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Prosthetic Rehabilitation of a Patient after Hemimaxillectomy due to Squamous Cell Carcinoma in the Maxillary Sinus: Case Report

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Abstract

Rehabilitation of uncontrolled diabetics with impairments due to acquired defects is complex. More significant defects are more challenging to treat than smaller ones, which can often be corrected surgically. When surgical reconstruction is not possible, the preferred treatment method for facial defects is prosthetic reconstruction. An obturator prosthesis is a standard and efficient method for treating such maxillary defects. This case report aims to evaluate patients' satisfaction with uncontrolled diabetes with improved speech, swallowing, and articulation, and achieving acceptable aesthetics after rehabilitation.

This case report details the ultimate obturator prosthesis therapy for an elderly male patient who had a hemimaxillectomy because of squamous cell cancer of the maxillary air sinus. The patient had uncontrolled diabetes and mobility grade 1 of the remaining upper teeth. A gauze coated with Vaseline blocked a significant medial undercut in the defect. The primary, final impression, and jaw relationships were recorded to aid postoperative speech and deglutition. Normal palatal contours were replicated to ensure functional outcomes. The obturator portion was hollowed to reduce its weight and prevent unnecessary strain on the supporting teeth and tissues. The obturator was fabricated using heat-cured acrylic resin to allow future additions in the event of tooth extraction and relining.

A well-made and constructed obturator for diabetic patients can offer high adaptability and functionality. Multidisciplinary planning is essential for effective dental care and functional rehabilitation, and avoiding oroantral communication. This will significantly improve the patient's quality of life.

Keywords

- maxillofacial defect
- hemimaxillectomy
- interim obturator
- maxillofacial prosthesis
- prosthetic rehabilitation

Introduction

Of all the malignant neoplasms of the oral cavity, oral squamous cell carcinoma (OSCC) accounts for 90 to 95% of cases. It has been closely associated with the use of tobacco and alcohol. SCC often occurs in severe, well-established intraoral regions such as the floor of the mouth, tongue, gingiva, lips, and buccal mucosa. It may also be found in the tooth-bearing areas of the mandible or maxilla.[1]

Oral cancer including OSCC carries a high morbidity and mortality rate due to its ability to encroach on surrounding tissues. The most common therapeutic intervention for OSCC includes a wide surgical resection with adjunct radiotherapy

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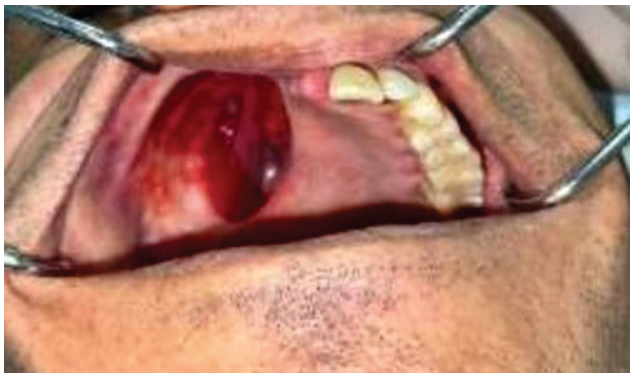

Fig. 1 Maxillary defect.

and chemotherapy. A successful outcome from the treatment entails disease-free survival. Unfortunately, due to the aggressive treatment protocol, the patients would have severe tissue morbidity reducing their quality of life. Hemimaxillectomy is a major resection strategy employed for OSCC involving the gnathic bones without midline involvement. The surgery resulted in a palatal defect causing hindrance in phonation, deglutition, and mastication, in addition to the altered facial appearance, emotional stress, and social stigma.[2,3]

The most common strategy employed to rehabilitate the patients includes the fabrication of a prosthesis. Unlike a small palatal defect, which could be surgically corrected through microvascularized or pedicled flaps, a large defect requires an obturator with a maxillofacial prosthesis. This case report presents the case of a cancer patient who underwent a radical treatment protocol resulting in significant loss of tissue impairing his ability for phonation, mastication, and deglutition. The case report describes the various steps and considerations involved in the planning, fabrication, placement, and acceptance of prosthetic rehabilitation.[4,5]

