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MAXILLARY OBTURATOR PROSTHESIS: A REVIEW AND CASE SERIES

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Abstract

An extensive intraoral maxillofacial prosthesis presents challenges to the clinician in many ways. The problems encountered may include support and retention of the prosthesis. These problems arise due to unfavorable anatomical configuration of the defect. This unfavorable configuration may prompt the clinician to device alternate /additional means of support and retention. The aim of this article is to review these additional means of support and retention for the maxillary obturator prosthesis.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 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.

Keywords: Hemimaxillectomy, obturator, oroantral communication.

Introduction

The surgical treatment of maxillofacial malignancies often results in intraoral and extraoral defects. While small sized defects can be restored by reconstructive surgeries, prostheses are often necessary to mask the larger anomalies. The restoration of large maxillofacial defects pose challenges to Prosthodontists because of the limited means of retention, enhanced expectations about esthetics and the need to restore function to the best possible extent.A successful rehabilitation would go a long way in improving the quality of life of the patient.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 of oral neoplasms. The opening developed 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 masticatory function.

The prosthesis needed to cover the maxillary defect is known as a maxillary obturator. An obturator 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. 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. 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.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
- 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.

The following are the series of cases being done in Guru Nanak Dev Dental College and Research Institute, Sunam.

CASE 1

The patient had reported to the Department of Prosthodontics of GNDDC, Sunam,for management of bilateral inferior maxillectomy defect. The patient was experiencing difficulty in swal-

lowing and nasal regurgitation and was on liquid diet through nasogastric tube.

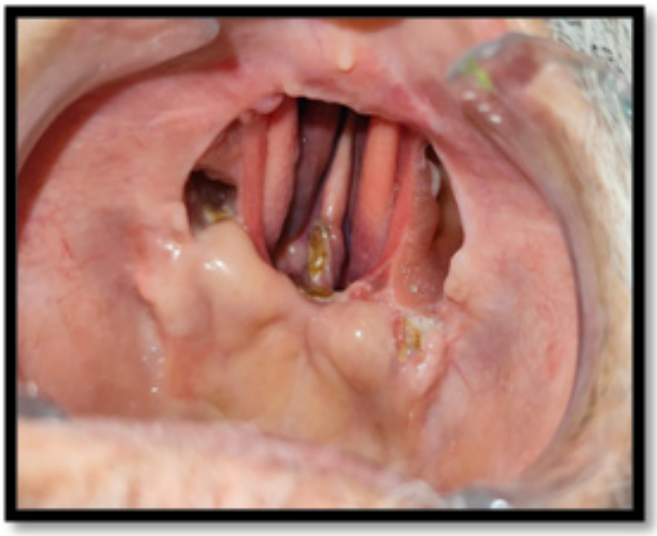


Fig 1: Intraoral pre operative bilateral inferior maxillectomy defect

Maxillary impression was made using putty consistency of addition silicone material in sectional manner. To prevent aspiration of material, a thin piece of gauge (2 × 2 cm) tied with dental floss was placed in the defect. The impression was poured in gypsum type IV material (diestone).

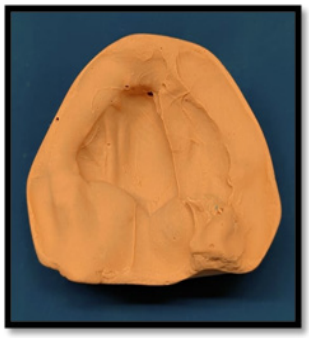
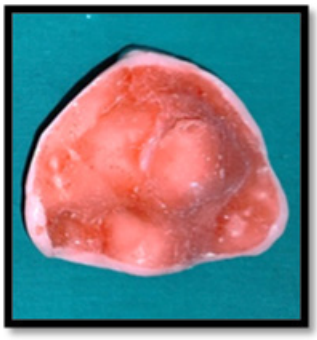


Fig 2: Primary impression **Fig 3: Primary cast**

The double wax spacer was adapted on the primary cast and custom tray using self-cure acrylic resin was fabricated. The fabricated custom tray was verified in the patient's oral cavity for the required adequate fit and extensions. After verifying the fit and required border extensions, the fabricated tray was coated with a thin layer of tray adhesive. The adhesive was air dried using three- way syringe. Border extensions were recorded using putty consistency of addition silicone material. After the border moulding, the wax spacer was removed and the acrylic tray was coated with tray adhesive.



