Quest Journals
Journal of Medical and Dental Science Research
Volume 8~ Issue 11 (2021) pp: 36-42
ISSN(Online) : 2394-076X ISSN (Print):2394-0751
www.questjournals.org

Research Paper

Prosthetic management following ameloblastoma resection

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Abstract:
Ameloblastoma is a rare, locally aggressive and usually asymptomatic odontogenic neoplasm,more common in the mandible that tends to grow slowly but locally invasive and can be highly destructive of the surrounding dental structures. Surgical resection is the most definitive treatment. Although, its extent of surgery is often debated in the literature. However, treatment can further contribute to patient deformity and malfunction which leads to serious complications such as facial deformity, phonetic difficulties, swallowing problems with, loss problems teeth and alveolar basal resorptionwhich cause significant chewing impediments.
The management is multidisciplinary. The fibula is one of the favorite flaps for the reconstruction of mandible defects. The most common prosthetic rehabilitation for such patients is, removable mandibular guide flange prosthesis and palatal based guidance restorations.
Regarding the masticatory rehabilitation of these patients, the application of a removable prosthesis, not supported by implants, may be difficult or even impossible due to the post-surgical alteration of the anatomical structures, the low salivary flow and the acceptability by the patient.
The purpose of this article was to report a case of desmoplastic ameloblastoma on which we present the diagnostical approach as well as the surgical-prosthetic management.
Key words: *ameloblastoma, resection, mandibular reconstruction, oral rehabilitation, implant, prosthesis.*

Received 08 November, 2021; Revised: 22 November, 2021; Accepted 24 November, 2021

I. Introduction:

As stated by Robinson, ameloblastoma is usually unicentric, nonfunctional, intermittent in growth, anatomically benign and clinically persistent tumor. It is relatively uncommon and accounts for approximately 1% of all oral tumors. It occurs in all age groups but the lesion is most commonly diagnosed in the third and fourth decades[1].

The main goals of ameloblastoma treatment are complete removal of the tumor and restoration of function and aesthetics by restoration of the mandibular post-surgical defect.

Surgery is deemed to be one of the major treatment approaches for ameloblastoma, and resection is considered an ideal surgical method. However, it involves a wide bone margin, demanding the immediate or delayed bony reconstruction of the defect with tissue grafts and/or prosthetic rehabilitation. Meanwhile, with aggressive treatment and the current standard of care, a high degree of morbidity is observed and the risk of recurrence still exists [2].

Prosthetic rehabilitation should be available to restore mastication within the mandibular residual functions. All framework designs should be detected by a basic prosthodontic one, which is a common feature of all removable resection prostheses [3].

Although the management is the responsibility of the maxillofacial surgeon, the role of the dentist is to establish an early diagnosis and to plan a post-surgical prosthetic rehabilitation [4].

The success of treatment requires good collaboration between both of them.

The aim of this manuscript is to present through a clinical case, the stages of prosthetic rehabilitation after resection of an ameloblastoma in the mandible,

II. Case Report:

A 54-years-old male was referred to the Department of Prosthodontics at dental clinic of Monastir by his dentist for prosthetic rehabilitation.

A surgical removal of a recurrent ameloblastoma in the right side of the mandible was performed in 2009. The patient was also subjected to an immediate reconstruction with an iliac crest bone graft, which has failed.

The chief complaint was functional: a chewingproblemsand improper speech.

Extra oral examination revealed a relevant facial asymmetry, a sufficient mouth opening and a slantedmouth opening/closing path. (Fig 1)

Figure 1

Intraoral examination revealed a poor oral hygiene. In the maxilla, we noted, a mobility class 3 of the 16 and 17with a gingival recessionreaching the root apical third.Theseteeth were over erupted. The 27 was mobile with recession reaching the middle third.The 18,15,26 and 28 were missing. (Fig2)

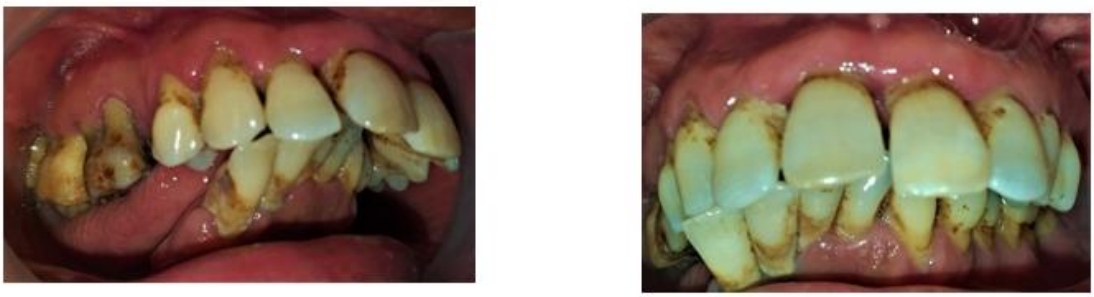

Figure 2

In the mandible, we noteda red and swollen gingivae specially in the anterior sector, a mobility class 3 of the 42,41,31,36and a recession reaching the root middle third in the 36.

