JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Definitive obturator for loss of central palatal substance : Case report

Rimaoui S, El Assraoui kh, Kaoun Kh, Bellemkhannate S

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

ABSTRACT

Maxillary resection surgery often results in loss of tissue, which, depending on its extent and location, can lead to numerous functional and aesthetic sequelae.

Surgical resection can involve the entire palatal arch, often resulting in loss of dental structures and communication with the sinuses and nasal cavities. In this situation, a lack of water and air tightness is observed, leading to feeding difficulties and phonetic problems resulting in unintelligible speech. The prognosis is often uncertain due to the lack of prosthetic support surfaces and structures.

However, in cases of limited surgical resection, especially in cases of central palatal substance loss (ARAMANY class III), dental structures are often preserved and rehabilitation with an obturator with a cast metal framework allows patients to regain optimal function, provided that a well thought-out design is established with good choice of the retention elements.

In this article, we describe the steps involved in creating a definitive obturator for central palatal substance loss, following the steps and rules involved in its design.

Keywords : Definitive obturator, maxillectomy, ARAMANY class III, metal framework.

INTRODUCTION

Maxillary defects can be divided into two categories: defects resulting from congenital malformations and acquired defects [1]. Maxillary acquired substance loss can have various causes: Trauma, extensive benign or malignant tumour resection, infectious disease or iatrogenic factors (osteoradionecrosis, drug inhalation) [1].

These defects predispose the patient to altered masticatory function, fluid leakage into the nasal cavity and hypernasal speech [1]. Aesthetic appearance is also altered, with sagging of the skin, facial asymmetry and external scarring. The combination of all these factors has a negative impact on the psychological state of patients, leading to depression and social isolation [2].

If surgical reconstruction is not possible, rehabilitation with a maxillofacial prosthesis remains the treatment of choice to artificially restore the loss of substance.

A multidisciplinary consultation should be organised to discuss the different aspects of the case and to draw up an individual treatment plan. Prosthetic rehabilitation of a maxillary deficit depends on a number of parameters: The extent of substance loss, its location, the presence or absence of dental structures, the condition of the mucosal and osseous support surfaces. All these factors must be taken into account and analyzed in order to achieve successful prosthetic integration. [3].

The prosthodontic treatment of patients with acquired substance loss in the maxilla can be divided into three treatment phases, each with its own objectives [1] :

- The surgical obturator : This is a baseplate constructed from the preoperative impression and inserted at the time of maxillary resection immediately after surgery
- The temporary obturator : It is constructed from the post-surgical impression cast, which is usually without teeth. However , if anterior teeth are included in the resection, their addition to thetemporary obturator prosthesis can be of great psychological benefit to the patient.

- The definitive obturator : Around 6 months after the operation, the construction of a definitive obturator prosthesis can be planned. This obturator includes a false palate, a false ridge, teeth and an obturator that can be hollowed and closed in hard resin or soft silicone.

It should also be noted that the patient's psychological state and level of motivation and cooperation are factors that influence the prognosis of the treatment. Psychological support from an expert is recommended throughout the treatment period to facilitate the integration of this type of treatment.

In partially edentulous patients with substance loss, the treatment of choice remains the cast obturator prosthesis, which often consists of two parts: a metal base plate resting on the teeth and residual palate, and a rigid resin obturator. In this paper, the steps involved in the prosthetic management of a central palatal loss of substance will be described through a case study.

CLINICAL CASE

A 60-year-old male patient was referred to the Department of Removable Prosthodontics of dental consultation and treatment center -Casablanca-Morocco for functional and aesthetic rehabilitation.

The patient had a history of squamous cell carcinoma of the hard palate which had been surgically resected. The patient was also treated with 10 sessions of external transcutaneous radiotherapy.

Clinical examination revealed a loss of substance in the form of an oval cavity (Fig.1) measuring approximately 5 cm, located in the centre of the hard palate, with preservation of the dental structures and alveolar processes. The margins of the cavity were irregular. The surrounding area showed granulation tissue in the process of formation, indicating an ongoing healing phase. The patient reported no particular pain or discomfort in the affected area.