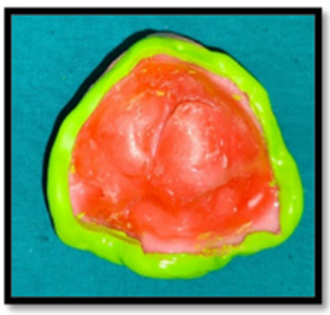
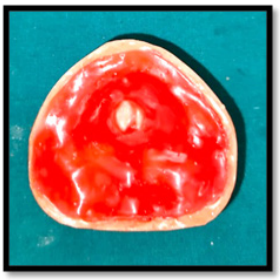


Fig 4: Fabricated custom tray **Fig 5: Border moulding**

After the drying of adhesive, the tray was filled with light body consistency of addition silicone material and was seated in patient's mouth. After the material was set, the tray was removed from the patient's mouth and any collected debris were washed under water. The obtained impression was checked for required extensions. The impression was then disinfected with 2% glutaraldehyde solution. The impression was poured in gypsum type IV product (diestone) and master cast was obtained.

Fig 6: Final impression **Fig 7: Master cast**



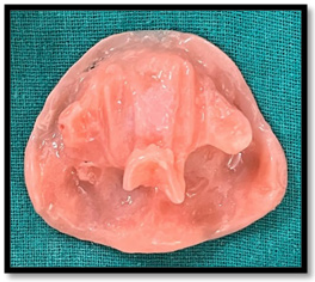
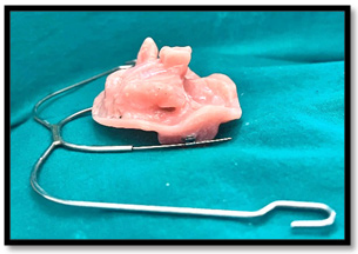
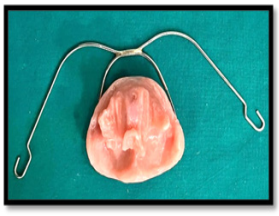


Fig 8: Wax -up Fig 9: Fabricated obturator prosthesis

Fabrication of headgear

The headgear face-bow assembly used in these patients is similar to that used in orthodontics for growth modification, molar distalisation in young children, and anchorage reinforcement in adults. An orthodontic facebow consisting of an inner and an outer bow was fabricated. The 0.04-inch inner bow (stiff round wire) was adjusted according to the patient arch and inserted in the molar tubes attached in the molar region using self-cure acrylic resin material. The 0.06-inch outer bow was adjusted such that it should be parallel to the ala tragus line by assessing the correct orientation of the inner bow intraorally.





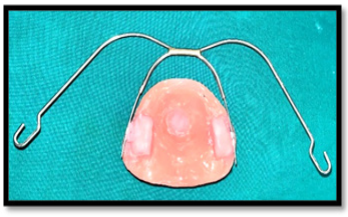


Fig 10: Attachment of wire component of the headgear to the fabricated prosthesis

To obtain the correct orientation of the facebow, two vertical wax pillars were made at the level of the occlusion plane, and the in-

ner bow was adjusted such that the outer bow came out at the corner of mouth; not interfering with commissures to prevent ulceration and lip trap. After that, it was adjusted at the level of the occlusion plane of mandibular teeth so that there would be an even distribution of occlusal forces without disturbing the underlying healing process. The pre-fabricated headgear consisting of two long and wide elastic straps, one verticaland the second horizontal with one diagonal strap connected to both was used. Both the straps were first adapted to fit according to the shape and contours of the patient's head. The multiple slots were present in the diagonal strap along the zygomatic bone plane of the headgear on both sides to hold the retaining wire component. These multiple slots were used to alter retention as necessary. The vector pull was in an upward direction to adapt the prosthesis more into its desired position, maintain adequate retention during functional movements, and at the same time prevent the anterior rotation of the prosthesis while in use.

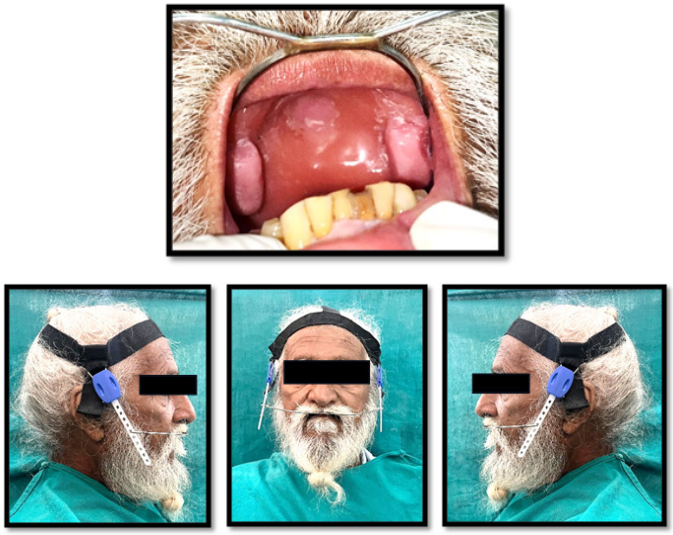


Fig 11: Attachment of the intraoral and extraoral components of the headgear with the fabricated prosthesis

