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Prosthetic Rehabilitation of a Maxillary Defect in a Completely Edentulous Patient: Case Report

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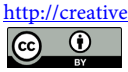

Abstract

Maxillary defects represent a major challenge in maxillofacial prosthodontics because of their anatomical, functional, esthetic, and psychological consequences. These defects most commonly result from surgical resection of tumors involving the upper aerodigestive tract. The resulting oro-sinusal communication compromises essential functions such as mastication, speech, swallowing, and respiration. Prosthetic rehabilitation with an obturator prosthesis remains the gold standard therapeutic approach, particularly in completely edentulous patients. This report describes the clinical management of a 58-year-old completely edentulous patient presenting with a Class II maxillary defect according to Aramany's classification following resection of a squamous cell carcinoma involving the right hemi-maxilla. The rehabilitation protocol included the fabrication of an immediate obturator followed by tissue conditioning using an interim obturator to promote mucosal healing and improve tissue adaptation prior to definitive prosthetic rehabilitation. A definitive hollow closed obturator was subsequently fabricated after complete tissue stabilization. Clinical outcomes demonstrated significant improvement in orofacial functions, facial esthetics, and psychological well-being. The objective of this work is to describe the different stages involved in the prosthetic rehabilitation of a maxillary defect in a completely edentulous patient.

Subject Areas

Dentistry

Keywords

Maxillofacial Prosthesis, Maxillary Defect, Obturator, Complete Edentulism,

Prosthetic Rehabilitation

1. Introduction

Maxillary defects are complex mutilations affecting the oro-facial region. They most commonly result from surgical treatment of upper aerodigestive tract tumors, particularly maxillary squamous cell carcinomas [1]. Less frequently, they may occur secondary to severe trauma, infections such as noma and maxillary mucormycosis, or congenital pathologies [2]. Both prolonged bisphosphonate use and chronic cocaine use have been identified as potential causes of maxillary defects secondary to osteonecrosis of the jaw [3]-[5].

These defects frequently create a communication between the oral cavity and the nasal and sinus cavities, resulting in major functional disturbances. Patients may experience difficulties with mastication, swallowing, speech, and respiration. In addition to these functional impairments, the associated esthetic alterations can lead to significant psychological and social consequences [6].

Despite advances in reconstructive surgery and implantology, maxillofacial prosthodontics remains essential in the management of these patients. In completely edentulous patients, prosthetic rehabilitation is particularly challenging due to the absence of supporting teeth and the difficulty in achieving adequate prosthesis stability.

The obturator prosthesis re-establishes the seal between the oral and naso-sinusal cavities while improving orofacial functions and facial esthetics [7]. The success of this rehabilitation depends on careful treatment planning, appropriate tissue conditioning, and close multidisciplinary team collaboration [8].

This report describes the stages of prosthetic rehabilitation in a completely edentulous patient with a maxillary defect, and the functional and esthetic treatment outcomes.

2. Clinical Case

A 58-year-old female patient was referred to the removable prosthodontics department by the maxillofacial surgery department before surgery for the fabrication of an immediate obturator prosthesis, following the diagnosis of a squamous cell carcinoma involving the right hemi-maxilla. The immediate obturator was prepared preoperatively and inserted immediately after surgery, with heavy-body silicone used to obturate the surgical defect. Following the surgical procedure, a significant maxillary defect remained, resulting in a communication between the oral and sinus cavities. This defect severely compromised the patient's mastication, swallowing, and speech with nasalization of the voice. The patient also expressed considerable esthetic dissatisfaction and psychological distress related to the alteration of her body image. The patient underwent chemotherapy followed by radiotherapy sessions.

To optimize biological conditions before fabrication of the definitive prosthesis, tissue conditioning was performed using a delayed-setting resin material and interim prosthesis. This therapeutic phase offers several advantages:

- Improvement of tissue healing;
- Reduction of pressure areas;
- Better adaptation of the future prosthesis;
- Rapid restoration of orofacial functions.
- Psychological support for the patient during the postoperative phase.

Between visits, the tissue conditioning material became firm. The surface and periphery of the material were trimmed and then relined with fresh material. Every two weeks over a two-month period, the prosthesis was adjusted to accommodate tissue changes at the surgical site.

Following complete healing of the surgical site, the rehabilitation phase with a definitive obturator prosthesis was started. Intraoral examination revealed bimaxillary edentulism associated with a Class II defect according to Aramany's classification. The residual ridge shows moderate resorption in both the maxilla and the mandible. The patient showed no limitation in mouth opening, and the fibromucosa was firm and resilient. The defect presented undercuts that could be exploited to improve prosthesis retention (**Figure 1** and **Figure 2**).

