



Prosthetic Rehabilitation Following Subtotal Maxillectomy: A Case Report

Akram Arhzer, Khadija El Assraoui, Rabab El Abdouli, Samira Bellemkhannate

Department of Removable Prosthodontics, Faculty of Dental Medicine, Hassan II University, Casablanca, Morocco

Email: arhzerakram@gmail.com

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Abstract

Surgical resection of maxillary malignancies often results in significant functional and aesthetic morbidity, substantially affecting patients' quality of life. Depending on the extent and localization of the resection, patients may experience severe impairments, including speech disorders, nasal regurgitation, compromised mastication, and facial asymmetry. Maxillofacial obturator prostheses represent a predictable and minimally invasive approach for the rehabilitation of such defects, aiming to restore oro-nasal separation and improve essential oral functions. This case report describes the prosthetic management of a 55-year-old female patient who underwent subtotal maxillectomy for squamous cell carcinoma of the maxilla. A subtotal obturator prosthesis was fabricated to restore oral function, facial aesthetics, and speech intelligibility. Clinical follow-up demonstrated significant functional improvement and high patient satisfaction. The aim of this paper is to describe, through this clinical case, the decision-making criteria and the prosthetic fabrication steps of a subtotal obturator prosthesis following subtotal maxillectomy that also involves the anterior part of the maxilla.

Subject Areas

Dentistry

Keywords

Obturator Prosthesis, Maxillary Substance Loss, Prosthetic Rehabilitation

1. Introduction

Maxillary defects following tumor resection often extend beyond the mucosa to involve the underlying bone [1]. When these defects are bilateral and involve the anterior maxilla, they compromise essential functions, including speech, swallow-

ing, and mastication, while also disrupting facial symmetry and lip support. Given the complex three-dimensional architecture of the midface, which plays critical aesthetic and functional roles, prosthetic rehabilitation in such clinical situations remains a major challenge [1].

Patients diagnosed with head and neck cancer often experience significant psychological and social distress due to the potential functional sequelae of surgery, radiotherapy, and chemotherapy [2]. Impairments in speech and alimentation can lead to social withdrawal, reduced professional engagement, and a marked decline in overall quality of life. Consequently, successful rehabilitation must address not only anatomical reconstruction but also functional restoration and psychosocial reintegration [2] [3].

Obturator prostheses play a crucial role in the rehabilitation of such defects. They provide immediate restoration of oro-nasal separation, improve phonation and deglutition, and re-establish facial support [4]. Achieving optimal outcomes requires a multidisciplinary approach involving surgeons, prosthodontists, speech therapists, and other healthcare professionals. Various materials, designs, and clinical techniques have been described in the literature, each aimed at enhancing retention, stability, and patient comfort [5].

This paper describes the clinical steps involved in the definitive prosthetic rehabilitation of a 55-year-old woman following subtotal maxillectomy for maxillary squamous cell carcinoma.

2. Case Presentation

A 55-year-old female patient was referred to the Department of Prosthodontics by her maxillofacial surgeon for aesthetic and functional prosthetic rehabilitation. Her medical history revealed squamous cell carcinoma of the hard palate. Adjuvant radiotherapy was subsequently delivered to the maxillary tumor bed and adjacent structures in 20 fractions, with a total dose of 60 Gy. Considering the irradiated field and the associated risks of xerostomia, impaired tissue healing, and osteoradionecrosis, careful prosthetic planning was undertaken. A 6-month healing period following completion of radiotherapy was respected to ensure adequate tissue maturation and stabilization before initiating definitive prosthetic treatment.

The clinical timeline consisted of subtotal maxillectomy, adjuvant radiotherapy, a 6-month healing phase, and subsequent definitive prosthetic rehabilitation. At presentation, the patient reported nasal regurgitation during swallowing, impaired speech intelligibility, difficulty with mastication, and aesthetic concerns.

Upon extraoral examination, the patient exhibited marked facial asymmetry characterized by collapse of upper lip support and partial lip incompetence. Additionally, a concave midfacial profile was observed, identified as a direct consequence of the loss of underlying maxillary support (**Figure 1**).

