

Prosthetic Management of Maxillary Defect Due to an Osteoradionecrosis: A Case Report

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Abstract

Osteoradionecrosis is one of the most serious complications of head and neck radiotherapy and is considered as a public health problem worldwide. It is most commonly characterized by the exposure of the affected bone, in addition to oral ulcers, drainage of purulent secretion and oral fistulas. Treatment of osteoradionecrosis is a challenging problem. The conservative approach to management consists of antibiotics, transoral debridement or sequestrectomy, and hyperbaric oxygen therapy. For advanced stages, patients are treated aggressively by surgical resection of all diseased hard and soft tissue with or without immediate reconstruction. The surgical removal of all or part of the maxilla, leaving the patient with a defect that compromises the integrity and function of the oral cavity. The postoperative restoration of esthetics, deglutition, and speech shortens recovery time in the hospital and expedites the patient's return to the community as a functioning member. The surgical obturator is the proven treatment option in such situations. This article describes a simple technique to fabricate an immediate obturator after sequestrectomy. The obturator fabricated restores patient's manducatory functions and thus may have a positive effect on the patients' psychology.

Keywords: Radiotherapy, Osteoradionecrosis, Sequestrectomy, Maxillofacial prosthesis, immediate obturator, prosthetic rehabilitation.

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INTRODUCTION

Radiotherapy, whether exclusive or combined with surgery, represents one of the main therapeutic weapons for cancers of the orofacial sphere [1].

Osteoradionecrosis is the major complication of radiotherapy due to an alteration of the defense and healing capacities of the mandibular or maxillary bone tissue, and to the damage of the capillaries, resulting in a decrease in tissue perfusion [2].

The treatment of maxillary osteoradionecrosis can lead to maxillary defect which connects the oral cavity with the maxillary sinus. This must be completed by a prosthetic rehabilitation that allows the patient to take his manducatory functions back, especially mastication and phonation.

In this work, through a clinical case, we will present the steps of the immediate prosthetic rehabilitation of a maxillary defect after a sequestrectomy of a maxillary osteoradionecrosis.

CASE REPORT

A 30 years old man, reported by the Department of Oral Surgery of the Dental Clinic of Monastir (Tunisia) to the Department of Maxillofacial Prosthodontic for a prosthetic rehabilitation.

A surgery of grade 2 chondrosarcoma of the right nasal fossa was performed in 2005. The patient was also subjected to adjuvant chemotherapy and radiotherapy on the tumor zone and lymph node areas.

Extraoral examination showed post-surgical facial asymmetry in the right hemi-lip and right nostril with a labial commissure deviation to the right side.

The mouth opening/closing path was straight with moderately sufficient amplitude. Palpation of lymph nodes was normal.

The intra-oral examination showed a moderate maxillary defect, connecting the oral cavity with the right maxillary sinus. The limits of the defect were covered with a necrotic tissue and exposing the roots of

13, 14, 15,16 which were mobile (mobility grade 4) (Fig 1).



Fig-1: Intra-oral photo

In the mandible, there was no missing tooth. A poor oral hygiene was noted with the presence of scale on the anterior teeth.

Examination of the occlusion showed a preserved Occlusion Vertical Dimension (OVD) and Maximum Intercuspation Occlusion (MIO).

Treatment plan was formulated for extraction of 13, 14, 15, 16, sequestrectomy of necrotic tissue and an immediate obturator which restore the separation between the oral and right sinus cavity and replace the missing teeth.

The mucostatic primary impressions were made with an irreversible hydrocolloid (Alginate) using perforated stock trays, whose size was carefully determined.

These impressions were poured with yellow plaster. The limits of the future resected area were traced on the maxillary cast by the surgeon (Fig 2).



Fig-2: The limits of the future resected area traced on the maxillary cast



Fig-3: Teeth that were to be extracted removed by scraping on the cast

Teeth that were to be extracted during surgery were removed by scraping on the cast simulating the surgery (fig 3). On the corrected cast, the lab technician made a palatal plate (with transparent resin) with clasps on the remaining teeth and prosthetic teeth, whose color was chosen carefully (Fig 4, 6).