We noted also abony defectwhich concerned the right mandibular body distally from the premolar region.The 38,37,43,44,45,46,47 and 48 were missing.

The panoramic radiograph and the CBCT (Cone Beam Computed Tomography) (coronal section and 3D reconstruction) confirmed the existence of an interruptermandibular defect of a part of the body, and the whole ramus on the right side. (Fig3, Fig 4)

Figure 3

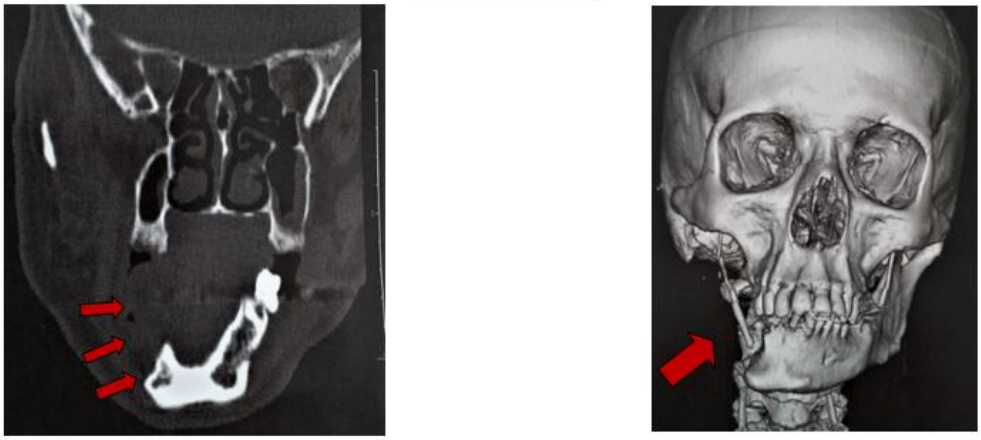

Figure 4

The examinationof theocclusion showed apreserved Occlusion Vertical Dimension and an unpreserved Maximum IntercuspidalOcclusion.
The treatment plan was formulated for free fibula flap and an implant-retained prosthesis after extraction of unuseful teeth. However, due to financial constraints, the patient opted to removable partial dentures.
Primary impressions were made with an irreversible hydrocolloid (Alginate) using perforated stock trays, whose size was carefully determined.Impressionswere poured with white plaster.
Custom trays were made with a self-curing resin after scratching extracted teeth (17,16,27,42,41,31) on primary casts.
The maxillary and the mandibular custom tray were carefully adjusted in the mouth and the peripheral seal was made using thermoplastic paste (Kerr®) next to the edentulous ridges.
Anatomo-functional impressions were taken with polysulfide (Permlastic™) and poured with hardplaster. (Fig5)

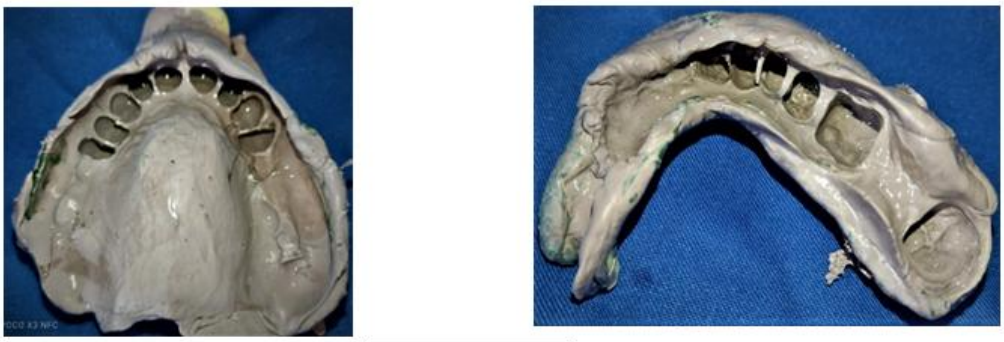

Figure 5

Jaw relation was made in centric relation and in the correct occlusal vertical dimension, because the mandibular deviation was reducible.
This was followed by the mounting of the casts on articulator. (Fig 6)

Figure 6

After teeth setting up (Fig7), the try in was done to evaluate the new occlusal relationship and the esthetic appearance.