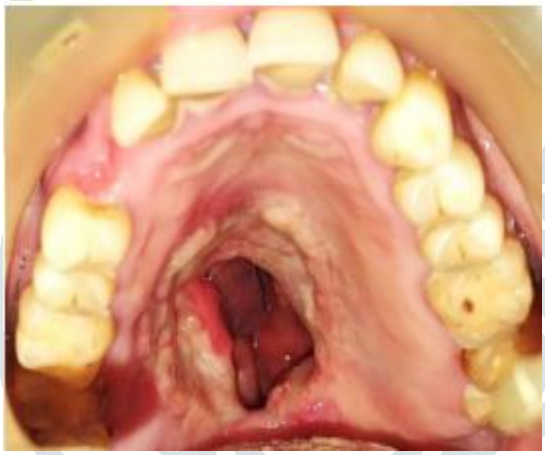

Figure 1 : Endo-buccal view of central palatal loss of substance

The defect was classified as an Aramany Class III maxillary defect.

The treatment decision was a removable cast metal framework prosthesis with a rigid acrylic resin obturator.

The treatment plan consisted of 2 phases :

- A temporisation phase : During this phase, the patient was reviewed every one to two weeks, due to the rapid soft-tissue changes that occur within the defect.
- A definitive phase involving the design of the cast obturator prosthesis : The aim was to restore a well-healed defect with stable surrounding tissue and no signs of ulceration or bleeding.

Temporisation phase

An alginate impression was taken using a commercially available impression tray after the undercuts had been filled with sterile compresses (Fig.2). A palatal plate was fabricated from the resulting model using autopolymerized transparent acrylic resin. It should be kept simple and lightweight.

In the case if the patient has the existing prosthesis, it may be adapted and extend with autopolymerizing acrylic resin to cover the margin of resection on the soft palate, for use as a temporary obturator [1]. Then it will be relined with tissue conditioning resin.

Figure 2 : Alginate impression

Once the plate had been adjusted, a resin conditioner was applied. This obturator permits deglutition, thus the nasogastric tube may be removed at an earlier date. This created also a protective barrier over the surgical resection area, helping to avoid direct trauma to the tissues by providing mechanical protection against masticatory forces and oral irritants. The resin conditioner also stimulated healing by encouraging cell proliferation. The plate was relined with conditioning resin every week for 2 months. Once healing was deemed complete, with a firm, non-bleeding mucosa and clean, regular margins, the final prosthetic phase began.

Final phase

This phase began with the taking of a new alginate impression (Fig.3) to record the maxillary arch and the loss of substance after healing. The impression was poured using a dental stone, and adiagnostic cast was obtained. This cast was surveyed then the framework was designed. The model obtained from this impression will also be used to fabricate a individual impression tray.

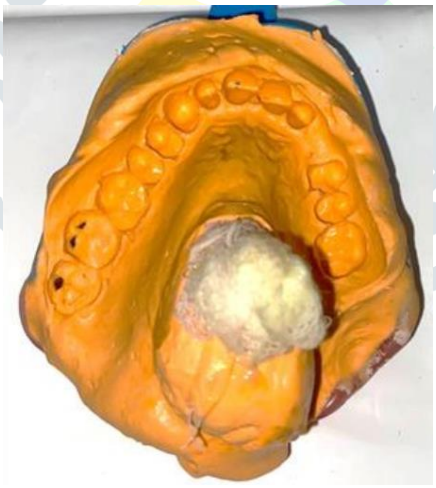

Figure 3 : Post-healing alginate impression

Prior to taking the central impression, preparation of the clasps' housings is performed according to the pre-established framework design of the removable partial denture. Due to significant cantilevering of the obturator, the clasps will need to engage nearly all the teeth of the healthy hemi-arch. The design included a full palate central connector. It should be noted that the prepared plate will extend closely to the defect area by a retentive grid that will be embedded in the obturator.

The central impression was taken using a medium-viscosity polysulfide material (Permlastic Regular®) (Fig.4).

Figure 4 : Secondary impression

In the following session, the metal framework (Fig.5) was tried on in the mouth and the fit of the clasps and the correct position of the retention grid were checked and adjusted.