Fig-4: A palatal plate (with transparent resin) with clasps on the remaining teeth and prosthetic teeth



Fig-5: Tissue conditioner (“Kerr FITT”)



Fig-6: The palatal plate before mouth Insertion

On the surgery's day (fig 7), at the end of the procedure, the palatal plate was inserted in mouth, with tissue conditioner ("Kerr FITT") (fig5) which filled the defect (fig 8).



Fig-7: Teeth extraction and sequestrectomy



Fig-8: The immediate obturator relined with the tissue conditioner

After ten days, the immediate obturator was relined with the tissue conditioner, and the relining procedure was repeated weekly.

Wearing and oral hygiene advice were instructed to the patient, and follow-up appointments were scheduled.

DISCUSSION

Radiation therapy alone or in combination with chemotherapy or surgery is an established form of therapy for the treatment of head and neck cancer [3]. Although radiotherapy can increase cure rates, it does carry the risk of secondary effects and potential orofacial complications (such as mucositis, dry mouth and loss of taste) and in the long term (fibrosis of soft subcutaneous tissues, atrophy of the masticatory muscles, swallowing abnormality, trismus, Post-Radiation Caries and osteoradionecrosis) [4, 5]. Despite the use of intensity modulated radiation therapy, osteoradionecrosis is one of the most feared complications of head and neck radiotherapy, as it can significantly affect quality of life [6].

Osteoradionecrosis is defined as irradiated and exposed bone tissue that does not heal over a period of 3 months, without the presence of a residual or recurrent tumor [3]. It is considered a late event, with the vast majority of cases occurring within the first 3 years after treatment [7, 8].

Osteoradionecrosis can occur spontaneously due to genetic factors linked to the TGF- β 1 gene [9] or be the result of trauma (tooth extraction and denture-related irritations are common causes).

The radiation dose is the main risk factor for osteoradionecrosis, high total doses, high doses per fraction; large field sizes and technology of radiotherapy are all acknowledged to be linked with increased risk [10, 11].

Although osteoradionecrosis can be observed without exhibiting bone exposure [16], normally clinically it can range from a small area of intraoral bone exposure to extraoral fistulas and even pathologic fractures [12].

Osteoradionecrosis is difficult to treat. Several therapies have already been reported that have led to widely divided opinions, but there is still no universally accepted approach. More traditional or early-stage approaches include conservative treatments with oral hygiene control, optimization of nutritional status, hyperbaric oxygen, and the use of antibiotics over a varying period of time. Surgical management can be classified into minor and major procedures [13]. Minor surgery includes tooth extraction or debridement and sequestrectomy of necrotic tissue and antibiotics [14].

Recently, factors such as appearance, swallowing and chewing that interfere with quality of life have been analyzed and shown that the surgical approach with debridement and sequestrectomy can greatly improve quality of life [15, 16].

In order to achieve satisfactory results, cases that do not respond to conservative treatment options or

those in more advanced stages are treated with surgical resection, with or without reconstruction (13).

More recently and in light of the pathophysiology of the disease proposed by Delanian, pharmacological treatment with pentoxifylline-tocopherol with or without clodronate (PENTOCLO), teriparatide and low-level laser therapy (LLLT) have been introduced [17,18].

The prescription of each treatment modality is individualized and some of them are controversial, however, all require long periods of intervention and none of them is definitive. For these reasons, patients with osteoradionecrosis should be monitored regularly due to the high risk of disease progression [12].

The sequestrectomy of the necrotic tissue associated with the tooth extraction undergone by the patient resulted in an increase in the volume of the already existing maxillary defect. This generated functional disorders, namely speech difficulties, due to air leakage. The voice was nasalized with incomprehensible words. Eating became severely disrupted by the reflux of food and fluids into the sinus cavity. Infectious problems have also been noted in the right sinus. Soft tissue sagging on the right side with deterioration of patient aesthetics has been noted. This mutilation deeply affected the patient and made him vulnerable and isolated from his social environment [19-21].