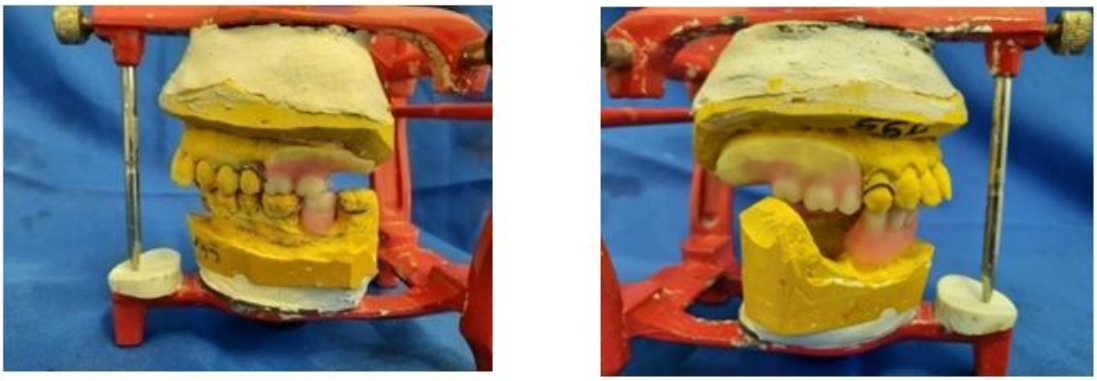

Figure 7

Then,a partial palatal flange extending 7 to10 mm carried out laterally and superiorly on the palatal aspect of the premolars and molars of the non-defect side, was designed in the upper denture sliding on the lingual surfaces of the mandibular premolo molar group on the left side to direct the mandible to an appropriate intercuspalposition.(Fig 8:a,b)Once polymerized, dentures were polished and inserted in mouth.

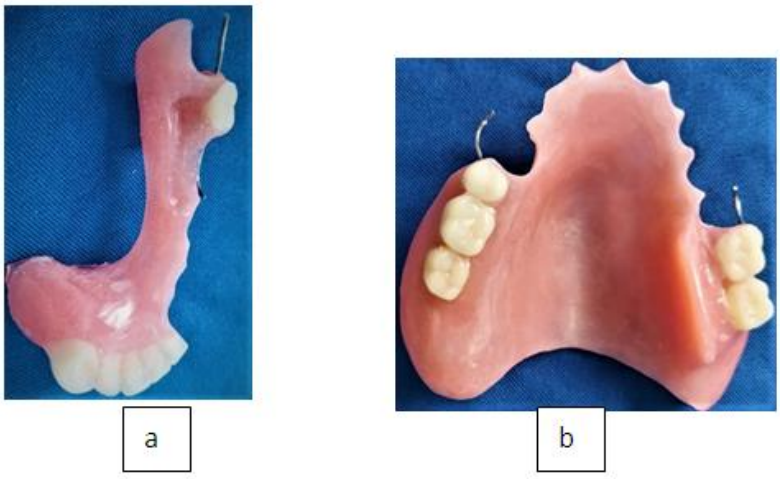

Figure 8

III. Discussion:

Ameloblastoma is an uncommon benign, locally aggressive odontogenic neoplasm that accounts for approximately 10% of all tumors that arise in the mandible and maxilla [5,6].

Its etiology has not yetbeen recognized precisely, but factors such as trauma, extraction of teeth, and vertical prosthetic height have been regarded aspossible etiologic factors in some articles[7,8].
It is usually found in young adults. Males and females are equally affected [9,10].
Radical surgery is the treatment of choice with lowrecurrence rates in both case of a primary and a recurrentameloblastoma[11].
Management of ameloblastoma still remainsa subject of debate posing a dilemma to the surgeonsbetween a more conservative treatment and a more radical one[12]. There is a tendency to treat conservatively small tumors (enucleation, curettage, marsupialization) whereas large and recurrent tumors are treated radically (marginal, segmental resection, hemi-mandibulectomy) [13].
The treatment can be performed conservatively (by enucleation or curettage) or radically (marginal, segmental resection, hemi-mandibulectomy). Ameloblastoma has a much higher recurrence rate then other benign jaw tumors. Late diagnosis and the spread of the lesion to appear on more than one location lead to poor prognoses for aesthetic and functional rehabilitation[13].
According to the literature, the treatment strategy is the main factor that influences the recurrence rate, as well as the risk of postoperative complications[14].
Radical surgery, although it has been recognized as the most effective treatment modality, is associated with a higher rate of complications, leading to patient invalidation, and requires more sophisticated approaches to cosmetic and functional rehabilitation[14].
According to Périand al. mandibular defect will lead to an osteo-maxillo-dental deficiency responsible for deformations whose functional, aesthetic and psychological repercussions are particularly serious[15].
Fibrous Scar, as vicious retractile scars, are the consequence of wound healing. They concern the cutaneous, subcutaneous tissues and the mucosa. They appear about 15 days after the surgery[15].