Figure 5 : Metal framework

Once the metal framework had been validated and adjusted, a liquefied wax impression was taken to record the details and ensure a good seal of the obturator. Tightness tests was performed by asking the patient to sip water and say a few words. There was no leakage of fluid or air and the patient was able to communicate clearly.

An alginate Pick-up impression was then taken using the Stellite with its obturator (Fig.6). Master cast was poured and jaw relation was recorded and transferred to a semi adjustable articulator. Teeth were arranged on the metal framework, and wax try-in was carried out (Fig.7).

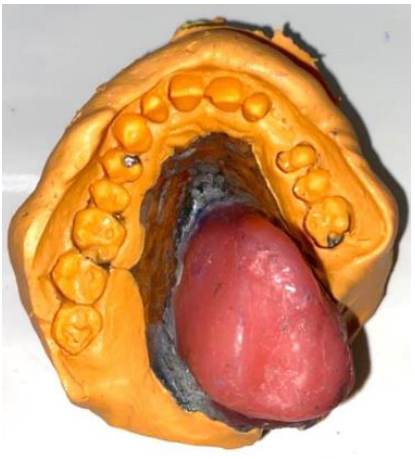

Figure 6 : Pick-up impression

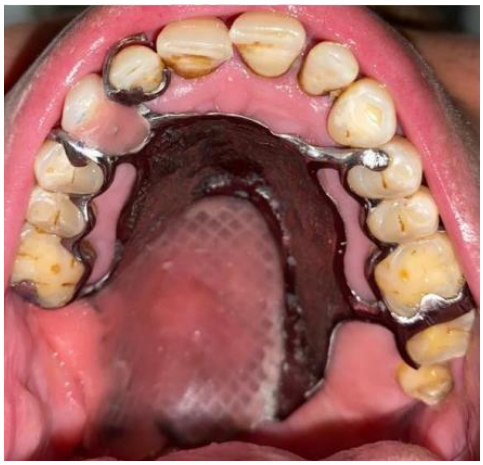

Figure 7 : Trying on the prosthesis

After validation of the prosthesis in the wax stage, it was polymerised using a thermopolymerisable acrylic resin.
The final prosthesis was placed after intra-oral corrections and adjustments. The patient was very pleased with the result and was able to resume almost normal eating and speaking (Fig.8). The patient was given instructions for prosthesis maintenance and periodic visits.

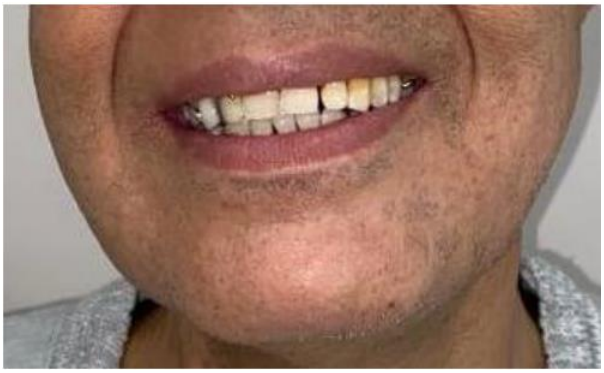

Figure 8 : Patient's smile after prosthesis insertion

DISCUSSION

Even with advances in plastic surgery, the conventional obturator prosthesis remains the ideal therapeutic solution in a number of specific clinical situations. Prosthetic rehabilitation is preferable to reconstructive surgery for patients with highly recurrent tumors. In this case, any recurrence can be detected early in the post-operative period, which is not clinically possible after reconstructive surgery [4].
Despite the abundance of articles in the literature dealing with the design of metal partial dentures, very few discuss the obturating metal partial denture.
Substance loss varies from case to case in terms of extent, location and number of teeth remaining after resection. This diversity makes the design more delicate, as each situation requires its own analysis and characteristics.
In order to facilitate the design of this type of restoration, it is advisable to first define the classification of the substance loss. Aramany has classified acquired maxillary defects into 6 different groups according to the relationship between the defect area and the remaining abutment teeth. In class III, the palatal defect occurs in the central part of the hard palate and may involve part of the soft palate [1], [2].
The dentition is usually preserved, making this obturator prosthesis design simple and effective. The classification and design closely resemble the Kennedy class III design [1]. The presence of teeth facilitates prosthetic rehabilitation, contrary to the fabrication of a prosthesis for an edentulous patient with maxillectomy defect is challenging even to the most experienced clinician [5].
In our clinical case, surgical resection preserved the natural teeth, which played an essential role in prosthetic support by means of well-distributed bilateral supports. A quadrilateral shape, as wide as possible, was chosen to ensure good prosthetic stability. Support is provided by the widely spaced and bilateral abutments [6]. The retention of an obturator depends on various factors such as direct and indirect retention provided by the remaining teeth, defect size, tissue undercuts available around the cavity and development of muscular control [6].