Case Report

A 55-year-old male patient presented to the dental clinic of the Faculty of Dentistry, Najran University with a large maxillary defect in the alveolar process, hard palate, right half of the maxilla, and nasal tissue. The cause of the defect was radical surgical removal of OSCC involving the right maxillary sinus. Based on Aramany's classification system for maxillary defects, the present case was classified as class I: lateral defect with anterior margin approaching the midline (►**Fig. 1**). Due to the extent of the defect, a surgical correction was not feasible. Thus, a prosthetic rehabilitation tool was employed. The patient had uncontrolled diabetes mellitus and mobility grade I in the remaining upper natural teeth. To accommodate future additions in the event of tooth extraction and relining due to uncontrolled diabetes, the obturator was designed to be constructed from acrylic resin with a wrought wire clasp, maximum extension, hollow, closed design, and suitability for conversion into a complete denture in the future.

Methodology Employed

A metal stock tray with appropriate dimensions, short flanges, and a 6-mm clearance was selected and modified according to the remaining maxilla structure. The adhesive was applied to the tray to ensure better retention of the impression materials, and all flanges were coated with peripheral beading wax. Extra wax was put around the defect to support the imprint material. A gauze coated with Vaseline was used to block a significant medial undercut of the defect, a surgical thread was wrapped around it, and the binding was tightened. A large portion of this is located outside the mouth around the tray handles to prevent the impression material from entering the patient's airway (►**Fig. 2**). Impression material was injected into the lateral and posterior undercuts before seating the tray. The primary impression was made with alginate impression material in the modified tray, and it was carefully removed to avoid discomfort. Wax was used to block out any unwanted undercuts before pouring the cast. A special tray was made of acrylic resin, the tray extensions were checked in the mouth, and many holes were formed to allow the impression material to escape and the adhesive to be applied. A border was first formed with modeling plastic. Then the tray was stabilized and aligned with the defect. Saline irrigation was used to clear the defect of excess nasal secretions. Finally, an impression was made by preparing and injecting elastomeric imprint material into desired undercut regions before seating the loaded tray into place. The patient was told to conduct eccentric mandibular motions to account for the movement of the coronoid process of the mandible and the anterior border of the ramus, in addition to manipulating the lips and the face. The final impression was gently removed once the substance had hardened. Then the impression was boxed to prepare for pouring into it to make the master cast (►**Figs. 3** and **4**).

Record blocks were produced using the master cast, and the relationships between the jaws were noted. Because the defect was so severe, it was impossible to produce stability and support with a normal record foundation; thus, a permanent denture base was utilized to obtain a jaw relation record. During registration, great care was taken to ensure

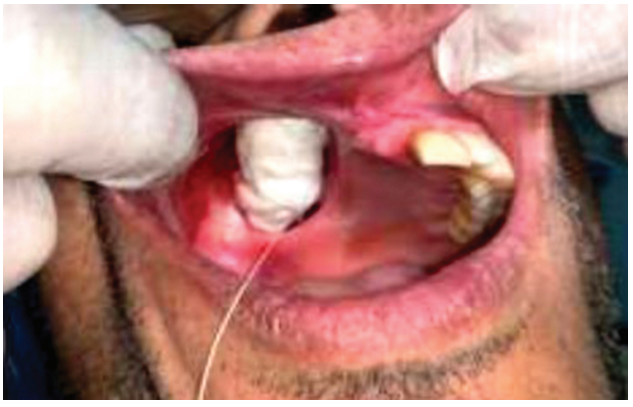

Fig. 2 The gauze pack limits the extension of the alginate into the defect.

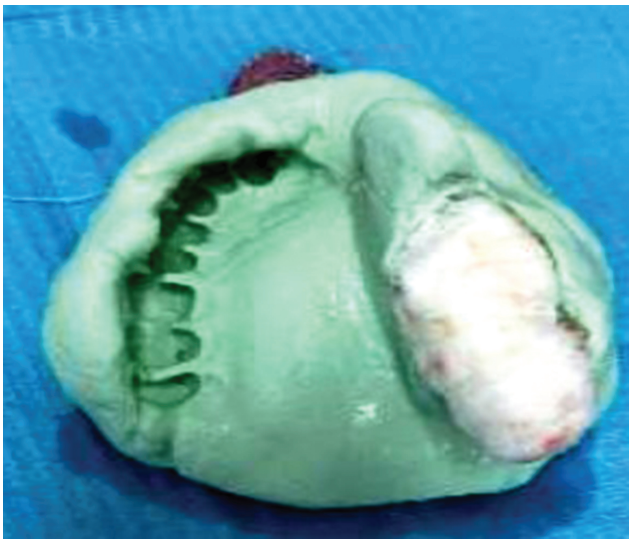

Fig. 3 Final impression by alginate.

