the prosthesis. Oral hygiene instructions were explained to the patient, and recall visits were scheduled on a regular basis for examination of the tissues and modification of the appliance.

### Discussion

Maxillofacial prosthetics is the branch of prosthodontics concerned with the restoration and/or replacement of the stomatognathic and craniofacial structures with prostheses that may or may not be removed on a regular or elective basis.<sup>[13]</sup> These defects may be due to surgical resection, trauma, pathology, or congenital malformation.<sup>[14]</sup>

The primary goal of the treatment of the maxillectomy defect is to give a prosthetic obturator which closes the defect



Figure 4: Wax lid sealed

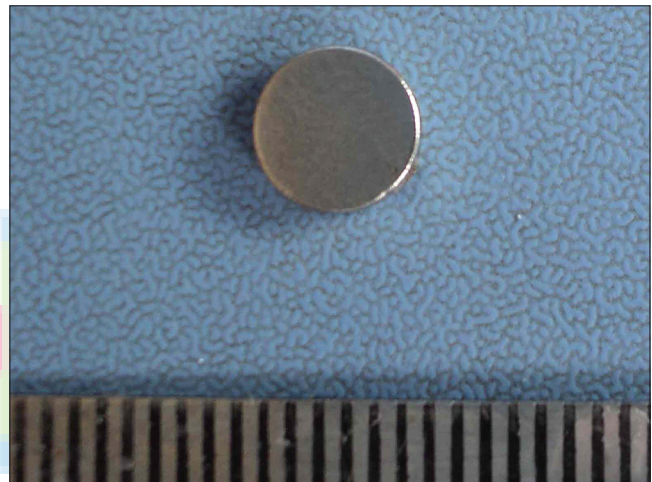


Figure 5: Cobalt-samarium magnet



Figure 6: Bulb in patient's mouth

and separates the oral cavity from the sino-nasal cavities. The size and location of the defects influence the degree of impairment and difficulty in prosthetic rehabilitation.<sup>[15]</sup> The



**Figure 7:** Prosthesis and bulb

present case is a classical Armany's class I defect which is unilateral; the entire palate on right side was resected along the midline, and the teeth on left side were kept intact.<sup>[16]</sup> The periodontal condition of the remaining teeth was good with satisfactory oral hygiene practice by the patient. The hollow bulb design was used to reduce the weight of the prosthesis. Hollow bulb reduces the weight of the obturator and decreases pressure to the surrounding tissues. It also helps in deglutition and encourages regeneration of the tissues. The lightweight of the obturator also does not cause excessive atrophy and physiological changes in muscle balance.<sup>[15]</sup>

The prosthodontist plays an important role in the rehabilitation of maxillofacial defects having limited mouth opening. Two-piece obturator prosthesis is an alternative treatment for the patient with severe trismus.<sup>[6-10]</sup> As the resection bed was treated postoperatively with radiation therapy, it resulted in limited oral opening, and insertion of one-piece obturator prosthesis was not possible. Thus, the treatment plan included the use of a magnet-retained two-piece hollow bulb obturator. The bulb was fabricated separately which could be fitted accurately in the patient's mouth. Providing improvement in speech was one of the priorities of the patient.

Magnets are used because of their small compact size and strong attractive forces. Few of the advantages being an ease of cleaning, ease of placement for both dentist and patient, automatic reseating, simplicity of the clinical and laboratory procedures, and constant retention with number of cycles.<sup>[17,18]</sup> However, the long-term durability of the magnets remains a problem cite. The cobalt-samarium magnet used in this case provided an essential retention and was cost effective for the patient. The patient was informed about the procedure and materials used, and informed consent was procured. The patient also accepted the need for frequent review calls after insertion of the prostheses. A constant follow-up on a



**Figure 8:** Prosthesis in patient's mouth

longitudinal basis is necessary, and further research on the magnetic field of commercially available magnets is needed.

## Conclusion

Subtotal maxillectomy present surgical and prosthodontic rehabilitative challenges. The problem experienced by hemimaxillectomy patients are reduced if a team approach is adopted and specialists are careful to apply skill and experience at all stages and keep the patient under regular review. Magnetic retention for maxillectomy patients is advantageous as it serves to dissipate lateral forces; however, over a period of time the magnets used intraorally require replacement due to lack of long-term durability in oral conditions. As we have used such intraoral magnets, the patient was informed about the limitations, and he was instructed to report to the clinic once in 6 months to replace the magnets if required.

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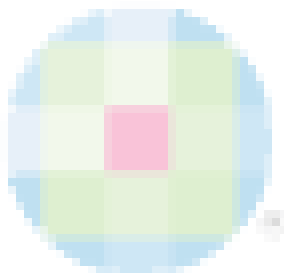
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