Retention was mainly achieved with circumferential clasps at 12, 14 and 16 and on the contralateral side with an embrasure circumferential clasp between 26 and 27. The 5 mm anterior and 7 mm posterior decolletage was respected because the loss of substance was not too large.
It should be noted that the type of obturator also determines the stability of the prosthesis. There are many types, including rigid acrylic obturators and flexible silicone obturators. In edentulous or partially edentulous patients, a rigid obturator is often chosen [7]. This obturator can vary in shape and size and must contribute to the stability, retention and water and air tightness of the prosthesis. In cases of extensive substance loss, hollow obturators are preferred because their light weight improves retention of the prosthesis. However, their design remains complex and requires sophisticated fabrication techniques.
After surgery, the resultant paltal substance loss could be small or massive. It may involves of a major portion of the palate, nasal cavity and/or maxillary sinus. The patient's quality of life often collapses because of function, speech, and aesthetic disorder [8].

Following such resections, the support, retention, and stability of the removable partial obturator denture depend on the remaining hard and soft tissues and remaining natural teeth, the borders, and the undercut areas within the defect [4].
In this case, a good distribution of the support and retention elements was achieved thanks to the presence of the natural teeth and, given the limited amount of substance loss, we opted for a solid resin obturator.

CONCLUSION

This case study has demonstrated the effectiveness of obturators in restoring function and esthetics in patients with maxillary substance loss. Through careful evaluation, a prosthesis adapted to the patient's specific needs was fabricated, enabling them to regain an improved quality of life.
However, it is important to remember that each clinical case is unique and an individualised approach is essential to ensure optimal results.

REFERENCES

[1] Keyf F. Obturator prostheses for hemimaxillectomy patients. Journal of Oral Rehabilitation. 2001;28(9):821–829. doi: 10.1046/j.1365-2842.2001.00754.x. [PubMed] [CrossRef] [Google Scholar]
[2] ARAMANY, M.A. (1978a) Basic principles of obturator design for partially edentulous patients. Part I: Classification. Journal of Prosthetic Dentistry, 40, 554.
[3] Aramany M. A. Basic principles of obturator design for partially edentulous patients. Part II: design principles. Journal of Prosthetic Dentistry. 2001;86(6):562–568.
doi: 10.1067/mpr.2001.121619. [PubMed] [CrossRef] [Google Scholar]
[4] Ouaalla M, EL Assraoui Kh, Zeroual R, Bellemkhannate S. Rehabilitation of a Patient with Partial Maxillectomy: A Case Report. Integr J Med Sci.2022;9:1-6 . DOI: 10.15342/ijms.2022.481
[5] Roumanas ED, Nishimura RD, Davis BK, Beumer J., 3rd Clinical evaluation of implants retaining edentulous maxillary obturator prostheses. J Prosthet Dent. 1997;77:184–90. [PubMed] [Google Scholar]
[6] Parr G. R., Tharp G. E., Rahn A. O. Prosthodontic principles in the framework design of maxillary obturator prostheses. Journal of Prosthetic Dentistry. 2005;93(5):405–411
doi: 10.1016/j.prosdent.2005.02.017. [PubMed] [CrossRef] [Google Scholar]
[7] Benoist M. Réhabilitation et prothèse maxillo-faciale.Paris: Éditions Julien Prélat; 1978.
[8] Mousa A. M , Johari Yap A , Nafij B. J , Khursheed A. M , Adam H. Biomechanical Stress in Obturator Prostheses: A Systematic Review of Finite Element Studies. BioMed Research International 2021; ID 6419774 : 12 doi.org/10.1155/2021/6419774