Intraoral examination revealed a subtotal bilateral maxillary defect accompanied by a persistent oro-sino-nasal communication. The patient presented with

extensive maxillary edentulism, with only a single posterior tooth remaining. Tooth 27 showed good osseous support and no clinical mobility. The margins of the surgical defect were clean and regular, with no visible necrotic tissue. Furthermore, accumulation of secretions and debris was observed within the defect cavity. According to the Aramany classification, the defect corresponded to Class IV (**Figure 2**).

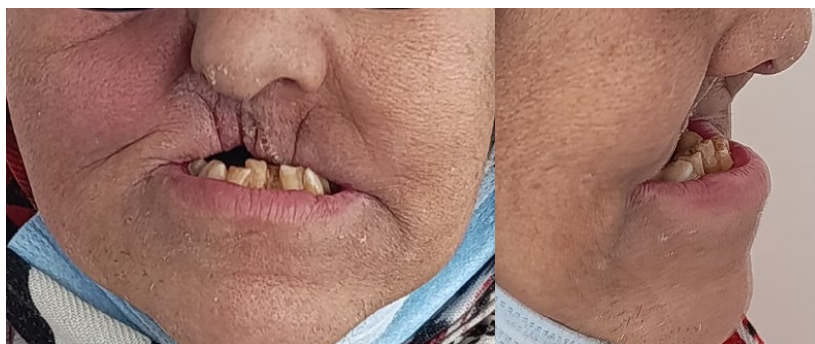


Figure 1. Frontal and profile extraoral views.



Figure 2. Intraoral view of the maxillary defect following maxillectomy.

The mandibular arch is fully dentate, with carious lesions present. Radiographic examination confirmed the clinical findings and revealed the extensive nature of the maxillary defect, highlighting the significant challenges for prosthetic rehabilitation (**Figure 3**, **Figure 4**).

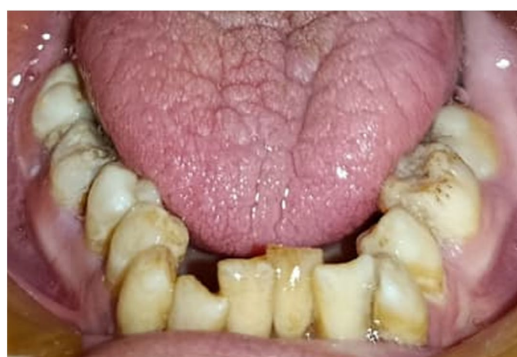


Figure 3. Intraoral view of the mandibular arch.



Figure 4. Panoramic radiograph.

The therapeutic decision consisted of preserving tooth 27 due to its good osseous support and the fact that the patient had undergone radiotherapy, which contraindicates extraction. The main challenge in this case was achieving acceptable esthetics, given the postoperative retraction and reduced length of the upper lip. In such situations, a slight reduction in the vertical dimension of occlusion (VDO) is often performed to allow lip contact at closure. At the same time, tooth preservation was essential, as it contributes significantly to prosthesis retention in view of the extensive loss of substance. Surgical reconstruction and implant-supported rehabilitation were not considered viable treatment options because of the patient's medical history, severe residual bone deficiency, financial constraints, and reluctance to undergo additional major surgical procedures. Following analysis of the clinical and radiographic data and after discussion with the patient, a subtotal maxillary obturator prosthesis was planned, with a clasp on tooth 27 and a hollow, closed obturator design to reduce its weight.

Primary impressions were made using irreversible hydrocolloid. To prevent material extrusion into the undercut inside the cavity, the palatal defect was packed with gauze coated with petroleum jelly (**Figure 5**). A stone model was subsequently fabricated to design a custom impression tray. This tray was clinically adjusted to eliminate over-extensions while ensuring full coverage of the defect. Subsequently, border molding was carefully performed to accurately delineate the defect's extension. Finally, a definitive functional impression was obtained using polyether to precisely record the defect's morphology and the remaining anatomical structures. For optimal stabilization of the custom tray and to prevent its rotation within the defect, support is always provided on the healthy structures, specifically at the level of tooth 27 (**Figure 6**).