In order to avoid these severe and handicapping consequences, it is imperative to put in place an immediate obturator. Effective communication between the team work (dentist and oral surgeon) is needed for successful treatment and rehabilitation. This is important to determine the sequestrectomy margin and to design the immediate obturator which according to several authors, it is a necessity. The conservation of teeth and anatomical elements needed for the stability of the immediate obturator will also be discussed. The major goal of therapy is not only to remove the necrotic tissue, but also to give the patient a reasonably normal life. The team concept is to ensure the patient's early and successful rehabilitation. Immediate obturator reduces both post-operative morbidity and length of hospitalization. It is required for the restoration of oral functions such as drinking and speech, and for the improvement of the aesthetics and maxillofacial appearance after sequestrectomy. It also contributes to improve mastication and deglutition because of the presence of teeth included in the prosthesis conception [22].

Immediate obturator also required for social interactions in patients with maxillary defect. It provides an improved quality of life and functional

advantage during the healing period. This allows the patient to live in a psychosocial environment [23].

The immediate obturator, also called surgical obturator, was pre-surgically fabricated and adjusted to fit the defect at the time of surgery (In our case, after sequestrectomy and teeth extraction), using tissue conditioners. With this adjustment, the necessity to use surgical packs is eliminated. It is periodically readapted to adjust the tissue changes during the healing period of the defects. The immediate obturator can be used as a temporary/interim obturator and it simplifies the rehabilitation procedures [24].

Rehabilitation via palatal obturators is preferred then surgical reconstruction in patients with a poor prognosis or in weak condition. Hence, it is crucial to work in close cooperation with the staff who makes the prosthesis and who evaluates the case when the sequestrectomy is planned. In this regard, dentist does not follow a rigid protocol but materials and techniques are selected on a personal basis, according to the features of each individual clinical case [24].

The immediate obturator is often correlated with the traditional concepts of retention and stability, which prevent nasal speech and the passage of liquids into the sinus cavity. Etienne and al. maintain that retention is easier to obtain in the clinical management of patients with maxillary defect with dentition compared to those without. The structure of the prosthesis obturator in patients with partial dentition usually comprises clasp components. Furthermore, the use of precise clasps in patients with maxillary defect with dentition may lead to a significant functional improvement guaranteeing aesthetic advantages [25].

Crucial to good results is the cooperation between the dentist and the surgeon already prior to surgery in order to set up immediately after surgery an immediate obturator, which can be modelled on the basis of the structural evolution of the oral cavity until complete recovery from surgery when a definitive removable obturator can be made [24, 26].

The immediate obturator prosthesis is prepared from the impression taken in a pre-surgical consultation. It is composed of a palatal plate, preferably in transparent resin, which allows, during placement, the visual control of the areas of compression and an obturator which fills the maxillary defect [27].

For Barrelier, the immediate obturator prosthesis is preferably made of flexible resin, which is much less complex than the acrylic resin [28]. It is made from an impression taken at the end of the surgery. Brogniez and Hamoir recommend the use of a much more elaborate and comfortable prosthesis,

consisting of a stellite palatal plate with precise retainers [29, 30].

The obturator is made of tissue conditioners which has the advantage of improving the seal and not bothering the patient due to its elasticity. Other materials have also been reported in the literature such as high viscosity silicones, gutta-percha, hemostatic sponges and thermoplastic modeling paste [31].

The chemical adhesion is more sufficient for the liaison of tissue conditioners to the palatal plate. Benoist recommends the use of a retention device on the intrados of the plate [21].

Giumelli and Penn advise against replacing missing teeth to avoid the contours of the maxillary defect an occlusal stress by adding prosthetic teeth [32, 33]. On the other hand, Benoist and Shambharkar find that prosthetic teeth improve swallowing [27, 34].

CONCLUSION

Osteoradionecrosis treated with maxillary sequestrectomy leads to some oral disabilities which are minimized or eliminated almost immediately with prosthetic obturation lessening the sequel of surgery. As our case illustrates it, immediate prosthetic obturation enables the patient to immediately and effectively speak after surgery and reduce the leakage of food bolus and liquids into the sinus cavity so that the patient's comfort and function can be maintained until the definitive prosthesis is fabricated. Indeed, a definitive prosthesis is not indicated until the surgical site is healed and dimensionally stable.

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