



**CASE REPORT**

**A Sectional Prosthesis using Magnets for a Partial Maxillectomy Patient – A Case Report**

Vijitha D<sup>1</sup>, Balasubramanian R<sup>2</sup>, Satish A<sup>3</sup>, Mahendra Kumar N<sup>4</sup>

**ABSTRACT:** Patients with restricted mouth opening after maxillectomy procedure, often complain of difficulty in placement and removal of the dental prosthesis. Such a problem can be overcome by fabrication of a sectional removable prosthesis. This article presents a fabrication procedure of prosthesis for a patient with restricted mouth opening after partial maxillectomy, where the two sections, namely, the hollow bulb and the conventional complete denture, were retained to each other by incorporation of magnets and magnet keepers in both the sections.

**Key words:** obturator, dental magnet, restricted mouth opening, maxillectomy

Restricted mouth opening is a common sequel to surgical resection of facial and oral neoplasm, burns, postoperative head and neck trauma, and scleroderma. Rehabilitation of these patients with a dental prosthesis is often challenging, as the removal and placement of the prosthesis is difficult.

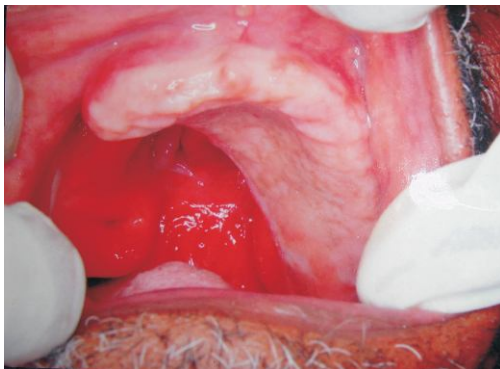
Fabrication of a sectional removable prosthesis has been suggested in the literature as a solution to the above problem [1]. Various techniques have been reported in retaining the sections of such prosthesis. The sections can be retained by use of Co-Cr frameworks with clasps [2,3] or by a post in one section that slides into stainless steel tubing in the second section of the prosthesis [4] or by the use of cast Co-Cr hinges and swing-lock attachments to fold and insert. [5,6] There are also few reports of sectional complete dentures retained with dental magnetic attachments.

The magnetic retention system is clinically useful for interrelating and retaining a segmented sectional prosthesis. Matsumura [7] used a dental magnetic attachment for a sectional removable partial denture. Nadeau J [8] described the use of combination of extra and intra-oral prostheses connected by magnets. Rene Brignoni [9] described the rehabilitation of a large mid-facial defect with a 3-piece prosthesis that included a sectional intra-oral obturator, extra-oral facial prosthesis and an intermediate retentive acrylic framework with the use of magnets.

This article presents a sectional prosthesis using magnets for a patient with restricted mouth opening after partial maxillectomy.

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A 58-year old, completely edentulous male patient, who



**Fig 1: Partial maxillectomy defect**



**Fig 2: Restricted mouth opening**

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**Fig 3: Hollow Bulb Obturator**



**Fig 4: Master cast with obturator in place**



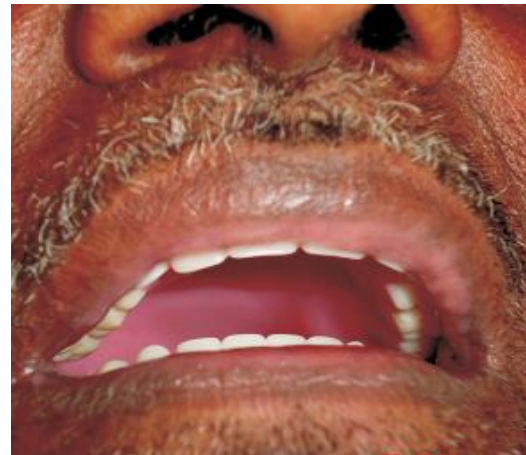
**Fig 5: Magnet keepers in the denture**



**Fig 6: Magnet keepers in the obturator**



**Fig 7: Obturator inserted**



**Fig 8: Dentures in place**

had undergone partial maxillectomy, (Fig-1) due to squamous cell carcinoma of palate 10 months back, reported to the Division of Prosthodontics, Raja Muthiah Dental College & Hospital, Annamalai University, Chidambaram, India. Post surgically, the patient had a restricted mouth opening of two fingers breadth (Fig- 2). He had difficulty in speaking, eating, swallowing and also had nasal regurgitation, resulting in profound psychological depression and severe weight loss.

On clinical evaluation, the defect was approximately 4x6 cm in size. It extended anteriorly up to 13 region and posteriorly it involved the soft palate. Medially the defect extended up to the mid-palatal region, and laterally up to the right buccal vestibule. As the defect was extensive the placement and removal of the interim obturator was very difficult.

Thus a two unit magnetically retained sectional obturator was planned for the definitive prosthesis. The patient was informed about the treatment plan and consent was obtained. Two sets of impressions of the maxilla were made using elastomeric impression material (Zetaplus, Zhermack, Italy.) with metal stock trays. In one of the stone casts obtained (Fig-3) a hollow bulb obturator was fabricated by the "Lost salt technique" for the defective site, to reduce the weight of the prosthesis.

