

Management of Edentulous Patients with Maxillary Substance Loss: A Case Report

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Received: 15 Jun 2023; Accepted: 19 Jul 2023; Published: 25 Jul 2023

Citation: Bouanane B, Rimaoui S, Zeroual R, et al. Management of Edentulous Patients with Maxillary Substance Loss: A Case Report. Oral Health Dental Sci. 2023; 7(3); 1-5.

ABSTRACT

Depending on the location and extent of the loss of substance following maxillary resection surgery, all functions of the masticatory apparatus may be adversely affected. Eating and communication are impaired, which has a negative impact on the patient's psychological state [1].

When reconstructive maxillofacial surgery is not possible, rehabilitation with a maxillofacial prosthesis is essential. It must restore functions (phonation, eating, breathing, etc.) and reintegrate the patient into his psychosocial environment by masking his disability [2]. To achieve these objectives, this prosthesis, like a conventional removable prosthesis, must meet the Housset triad (support - retention - stabilisation), but also the objective of tightness. We therefore speak of a "prosthetic tetrad in PMF" (Housset's triad completed by the objective of tightness) [3].

In the case of a completely edentulous arch with substance loss, the treatment becomes more complex due to the reduced support surface. The maxillofacial prosthodontist must therefore be extremely vigilant to ensure the success of this appliance. A wise choice of technique and impression material, as well as respect for the occlusal parameters (occlusal plane, vertical dimension, centric relation, etc.) will ensure prosthetic stability and integration [4].

In this article, we will focus on the peculiarities of the management and the different stages in the fabrication of a maxillofacial prosthesis for a patient with total edentulism and loss of maxillary substance.

Keywords

Maxillary resection surgery,

Introduction

As we have already seen, maxillary resection surgery leaves behind a loss of substance that often communicates with the sinus and nasal cavities, leading to quite pronounced functional and aesthetic consequences.

Eating is disrupted by the absence of seal, with liquids and food leaking out. The reduction in masticatory efficiency is also related to the loss of dental structures in the area of the surgical defect.

In particular, the patient suffers from problems with phonation: the loss of palatal support and air leakage cause nasation with incomprehensible pronunciation of phonemes [5]. Aesthetics are also altered, with depression of the facial contours opposite the loss of substance, accompanied by facial asymmetry and hyperpigmentation of the skin in patients treated with radiotherapy. If reconstructive surgery is contraindicated, rehabilitation with a denture is necessary. It compensates for substance loss and replaces missing teeth. Its aesthetic role is not negligible, as it provides support for sagging tissues and allows patients to regain their smile and reintegrate into their psychosocial context by concealing their disability [6].

Prosthetic rehabilitation in edentulous patients with substance loss is a real challenge, not only because of the limited supporting surfaces, but also because of the development of hyposiality, limited mouth opening and damage to the fibromucosa in the case of adjuvant radiotherapy [7].

Clinical Case

Mrs S, presented to the prosthodontic department of CCTD-Casablanca for functional and aesthetic rehabilitation.

Questionnaire revealed a history of squamous cell carcinoma of the hard palate treated by resection surgery followed by additional treatment with external transcutaneous radiotherapy. Clinical examination revealed a bimaxillary edentulous total with postoperative loss of substance occupying the left maxillary hemi-arch and communicating with the oral and nasal cavities (Figure 1). The margins of the surgical defect were clean and regular with no visible necrotic tissue. There was no evidence of inflammation or infection in the surrounding mucosa. There was no redness, swelling or purulent discharge and the patient reported no particular pain or discomfort in the affected area. Treatment with radiotherapy has caused muscle fibrosis, resulting in severe limitation of mouth opening, making access to the oral cavity difficult.

The therapeutic decision was a total obturator prosthesis and we will follow the stages of its design.

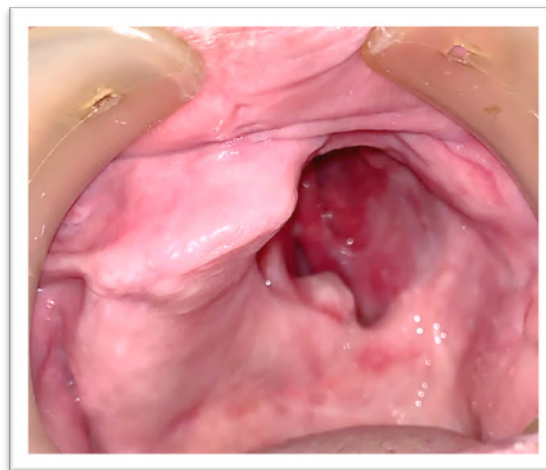


Figure 1: Endo-buccal view.

Procedure

The treatment plan consisted of 2 phases:

- A temporary phase lasting 1 month, the aim of which was to guide the healing process in order to restore a stable substance loss without signs of ulceration or bleeding, and to establish functional re-education in order to restore an amplitude of mouth opening favorable to the insertion of prostheses.
- A definitive phase involving the design of the total obturator prosthesis.

Temporisation phase

An alginate impression is taken using a commercial impression tray, after filling in the undercut areas with sterile compresses (Figure 2).

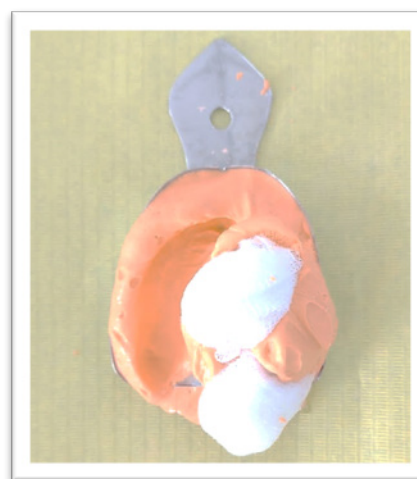


Figure 2: Maxillary alginate impression.