Figure 5. Maxillary primary impression.

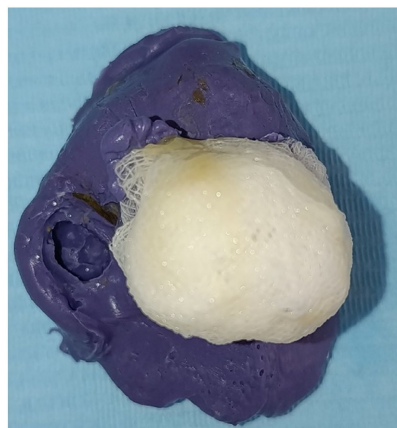


Figure 6. Maxillary functional impression.

Once the master casts were fabricated, maxillomandibular relationship records were obtained. Occlusal rims were adjusted to provide adequate lip support and to restore the contour of the alveolar ridge and missing dental arch. The orientation and position of the occlusal plane were determined according to the esthetic and functional principles used in conventional complete denture fabrication. Subsequently, the vertical dimension of occlusion was established to achieve optimal facial harmony, taking into consideration the occlusal relationship between teeth 27 and 37.

The prosthetic teeth were arranged in accordance with the established principles of complete denture prosthodontics, ensuring appropriate occlusal plane orientation, balanced occlusion, and satisfactory esthetic integration. To improve retention and resistance to dislodgement, a custom-fabricated wrought-wire clasp was incorporated on the remaining posterior abutment tooth. This design enhanced the mechanical stability of the prosthesis while facilitating a controlled distribution of occlusal forces to the supporting tissues.

Following clinical validation of the wax try-in, the prosthesis was processed using heat-polymerized acrylic resin and subsequently subjected to meticulous finishing and polishing procedures (**Figure 7**). The obturator was designed as a closed hollow bulb to reduce the overall weight of the prosthesis while preventing the accumulation of oral and nasal secretions. Following insertion of the definitive obturator prosthesis, occlusion was carefully evaluated and adjusted as necessary. Post-insertion follow-up visits were scheduled after 3 days, 1 week, and 15 days, and subsequently every 6 months to assess prosthesis function, tissue response, and overall patient satisfaction (**Figure 8**). Over an 18-month follow-up period, the prosthesis demonstrated excellent stability and good tissue tolerance. This favorable outcome resulted in a high level of patient satisfaction, with significant improvement in self-esteem and restoration of masticatory, phonetic, and swallowing functions.

Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical images.

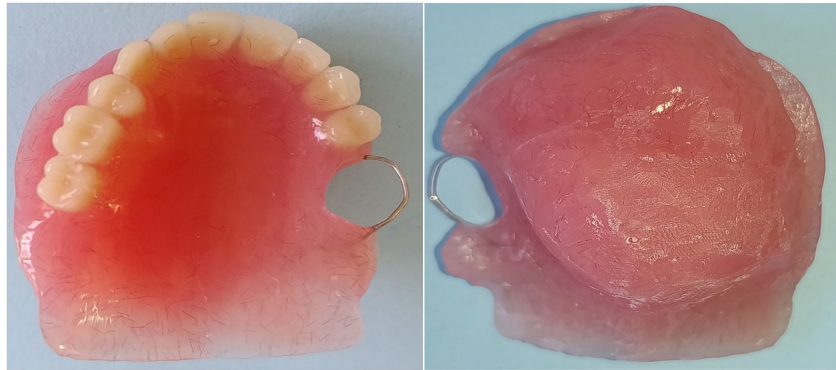


Figure 7. Obturator prosthesis after finishing and polishing.



Figure 8. Patient's smile after insertion of the prosthesis.