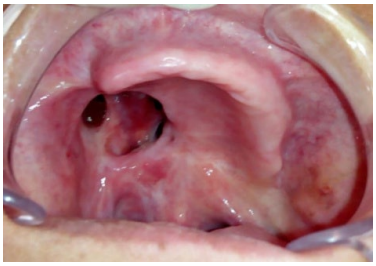

Figure 1. Intraoral view of the right maxillary defect.

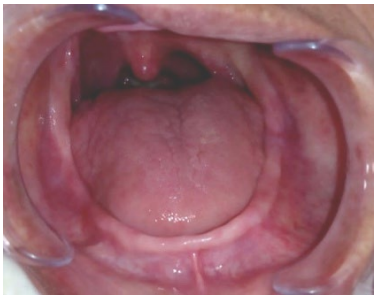

Figure 2. Intraoral view of the mandibular arch.

A preliminary irreversible hydrocolloid impression was first made in order to fabricate a custom tray, after blocking the surgical cavity with gauze. It should record the periphery as well as the defect area to a depth of approximately 3 - 4 mm [9] (**Figure 3**).

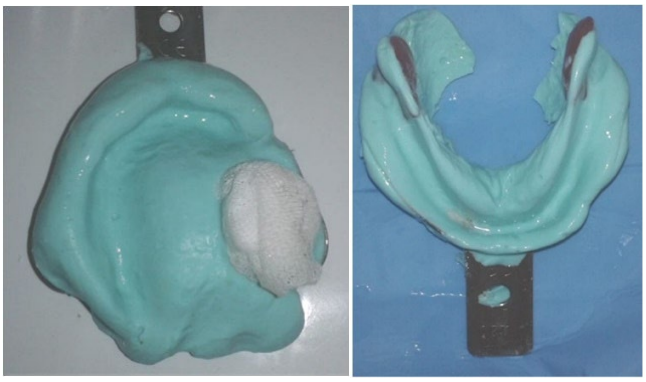

Figure 3. Preliminary impressions of the maxillary and mandibular arches.

The custom tray requires intraoral adjustment using standardized Herbst movements on the healthy side and should extend beyond the scar band and approximately 2 - 3 cm into the defect cavity. Posteriorly, it should cover the tuberosity on the healthy side and be extended to include the defect area.

A light-body silicone was then used to identify areas of overextension, which were subsequently reduced using a bur mounted on a handpiece. The fonctionnal impression was made in a single step using a hydrophilic vinyl polysiloxane (VPS) dental impression material. The impression was made after blocking out the undercut areas of the surgical site with gauze.

Functional border molding was performed using Herbst tests as well as by instructing the patient to move her head, open and close her mouth, perform lateral mandibular movements, and swallow. During impression making, it is essential to support the custom tray throughout all functional border movements. The applied force should be directed diagonally against the residual hard palate and alveolar ridge to prevent rotation of the impression toward the surgical defect (**Figure 4**).

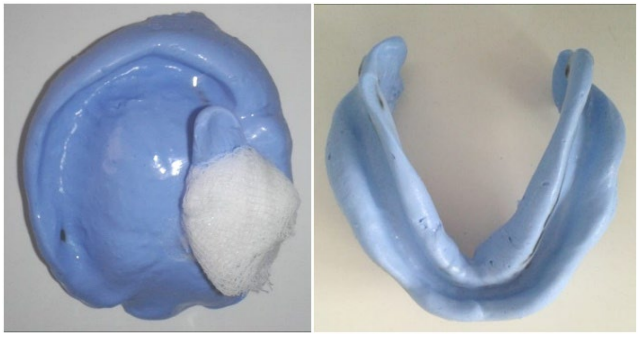

Figure 4. Functional impression of the maxillary and mandibular arches

The recording of the intermaxillary relationship involves several sequential steps. Initially, lip and cheek support are adjusted, particularly on the defect side. The occlusal plane is then established while taking into consideration the visibility

of the occlusal rim both at rest and during smiling. The anterior rim of the maxillary record base should be positioned along the wet–dry line of the lower lip to achieve appropriate esthetic support. Adequate stabilization of the occlusal base is essential to prevent displacement into the defect cavity. Conventional parameters, including esthetics and speaking space, should also be respected when determining the vertical dimension of occlusion. Finally, the maxillary obturator base is properly supported, and the patient is guided during the recording of centric relation.

At the try-in appointment, all records are verified, including the stability of the trial dentures, soft tissue support, occlusion, speech, and facial esthetics. The final palatal contours should also be evaluated at this stage. The contours on the surgical side should replicate those of the remaining hard palate. A closed hollow obturator was fabricated. The hollow closed obturator reduced the weight of the prosthesis, and its closed design made it easier to clean compared to a hollow open obturator (**Figure 5**).