that the maxillary record base was not moved. The preferred media for recording the patient's jaw connection is soft wax. Normal palatal contours should be replicated to aid with postoperative speech and deglutition (►**Fig. 5**).

Nonanatomic posterior teeth were selected and modified to eliminate occlusal contacts that might cause lateral deflection. In the mouth, the trial denture was tested. The obturator portion was hollowed to reduce the device's weight and prevent needless strain on the teeth and tissues that support them, which might cause the appliance to move vertically downward.

The trial denture was checked in the mouth. The obturator portion was hollowed out to reduce the device's weight and prevent unnecessary stress on the teeth and supporting tissues that could cause the device to move vertically downward. A small cellophane bag of sand was placed inside the bulb while the acrylic resin was applied. After processing, a hole was drilled in the bulb, the sand was removed, and the hole was sealed with self-cured acrylic resin. The obturator

Fig. 4 Master cast.

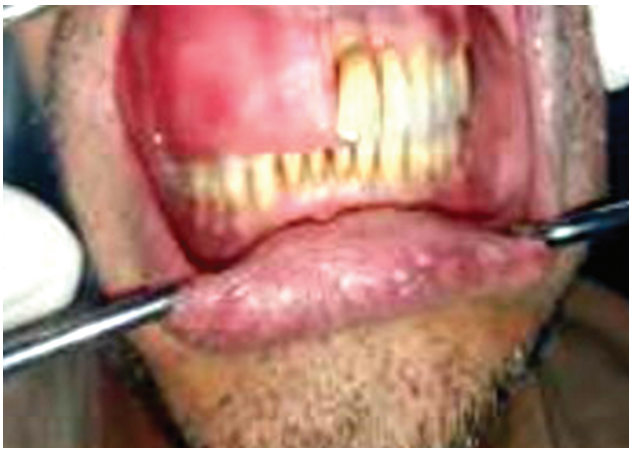

Fig. 5 The jaw relationships registration.

was processed with heat-cured acrylic resin. Pressure-indicating paste and articulating paper were used to ensure the proper fitting of the prosthesis. Overextensions in undercut areas may require relief. To reduce friction during functional movement, the upper surface of the obturator was well polished and slightly convex. The superior surface of the obturator was designed to be closed to prevent nasal secretions from accumulating and causing odor and weight gain. The primary purpose of the obturators was to restore the oral nasal barrier (►**Fig. 6**).

Obturator retention was achieved by engaging the buccal flanges with the teeth and alveolar ridge undercuts, using a wrought wire clasp, and maximum coverage of the remaining tissue. The prosthetic prognosis improved when teeth were present. The teeth helped stabilize, support, and hold the denture. The patient was advised to clean the denture with hand soap and a soft toothbrush. The patient was instructed to be recalled once a month for maxillary sinus cleaning and to ensure the prosthesis was fitted correctly.

Declaration of Patient Consent

The researcher confirms that all necessary patient consent documentation has been obtained. By signing this form, the

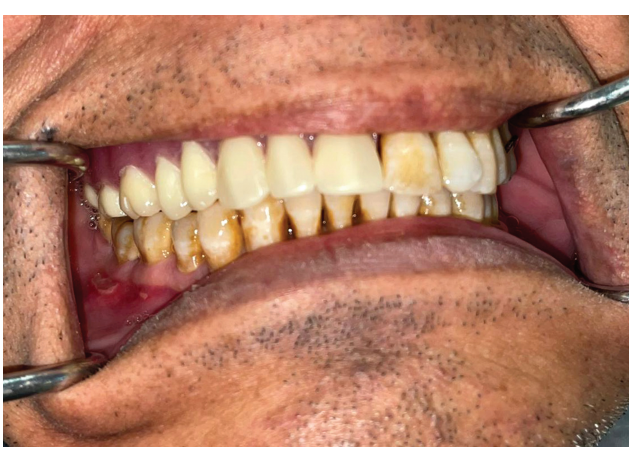

Fig. 6 The obturator in situ.

patient consents to the publication of their photographs and associated clinical data in the journal. The patient has been informed that their identity will be protected to the fullest extent possible and that their name and initials will not be disclosed.