3. Discussion

The primary indication for maxillectomy or partial maxillary resection is the surgical removal of malignant lesions affecting the maxilla [6]. Depending on the tumor type, size and anatomical location, resection may involve the hard palate, maxillary sinus and nasal cavity. Resection of the hard palate can result in direct communication between the oral and nasal cavities [7]. This communication allows the leakage of liquids and food into the nasal cavity and impairs the generation of adequate intraoral air pressure during speech, resulting in resonance disorders such as hypernasality [7]. Consequently, maxillary defects may lead to reduced speech intelligibility and significant masticatory dysfunction, adversely affecting nutritional intake [1] [4].

The management of maxillary defects follows a complex therapeutic continuum that may include surgical reconstruction, soft tissue surgery, and prosthetic rehabilitation (obturator prostheses or implant-supported obturator prostheses). [8]. The selection of the most appropriate approach must be individualized according to defect size and location, the quantity and quality of residual tissues, the number of remaining teeth, the patient's systemic health status, a history of radiotherapy, and patient expectations [1] [4]. Additionally, in a systematic review and meta-analysis comparing quality of life after surgical and prosthetic rehabilitation following maxillectomy, König *et al.* found no significant difference in quality of life or objective clinical outcomes between obturator prostheses and surgical recon-

struction. However, the authors emphasized that the currently available evidence remains limited and that more robust, large-scale investigations are needed to draw definitive conclusions. [4]

A multidisciplinary approach, associated with the integration of advances such as three-dimensional surgical planning and guided implant placement, is essential to optimize functional and aesthetic outcomes [9] [10].

In the present case, the defect corresponded to a subtotal maxillary defect with only one remaining posterior tooth and tuberosity. Such clinical situations present significant biomechanical challenges due to limited abutment support. The support available from both the residual maxilla and the defect itself must be carefully evaluated. Optimal exploitation of the anatomical structures within and around the defect can enhance the retention, stability, and support of the obturator prosthesis. These structures include the residual hard and soft palate, the height of the lateral wall, and the lateral scar band. The posterior extension of the prosthesis depends on the posterior extent of the defect. Partial or complete loss of the hard palate alters the function of the palatal musculature and often allows a more posterior extension of the prosthesis than would normally be possible [11]. Particular attention must also be given to occlusal adjustment in order to preserve the longevity of the remaining abutment and prevent prosthetic instability. Retention achieved through adequate prosthesis design can be easily disrupted during function, resulting in instability of the prosthesis. Therefore, a balanced occlusal scheme was established in this case to improve stability and promote favorable distribution of functional forces [11].

Several studies have demonstrated the effectiveness of obturator prostheses in restoring oral function after maxillectomy. Corsalini *et al.* reported satisfactory functional and aesthetic outcomes in a cohort of 25 patients rehabilitated with obturator prostheses after maxillectomy [12]. Furthermore, digital technologies such as CAD-CAM-assisted obturator fabrication have also been shown to enhance patient comfort during impression steps, minimize material consumption, reduce working time [13].

In the present report, the Obturator prosthesis resulted in restoration of oronasal separation, improved speech intelligibility, elimination of nasal regurgitation, and enhanced masticatory function. The patient also reported high satisfaction with facial support and overall comfort. These findings support the role of obturator prostheses as a predictable and conservative rehabilitation option in extensive maxillary defects.

Nevertheless, certain limitations must be acknowledged. This report represents a single clinical case with a relatively short follow-up period. Long-term prospective investigations involving larger cohorts are needed to better evaluate biomechanical stability, prosthetic longevity, and patient-reported outcomes in similar defect configurations. Despite the functional success of the prosthetic rehabilitation, residual aesthetic concerns related to upper lip retraction persisted. Consequently, the patient was referred for secondary surgical intervention aimed at re-

leasing the upper lip and improving smile aesthetics.

4. Conclusion

Maxillofacial prostheses continue to represent a cornerstone in the management of extensive maxillary defects following tumor resection. When carefully planned and executed, they provide predictable restoration of essential oral functions, re-establish facial harmony, and substantially improve patient quality of life. Multi-disciplinary coordination and long-term follow-up remain fundamental to ensuring durable and successful outcomes.

Conflicts of Interest

The authors declare no conflicts of interest.

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