The defect was blocked out in the second cast and a special tray (DPI-RR Cold Cure Dental products of India, Mumbai) was fabricated as for a conventional complete denture. With the hollow bulb placed in position in the patients mouth, peripheral sealing was obtained using elastomeric impression material (Zetaplus, Zhermack, Italy) of putty consistency. Final impression was made with light body impression material (Zetaplus, Zhermack, Italy). Master casts were poured with type III gypsum product (Denstone, Stone Plaster) for both upper and lower arch. (Fig-4)

Occlusion rims (Hindustan Modeling Wax No.2) were fabricated on the base plate adapted to the master casts. Face bow transfer was done to reduce occlusal error. The vertical dimension of occlusion was established. Centric relation was recorded by inter occlusal check record method. The maxillary and mandibular casts were then mounted on a semi- adjustable articulator (Dentatus ARH). Semi-anatomic acrylic teeth (Cosmodent Cross-linked acrylic teeth) of suitable size and shape were used in teeth arrangement.

A systematic wax try-in was done for the anterior and posterior teeth in separate appointments. The dentures were fabricated out of methacrylate copolymer resin base material (DPI Universal Heat Cure Denture Material, Mumbai) by the conventional compression moulding technique

Three samarium-cobalt magnets i.e., Dyna magnets (Dyna Dental Engineering, Bergen op Zoom, The Netherlands) were used. Tissue surface of the denture and the polished surface of the obturator were trimmed on corresponding opposite regions to gain additional space to accommodate the magnets and keepers. The magnets were cemented to the inferior surface of the hollow bulb with chemically activated acrylic resin(DPI RR Cold Cure DPI, Mumbai). The resin was allowed to cure completely. A thin circular plastic film of 2 mm diameter was placed over the magnet and the keeper was placed over it. This will reduce the likelihood of the self-polymerizing resin used to retain the magnet locking around the magnet keeper and the magnet. Denture prepared was large enough to accommodate the magnet keeper without dislodging it. Small amount of self-polymerizing acrylic resin was mixed and placed over the prepared tissue surface of the denture and it was placed over the magnet.(Fig- 5 & 6)

The hollow bulb was inserted in the patient's mouth and with that in place, the conventional maxillary denture was inserted (Fig-7 & 8). A final re-check of the occlusion was carried out with articulating paper. The Magnets and the keepers incorporated, helped to retain the two sections of the prosthesis. The removal and the placement of the prosthesis was also done in section, making the process easy for the patient.

## DISCUSSION

Edentulous patients with post-operative defects requiring prosthetic rehabilitation pose various challenges due to inadequate denture retention and stability that improves the quality of life. Following tumor resection in the maxilla, current reconstructive techniques include placement of a prosthetic obturator, restoration by local and regional flaps, and restoration by micro vascular free flaps.

An obturator is a prosthesis used to close a congenital or acquired opening in the palate. They also function in improving speech or swallowing, in support of tissue, or in retention of prosthesis. By decreasing the weight of

the obturator, the retention and stability may be optimized to allow the obturator to function comfortably. The superior surface can be either left opened or closed. The closed hollow bulb obturator prosthesis can prevent fluid and food collection and reduce air space. Open hollow bulb obturators often collect moisture and require frequent cleaning as the mucous accumulation results in bad odors and altered taste sensation.

Magnets have generated great interest in dentistry, and their applications are numerous. The first recorded use of magnets in prosthetic dentistry involved using the principle of repulsion of like-poles of magnets to maintain and improve the seating of complete dentures<sup>[10]</sup>. Using of magnets as an aid in retention of over dentures<sup>[11]</sup> was reported in the 1960s.

Earlier Alnicos alloys containing aluminium, cobalt, and nickel were in use, although cobalt platinum (Co-Pt) magnets were also available. At present, the commonly used magnetic material is the rare earth material containing, neodymium iron boron (Nd-Fe-B) and samarium cobalt (Sm-Co) magnets<sup>[12]</sup>

#### **The reasons for their popularity are**

1. Small size
2. Strong attractive forces
3. Unobtrusive placement in the prosthesis
4. Ease of cleaning
5. Ease of placement for both dentist and patient
6. Automatic reseating.

However, magnets have poor corrosive resistance within oral fluids and therefore require encapsulation within a relatively inert alloy such as stainless steel or titanium. Any contact with saliva will rapidly bring about corrosion and loss of magnetism.<sup>[13]</sup> To achieve a highly reliable system, other non-permeable sealing techniques such as laser welding are also being used. Laser welding is currently being used in commercial open-field systems such as the Dyna (Dyna Dental Engineering, Bergen op Zoom, The Netherlands) and Steco (Steco-system-technik, GmbH&Co, Hamburg, Germany) systems.<sup>[14]</sup>

#### **CONCLUSION**

The prosthesis provided for this patient in post maxillectomy defect, restored adequate function for him by separating the oral and nasal cavities, thus allowing adequate deglutition and articulation.

The patient felt his esthetics and functions were restored

close to normal and he also found placement and removal of the prosthesis easy. There was a considerable

**Address for correspondence:**

Dr. D.Vijitha MDS  
Reader,  
Dept of Prosthodontics  
Rajah Muthiah Dental College & Hospitals  
Annamalai University  
Chidambaram  
E-mail id: vijitha95@gmail.com

**Authors:**

<sup>1</sup> Reader, <sup>2</sup> Professor, <sup>3</sup> Reader, <sup>4</sup> Lecturer  
Prosthodontics, RMDCH, Annamalai University

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