The resulting model was used to fabricate a palatal plate in transparent acrylic.

Once the plate was placed in the mouth, it was relined with conditioning resin, trying to exploit the undercut areas to ensure retention of the temporary prosthesis (Figure 3). The conditioning resin was renewed every week for a period of one month.



Figure 3: Palatal plate relined with conditioning resin.

Throughout this period, we prescribed re-education exercises combined with heat therapy to relax the muscles and restore optimal mouth opening amplitude.

Final phase

At the end of the healing period, we could see a stable loss of substance lined by a healthy looking mucosa with a homogeneous pink colour. We started to fabricate the total obturator prosthesis.

A new alginate impression was taken, taking care to use sterile compresses in the undercut areas. The resulting stone model is used to design a individual impression tray, which is adjusted in the mouth by eliminating over-extensions and ensuring that it covers the entire loss of substance.

The secondary impression followed the same rules as the conventional total prosthesis, with a few special features: filling of the undercut areas was essential and the choice of materials had to be adapted to the specific needs of the patient. The secondary impression (Figure 4) was taken in 2 steps. In the area not affected by the resection, a polyether remargining was carried out; it should be noted that the use of Kerr paste is not recommended in irradiated areas as it may cause irritation or burns [8]. The second step was to take a central impression with the same material (polyether) in order to record the entire remaining supporting surface and the loss of substance.

The occlusal parameters (occlusal plane and DVO) were adjusted, the RC was recorded and the teeth were selected in the following session in the conventional manner. After validation of the prosthesis in wax, the prosthesis was polymerised using a thermopolymerisable acrylic resin (Figure 5).



Figure 4: Maxillary secondary impression.

Due to the large amount of substance loss, a hollow obturator was chosen to lighten the prosthesis and improve its stability.



Figure 5: Polymerisation of maxillary and mandibular prostheses.

After intraoral corrections and adjustments, the final prosthesis was placed (Figure 6). The patient was satisfied with the result (Figure 7); he was able to resume almost normal eating and speaking.

The patient was given instructions on prosthesis care and periodic recall.

Discussion

The prosthetic rehabilitation of a totally edentulous patient with substance loss in the maxilla is a real challenge that requires special attention. One of the major limitations to be considered is the limited osseous support surface. There is also a deterioration in the normal state of the mucosa, hyposialia, scarring bridges, etc., all of which limit the stability and retention of the prosthesis [9].



Figure 6: Prosthesis insertion.



Figure 7: The patient's smile before and after insertion of the prostheses.

When surgical reconstruction is not possible, the maxillofacial prosthesis remains the treatment of choice to rehabilitate these patients. However, a strict protocol must be followed to successfully integrate this type of prosthesis. For optimal treatment and to ensure the best possible rehabilitation and patient comfort, maxillary substance loss needs to be treated in three stages.

Immediate Obturator Prosthesis

This requires close collaboration between the prosthodontist and the surgical team. This is a prosthesis designed before the surgical resection and fitted during the operation. It provides good protection and water and air tightness in the immediate post-operative period [10]. Functions such as eating, swallowing and speaking are greatly improved. Regrettably, our patient came for an odontological consultation after the operation. As a result, we immediately started the 2nd phase of treatment.

Secondary Obturator Prosthesis

One week after the operation, the patient is seen again to check the wound after the immediate obturator prosthesis has been fitted. A new impression must be taken to record the postoperative state of the maxillary arch and to fabricate a new prosthesis, which will be more complex than the first one.

In our clinical case, we were satisfied with a palatal plate because the state of substance loss did not require a long healing period [11]. Otherwise, a prosthesis to replace the missing teeth is required to ensure esthetics and function. Relining of the secondary obturator prosthesis with conditioning resin should be done periodically every week during the healing period. It should be noted that this period is specific and may vary depending on the clinical situation.

Definitive Obturator Prosthesis

The definitive obturator prosthesis is performed when the healing process has resulted in a stable loss of substance with a normal texture, free of roughness, nodules or other palpable abnormalities. There should be no signs of inflammation or infection in the surrounding mucosa. Maxillofacial prosthetic rehabilitation must enable the patient to regain function with a normal diet and intelligible speech. Aesthetics must also be restored to ensure that these patients can be reintegrated into society and the workplace.

The treatment of choice in this clinical situation is an implant-supported obturator prosthesis. Osseointegrated implants with retention devices (attachments, connecting bars, etc.) play a key mechanical role, ensuring optimal retention and stability. This makes it possible to restore effective masticatory function, provide interesting esthetic solutions and significantly improve the patient's quality of life [6].

However, their indications are limited in patients with oral cancer. Radiation therapy is a major cause of implant failure. The dose of irradiation and the time between irradiation and implant placement appear to have a direct effect on implant success. When an implant solution is not possible, conventional obturator maxillofacial prostheses remain the only alternative. The success of this type of rehabilitation depends on a number of factors, such as the impression techniques and materials used and the accuracy with which occlusal parameters are recorded.

The type of obturator also plays an important role in the stability of the prosthesis and there are two types of materials used: rigid acrylic obturators and flexible obturators made from elastomers [10].

In our clinical case, we chose a hollow rigid obturator. The use of resins offers superior structural stability and durability. However, their weight can affect the stability of the prosthesis. Therefore, we made a hollow obturator; its lightweight improves the retention of the prosthesis, but its fabrication remains complex and requires clever methods.

Conclusion

The prosthetic rehabilitation of edentulous teeth with substance loss is a complex challenge for dental professionals. Conventional obturator prostheses are still very much in vogue, restoring masticatory function and giving patient's confidence in their appearance. However, it is essential to consider individual factors and personalize each treatment plan to achieve optimal results.

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