

Obturator prosthesis for hemimaxillectomy patients

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ABSTRACT

Rehabilitation of hemimaxillectomy patients can be challenging. The most common problem with prosthetic treatment in such patients is in getting adequate retention, stability, and support. The size and location of the defect usually influences the amount of impairment and difficulty in prosthetic rehabilitation. The obturator prosthesis is commonly used as an effective means for rehabilitating hemimaxillectomy cases. In cases of large maxillary defects, movement of the obturator prosthesis is inevitable and requires a form of indirect retention to limit the rotation of the prosthesis. The goal of prosthodontics is rehabilitation of missing oral and extraoral structures along with restoration of the normal functions of mastication, speech, swallowing, appearance, and so on. Malignancies are common in the oral region, which are treated through surgical intervention. Surgical intervention creates communication between the oral cavity, nasal cavity, and maxillary sinus. In such cases, it is very difficult for the patient to perform various normal functions like mastication, swallowing, speaking, and so on. Prosthodontic rehabilitation with obturator prosthesis restores the missing structures and acts as a barrier between the communication among the various cavities.

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INTRODUCTION

The most common of all intraoral defects are in the maxilla, in the form of an opening into the antrum and nasopharynx. Defects in the maxilla may be divided into defects resulting from congenital malformations and acquired defects resulting from surgery for oral neoplasms. The opening produced maybe quite small or it may include any portion of the hard and soft palate, the alveolar ridges, and the floor of the nasal cavity. Postsurgical maxillary defects predispose the patient to hypernasal speech, leakage of fluid into the nasal cavity, and impaired masticator function.^[1]

The prosthesis needed to repair the defect is known as a maxillary obturator. An obturator (Latin: *obturare*, to stop up) is a disc or plate, which closes an opening

or defect of the maxilla as a result of a partial or total removal of the maxilla.^[1] The goals of prosthetic rehabilitation for total and partial maxillectomy patients include separation of oral and nasal cavities to allow adequate deglutition and articulation, possible support of the orbital contents to prevent enophthalmos and diplopia, support of the soft tissue to restore the midfacial contour, and an acceptable esthetic result.^[2] Prosthodontic management of palatal defects has been employed for many years. Ambroise Pare was the first to use artificial means to close a palatal defect as early as the 1500s. The early obturators were used to close congenital rather than acquired defects. Claude Martin described the use of a surgical obturator prosthesis in 1875. Fry described the use of impressions before surgery in 1927, and Steadman described the use of an acrylic resin prosthesis lined with gutta-percha to hold a skin graft within a maxillectomy defect in 1956.^[3,4] The indications for the use of an obturator are:

- To serve as a temporary prosthesis during the period of surgical correction
- To restore the esthetic appearance of the patient rapidly for social contact
- When surgical primary closure is contraindicated
- When the age of the patient contraindicates surgery

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- When the size and extent of the deformity contraindicates surgery
- When the local avascular condition of the tissues contraindicates surgery
- When the patient is susceptible to recurrence of the original lesion which produced the deformity.^[5]

Obturers for acquired defects of palate

Almost all acquired palatal defects are precipitated by the resection of neoplasms of the palate and paranasal sinuses. The extent of the resection is dependent on the size, location, and potential behavior of the tumor.^[6]

Prosthetic therapy for patients with acquired surgical defects of the maxilla can be divided into three phases of treatment with each phase having different objectives.^[6,7]

The surgical obturator

It is a base plate appliance which is constructed from the preoperative impression cast and inserted at the time of resection of the maxilla in the operating room. The surgical obturator provides a matrix on which the surgical packing can be placed. It maintains the packing in the proper relationship, thus ensuring close adaptation of the skin graft. It also reduces oral contamination of the wound during the immediate postsurgical period and may thus reduce the incidence of local infection, and the nasogastric tube may be removed at an earlier date.

The temporary obturator

The temporary obturator is constructed from the postsurgical impression cast which has an artificial palate and artificial ridge and generally has no teeth. The closed bulb extending into the defect area is hollow. The patient is usually seen every two weeks because of the rapid soft tissue changes that occur within the defect during the organization and healing of the wound. The new lining material is placed or changed. It is best to remove the entire old interim lining material because of porosity, leading to bacterial contamination and precipitation of undesirable odors and mucosal irritations. The periodic addition of interim lining material increases the bulk and weight of the obturator and this temporary material may become rough and unhygienic.

The definitive obturator

A definitive obturator is not indicated until the surgical site is healed and dimensionally stable and the patient is prepared physically and emotionally for the restorative care that may be necessary. Changes associated with healing and remodeling will continue to occur in the border areas of the defect for at least one year. Dimensional changes are primarily related to the peripheral soft tissues rather than to bony support areas.^[1,6,8]

Approximately six months after surgery, consideration may be given to the construction of a definitive obturator

prosthesis. It is constructed from the postsurgical maxillary cast. This obturator has a metal framework which acts as the palate and supports the teeth and the closed bulb which is hollow. Often the temporary obturator will need to function comfortably for as long as six months. The timing will vary depending on the size of the defect, the progress of healing, the prognosis for control of the tumor, the effectiveness of the present obturator, and the presence or absence of teeth. To reduce and improve adhesion and retention, a hollow obturator bulb is required for cleft palate prostheses and for dentures following maxillectomies.^[9]

CASE REPORT

A patient aged 60 years reported to the department of prosthodontics six months after surgery. The chief complaint was an inability to masticate food because of loss of some teeth. The patient gave a history of a deleterious habit of chewing tobacco since 20 years. Maintenance of oral hygiene was very poor. The patient was operated for ameloblastoma after being diagnosed by biopsy. The site of surgery was the maxillary right buccal sulcus area and a part of the hard palate on that side [Figure 1]. A few teeth were also removed on that side. Intraoral examination revealed complete healing of the operated site. The missing teeth were 15, 16, 17, and 18.