Discussion

Most people who require maxillofacial prostheses have had several dental and surgical treatments. Patients who have had maxillectomy frequently require an immediate postsurgical prosthesis, an intermediate prosthesis, and a final prosthesis for their prosthetic rehabilitation. This is a lengthy process for the patient. Engaging soft-tissue undercuts, such as the scar band at the skin graft–mucosal junction, is also crucial to improve retention and stability.[6,7]

Many researchers have examined and debated obturator designs for acquired maxillary defects, emphasizing the importance of patient adaptation, comfort, and retention.[8–13] As a result, variables like the number of surviving teeth, the severity of the defect, and the edentulous area's retentive qualities influence the choice of a definite obturator type.[14] Furthermore, it was shown that the most important factor influencing patients' increased quality of life after maxillary excision was excellent obturator functioning. Although they have not been demonstrated to have a significant impact on obturator function, the size of the initial tumor and the resulting maxillectomy defect are reliable indicators of life expectancy.[15]

Maxillary defects often result from surgical therapy performed to remove benign or malignant neoplasms, particularly when extensive resection is required. The most preferred and advised course of therapy for such a problem is prosthetic rehabilitation using an obturator prosthesis. Defects in the maxilla often result from surgical therapy to remove benign or malignant neoplasms, especially when extensive resection is required. The most preferred and recommended treatment for such a problem is prosthetic rehabilitation with an obturator prosthesis. If a patient is at risk of recurrence of the original lesion that caused the deformity or if the size and extent of the deformity is too great, an obturator prosthesis is recommended.[16] The long-term effective and practical usage of the obturator prosthesis is largely dependent on the cast metal framework's proper construction. Various framework designs for the rehabilitation of maxillary defects have been published by numerous authors.[17,18]

The size, position, and degree of resection, the existence or lack of teeth, the state of the teeth's periodontal disease, and the teeth's alignment within the arch all influence the design decisions in these situations. Aramany's tripodal design was planned since the remaining posterior teeth were not in a straight line and the anterior teeth were intended to be employed in a cast metal framework. In situations like these, where the prosthesis is being exposed to different motions, it is imperative to provide sufficient retention, stability, and support. In this instance, retentive clasps on the central incisor, the first and second molars, the lateral scar band, and the height of the defect's lateral wall were used to secure the teeth to provide retention for the obturator prosthesis.[19]

Another crucial factor, in this case, was the stability of the obturator prosthesis, which was addressed by the bracing arms on the teeth, the maximum contact with the medial line of resection, the use of acrylic semi-anatomic teeth, the establishment of the correct occlusal scheme, the removal of premature occlusal contacts, and the widely dispersed stabilizing components. Support for the obturator prosthesis was given by the defect region and the remaining maxilla.[20]

It has been discovered that obturator prosthesis-supporting tissues change more quickly than any conventional prosthesis type. To evaluate the patient's occlusion and base adaptation and rule out any indications of a tumor recurrence, periodic reminders were arranged. The patient's recovery time was shortened as they were able to resume a regular diet and swallow food more easily shortly after the procedure. Soft meals might be masticated with the obturator at first, and firmer foods a few days later. There was no significant alteration in speech; it remained essentially unchanged. Because the patient's facial features and attractiveness were preserved, they were mentally more prepared to handle the rehabilitation.[21]

Conclusion

A conventional obturator for maxillary defects due to oncological resections is a simple and functional treatment option if there is a good indication. If the device is manufactured properly, the patient will achieve an appropriate level of function. Planning prosthetic care has a significantly positive impact on the patient's quality of life. The obturators for uncontrolled diabetics are preferably made of heat-cured acrylic resin to allow for subsequent additions, relines, and subsequent conversion to a complete denture with an obturator after extraction of the remaining movable teeth.

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Conflict of Interest
None declared.

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