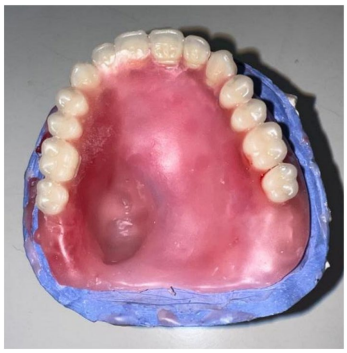

Figure 5. A cavity was created in the wax filling the defect area, followed by adaptation of a wax component to serve as a lid for the created cavity.

Upon insertion of the prosthesis, the internal surface was carefully examined for any irregularities. Rough areas on the inner surface or along the borders were detected using the fingertip, the tip of a probe, or preferably a gauze pad, which tended to catch on surface imperfections and facilitate their identification. Any detected irregularities were gently adjusted using a fine-grit bur, followed by careful repolishing of the affected area [9]. Borders that maintained their full thickness exhibited a smooth and well-finished surface. The prosthesis should also be evaluated for pressure areas using pressure-indicating past.

Follow-up and adjustment appointments were scheduled to ensure optimal adaptation and patient comfort, with subsequent visits once every six months. The prosthetic rehabilitation resulted in significant improvements in mastication, swallowing, speech, orosinusal sealing, and facial esthetics. The patient expressed great satisfaction with the treatment outcome, particularly regarding functional comfort and facial appearance. Furthermore, the restoration of the patient's smile highlighted the positive psychological impact of the rehabilitation (**Figure 6**).

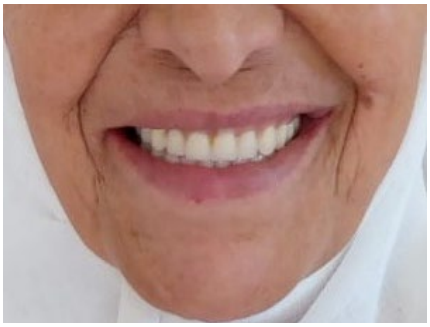

Figure 6. The patient's smile of satisfaction.

3. Discussion

Maxillary defects represent a major therapeutic challenge, particularly in completely edentulous patients, in whom prosthetic stability is severely compromised. The obturator prosthesis remains a reliable and accessible treatment option, as it not only restores oro-facial functions but also contributes to improving the patient's quality of life and facilitating social reintegration [6] [10].

The prosthetic rehabilitation of maxillary defects is generally carried out in three successive stages. The immediate obturator is inserted immediately after the surgical procedure and provides protection of the surgical site, initial closure of the oro-sinusal communication, and early restoration of essential functions; it is generally worn for approximately two to three weeks. Following the initial healing phase, an interim obturator is fabricated to accommodate postoperative tissue changes and to improve mastication, enhance speech, and allow progressive functional rehabilitation. In that stage, tissue conditioning with delayed-setting resins plays a fundamental role in tissue preparation before definitive rehabilitation. It promotes optimal tissue healing and improves the tolerance of oral tissues to the prosthesis, thereby facilitating subsequent prosthetic management [7] [11].

Finally, the definitive obturator is fabricated after complete stabilization of the tissues. A hollow closed obturator is indicated in patients without limited mouth opening, as it reduces prosthesis weight, enhances stability, and facilitates oral hygiene. The objectives of this stage are to ensure optimal comfort, adequate retention and stability, satisfactory esthetic restoration, and long-term functional rehabilitation [4] [7] [11] [12].

Recent advances in maxillofacial implantology have significantly enhanced obturator retention and stability [10]. Nevertheless, conventional prosthetic rehabilitation remains the treatment of choice in specific clinical situations, especially when patients have medical contraindications.

In some situations, prosthetic rehabilitation is preferred over surgical reconstruction, especially when managing highly aggressive tumors with a high recurrence potential. The use of an obturator prosthesis enables regular follow-up and permits timely detection of any recurrence [6].

Treatment requires a multidisciplinary approach involving maxillofacial surgeons, prosthodontists, and physical therapists to prevent restrictions in mouth

opening, along with psychologists to support the patient's successful recovery [6], [12].

Informed consent for the publication of this clinical case and the associated images was obtained from the patient.

4. Conclusion

Maxillary defects present significant functional, esthetic, and psychological challenges that require specialized and well-coordinated management. The obturator prosthesis represents an effective therapeutic solution, restoring essential orofacial functions while substantially improving patients' quality of life. Successful outcomes depend on careful treatment planning, appropriate tissue conditioning, precise prosthetic fabrication, and close multidisciplinary collaboration. This clinical case illustrates the crucial role of prosthetic rehabilitation in a completely edentulous patient with a maxillary defect, highlighting its marked functional, esthetic, and psychological benefits.

Conflicts of Interest

The authors declare no conflicts of interest.

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