Fig 12: Post operative photograph

The patient was asked to drink water to evaluate the need for any further adjustments chairside, and phonetics was also evaluated. The patient and his attendant were educated regarding the usage of the prosthesis, instructed to have liquid and semisolid food which doesn't require mastication and maintenance of headgear facebow assembly. The patients was advised to remove the appliance while sleeping and to clean it after every meal.

CASE 2:

A 58-year-old man reported to the Department of Prosthodontics, GNDDC, Sunam with the chief complaint of inability to eat food and nasal regurgitation. Examination revealed a partial maxillectomy defect in the anterior region crossing the midline. The naso-maxillary region was depressed due to bone loss, and this was also evident in extra oral examination.An irreversible hydrocolloid was used to make an impression of the maxillary defect area after blocking all undercuts with wet gauge. The impression was poured, and the final cast was obtained, on which a custom tray was made using a self-curing autopolymerising resin.

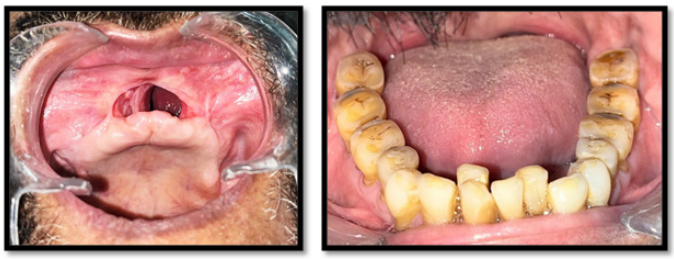


Fig 12: Pre-operative intraoral photographs

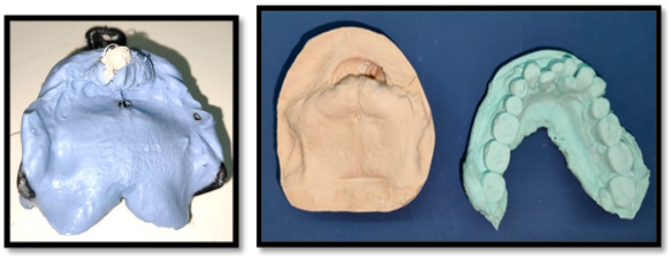


Fig 13: Primary impression and primary cast

Border molding for recording the soft tissue borders of the defect was carried out using putty consistency of addition silicone impression material. Light body consistency of addition silicone was used to make a wash impression, and the final master cast was poured using type IV dental stone (diastone).

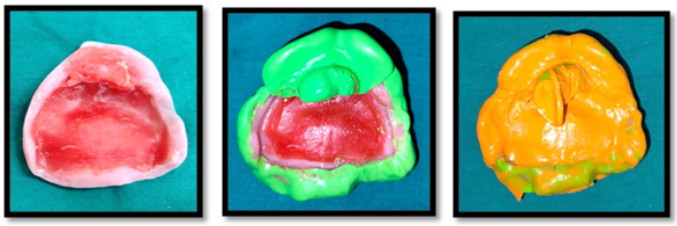


Fig 14: Fabricated custom tray; border moulding; final impression

All undercuts on the master cast were blocked out with wax.The final denture base was processed in heat cure after waxing up of the master cast.Occlusal wax rims were prepared to record maxillomandibular relations. After the maxillomandibular jaw relations had been obtained, the record was articulated, and teeth arrangement was done. On completion, the wax prosthesis was verified at the trial insertion appointment.