The treatment plan was fabrication of a definitive obturator.

- The primary maxillary and mandibular impression were taken with irreversible hydrocolloid material alginate (Zelgan 2002; Dentsply-India, Gurgaon, India) and the cast was poured with dental stone (type III) (Kalstone; Kalabhai Karson, Mumbai, India)
- The primary maxillary cast was surveyed and undercut areas were blocked
- Necessary mouth-preparation steps were carried out and the final impression was recorded using light-body addition silicone material (Aquasil LV; Dentsply International, Milford, Delaware, USA)
- This impression was poured with die stone (type IV) (Kalstone; Kalabhai Karson, Mumbai, India) and the cast was duplicated in refractory material and partial framework of the cast was fabricated with the help of various wax patterns
- Jaw relation was recorded with modeling wax (No. 2; MDM Corporation, New Delhi, India) and after teeth arrangement, a try-in was done [Figure 2]
- The prosthesis was cured with heat-cured acrylic resin (Trevlon; Dentsply, Gurgaon, India) and properly finished and polished [Figures 3 and 4]
- The prosthesis was finally inserted and the patient was educated regarding oral hygiene and future maintenance of the prosthesis [Figure 5].



Figure 1: Intraoral view showing the site of defect



Figure 2: Final try-in of prosthesis



Figure 3: Intaglio surface of finished and polished prosthesis



Figure 4: Polished surface of finished and polished prosthesis



Figure 5: Final insertion of prosthesis

DISCUSSION

A definitive obturator is not indicated until the surgical site is healed and dimensionally stable and the patient is prepared physically and emotionally for the restorative

care that maybe necessary. The obturator maybe displaced superiorly with the stress of mastication and will tend to drop without occlusal contact. The degree of movement will vary with the number and position of teeth, the size and configuration of the defect, the amount and contour of the remaining palatal area, height of the residual alveolar ridge, the size, contour, and lining mucosa of the defect, and the availability of undercuts. Lack of retention, stability, and support are common problems of treatment for patients who have had a maxillectomy.

The height and contour of the residual alveolar ridge and the depth of the sulcus are important in both the edentulous and the dentulous patient. A large, broad ridge or a ridge with a square or ovoid shape usually provide better retention, stability, and support than the small, narrow ridge with a tapering contour. The teeth are the greatest asset for providing retention of the obturator prosthesis. If sound natural teeth remain, the bracing components of the prosthesis framework can be used to minimize movement in all three directions. The number, position, and periodontal status of the remaining teeth

are the most critical factors in evaluating the amount of stress that the remaining teeth maybe able to absorb.

Obturator abutments adjacent to distal extension maxillary resection sites are subject to excessive rotational forces. Fixed splinting of some or all of the remaining teeth is indicated to provide dissipation of the stresses directed toward primary abutment teeth. When the remaining teeth are located unilaterally, the intracoronal retainer might provide some benefit in minimizing the amount of vertical movement of prostheses within the defect. Moreover, if the defect is small and the remaining teeth stable, intracoronal retainers might be considered. If the defect is large and some or all of the remaining teeth are weak, extracoronal retainers should be used. If the remaining teeth are not parallel with the walls of the defect, and if the palatal surfaces of the teeth are not adequate, guiding planes are provided to resist vertical displacement of the obturator and disengagement of the retentive clasp arms.^[6]

The basic principles of the design of removable partial dentures should be reviewed when designing the framework for an obturator. Major connectors should be rigid, occlusal rests should direct occlusal forces along the long axis of the teeth, guide planes should be designed to facilitate stability and bracing, retention should be within the physiological limits of the periodontal ligament, and maximum support should be gained from the residual soft tissues.

A lateral scar band results after surgical resection at about the level of the mucobuccal fold. Because of its lack of bone support, the lateral scar band also tends to stretch with continued use. This stretching may necessitate sequential additions to the prosthesis which maybe limited by cosmetic requirements and size and weight of the prosthesis. The height of the lateral wall of defect can be utilized for indirect retention. A high lateral wall of an obturator will undergo less vertical displacement with a given defect wall flexure than will a shorter prosthesis lateral wall.

The most important aspect of stability is occlusion. Maximal distribution of the occlusal force in centric and eccentric jaw positions is imperative to minimize the movement of the prosthesis and the resultant forces on individual structures. The stress created by lateral forces is minimized by the correct selection of an occlusal scheme, elimination of premature occlusal contacts, and wide distribution of stabilizing components.^[9,10] Acrylic resin teeth with a reduced occlusal contact area are indicated. Altering the cusp angle of posterior teeth influences the stability of the prosthesis placed on an edentulous resected maxilla. It maybe necessary to accept an occlusion that is not bilaterally balanced in

eccentric occluding positions for an edentulous maxilla or mandible. In edentulous patients, nonanatomic posterior teeth are preferred. The teeth are set in centric relation and adjusted to eliminate lateral deflective occlusal contact.

Dimensional changes in tissue continue to occur for at least a year secondary to scar contracture and further organization of the wound. The prosthesis is rebased to compensate for these changes. Changes in the tissues supporting a maxillofacial prosthesis maybe more rapid than in those supporting a more conventional prosthesis. Therefore, the occlusion and base adaptation must be re-evaluated frequently and corrected by selective grinding of the occlusion or rebasing of the prosthesis.^[11,12]

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, and experience of specialists. 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.

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