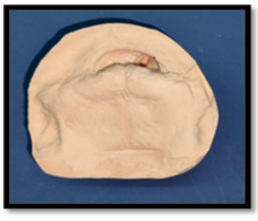


Fig: 15 Master cast

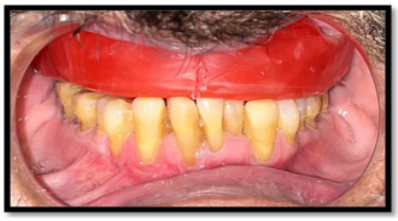


Fig 16: Jaw relation recorded

Fig 17: Try-in

The wax prosthesis was invested, and the wax was eliminated. A sheet of plastic based heat cure acrylic polymer in the dough stage was placed over the defect and the palatal area on the master cast. Pressure then applied to the base of the defect resulted in a cup-shaped depression of acrylic polymer over the defect. Salt was then used to fill the depression. Another thin sheet of acrylic polymer was placed, and packing was performed with conventional prosthodontic protocols. Finally, three to four holes were drilled on the palatal surface of the prosthesis covering the bulb. Warm water was injected through the holes to dissolve and eliminate the salt present in the bulb, resulting in a hollow space inside the bulb. The holes were sealed with a layer of self-curing acrylic, and final finishing and polishing of the prosthesis was done.

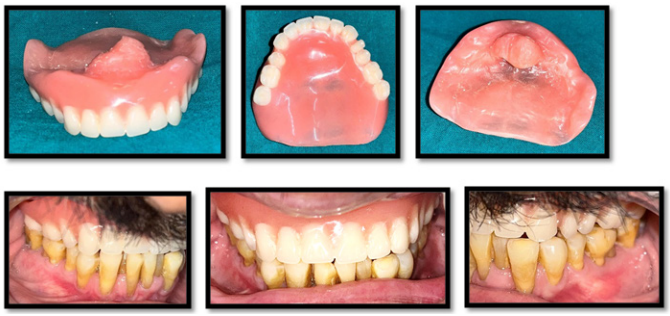


Fig 18: Fabricated definitive obturator prosthesis and the intraoral view

Fig 19: Post-operative photograph

DISCUSSION:

Bilateral maxillectomy presents a unique rehabilitation challenge to both the reconstructive surgeon as well as to the prosthodontists. Uncertainty prevails with respect to the treatment outcome when the defects are closed surgically in comparison to its prosthetic rehabilitation, and it remains in the domain of the operator to decide the most appropriate means of the defect closure. Compelling evidence is lacking concerning the superiority of one treatment modality over the other, and no significant difference in the quality of life score was found when maxillectomy defects were treated either with an obturator or surgical reconstruction. Irrespective of the final treatment options available for patients with bilateral maxillectomy, the most immediate matter to be addressed postsurgery is the maintenance of adequate nutrition in the interim phase. In addition, the literature is replete of concrete remedies for rehabilitating edentulous patients with bilateral maxillectomy during the interim period. When surgical reconstruction of the extended maxillary defects is ruled out by the operating surgeon, it is of paramount significance to intervene by prosthetic means rather than to allow patients to be on a feeding tube for the entire interim period. For unreconstructed defects, positive functional outcomes have been strongly influenced by the patient's satisfaction with the obturator and inversely to the volume of surgical defect, number of the remaining teeth and their prognosis, and the need for adjuvant radiotherapy. Understandably, edentulous patients with maxillectomy had shown inferior outcomes when their quality of life was compared to the patients with some teeth remaining.

In such a precarious situation where all means of providing a sustainable treatment failed, it became vital to explore alternative means of retaining the prosthesis to meet their critical nutritional and communication needs. Customized headgear retained obturators were adequately retentive and did serve its purpose well. It also gave the liberty to alter retention and refine the prosthesis at will, provided access to the operated site for a quick evaluation of disease recurrence, and was economical to the patients.

Certain drawbacks beyond the operator's control like disease recurrence, movement of the prosthesis during the function, esthetic concerns, and discomfort due to the collapse of the middle third of the face on the face-bow, may potentially limit the long-term utility of this extra oral aid for retention. Considering the size of the defect and suboptimal contours of the interim obturator, it is logical that a period for adaptation be given for speech to become intelligible. The prosthesis did not interfere in normal mandibular movements and speech improved over time. Relying on the positive response, headgear face-bow may be considered as a valuable and a prudent alternative for retaining a non-implant supported obturator in patients who are edentulous and/or present with this type of maxillary defects. This option can be considered a viable retention aid available to edentulous patients with extensive maxillary defects, even for their final prosthesis, as was done for the patient.

CONCLUSION:

A customized and accurately adapted headgear face-bow assembly provides a viable mode of retaining the obturator in edentulous patients with extensive maxillary defects. This line of treatment has shown positive functional outcome in all four patients. In addition to being economical; this extraoral assistance further benefits the patients due to its ease of fabrication, convenience of altering retention, amenable to needbased adjustments, and quick evaluation of recurrences.

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