When surgery includes a segmental mandibulectomy, masticatory behavior was altered. This is due toa disruption to the occlusion, changes in muscle recruitment, an altered maxillomandibular relationshipand probable loss of sensory feedback. Chewing was altered to some degree, because a chewing preference for the non-osteotomy side developed post-surgery. Alternatively, the modified strain pattern could have arisen from positional instability of the mandible[16,17,18].
Loss of continuity of the mandible leads to altered mandibular movements and deviation of the residual fragment towards the surgical side[19].
The morphological incidence is variable depending on the topography and the extent of the Segmental mandibulectomy defects.in our case report the defect was located in lateral segment of the body and the ascending ramus of the mandible. Therefore, it was responsible for a facial asymmetry, an erasure of the relief of the angular region and an ipsilateral lowering of the labial commissure[20].
This deviation was more important if the mandibular defect was not repaired immediately.
The amplitude of the functional movements of the mandible wasdecreased in both frontal andsagittal plane.In fact,in the frontal plan we noted ashift of the interincisal point on the resected side and limited or absence of laterality of the mandible on both right and left side. In the sagittal plan it was noteda recoilof the inter-incisal point, as well as the limitation or absenceof propulsion and retrusion of the mandible[19].

Mandibular reconstruction is necessary after tumor resection, resulting severe defects of the mandibular arch continuity and sacrifice of teeth. Basic reconstruction involves the use of non-vascularized bone grafts in combination with restoration of lost teeth by dental implants and implant-supported prostheses. In cases presenting with less than 5 cm mandibular segmental defect, reconstruction is achieved using a non-vascularized iliac crest graft[21].
They provided adequate structure and contour for implants associated with the short length of stay and low incidence of secondary procedures. In addition, they presented few complications such as infection, delayed healing, excessive bony resorption, fractures or plate exposure[22].
whereas, in cases where bone resection leads to a continuity severe defect, reconstruction using a micro-vascularized free flap is required[21].

Reconstruction of the large bone defect of the jaws using the reconstructive technique with free vascularized fibula flaps is a promising alternative to the commonly used techniques with no vascularized bone grafts. That do not show significant resorption after the reconstructive procedure and before implant placement[23]. Moreover, the vascularized graft remains capable of healing to the adjacent native mandible and eventually

withstand the loading forces associated with mastication, provide bone stock for dental implants in the majority of patients, which has been demonstrated as an essential factor for full oral rehabilitation[24].
The fibula osteocutaneous flap, is the most often choice of flap, allows for osteotomy and placement of dental implants, there are various modifications to reduce postoperative wound infection, and donor site morbidity[24].
Theseare relevant advantages that could lead to consider free flaps as the first choice in mandibular reconstruction[23].
Management of the patient following a mandibulectomy requires a sound understanding of removable prosthodontic principles[25].
The aim of surgical reconstruction is to prepare a sufficient supporting area to receive the prosthetic treatment.
The most common prosthetic rehabilitation for such patients is, removable guide flange prosthesis, palatal based guidance restorations and implant supported prosthesis [26].
Permanent partial denture repair is postponed until a satisfactory maxillomandibular relationship is achieved or a mandibular guiding therapy end point has been attained [27].
Various successful forms of guiding prosthesis in treating mandibular deviation have been documented in the literature. The extension may be processed in acrylic resin, casted with RPD alloy, or using a heavy wire loop [3,28].
Robinson et al. suggested that if the mandible can be manipulated into an acceptable maxillomandibular relationship, but lacks motor control to bring the mandible into occlusion, a cast mandibular resection restoration is appropriate. They further stated that fabrication of a provisional guide plane facilitates the fabrication of a definitive restoration [3].
Joshi et al described the fabrication of a mandibular guide flange prosthesis and suggested that a removable prosthesis is an effective alternative for most patients with mandibular defects[3].
Mandibular guide flange prosthesis is a corrective device indicated for hemi-mandibulectomy patients presenting good natural teeth on the residual mandible to restrict clinical symptoms and restore mandibular functions when the mandible can be moved into an adequate maxillomandibular relationship to bring it into occlusion. It fits generally over these teeth (base-plate) and has a guide plane (flange splint) of sufficient size and shape extending into the maxillary buccal vestibule, and which rides on the buccal surfaces of the maxillary teeth. "The flange mechanically maintains the residual mandible in the proper position for the vertical chewing stroke, with little or no lateral movementpreventing it from turning toward the resectedside." [26,27,28,29]
These prostheses may have altered contours to accommodate the surgically altered anatomy as compared with conventional removable dentures. Impression making to generate these portions of the prosthesis can be completed either through static or functional approaches.[25].
Post chirurgical altered intraoral anatomy can create challenges for intraoral mandibular resection prosthesisfabrication. Unfavorable location of suture lines can result in the edentulous ridge being contiguous with moveable structures of the oral cavity (tongue or buccal mucosa), which can dislodge the prosthesis or cause prosthesis instability. Additionally, the absence of the pelvi-lingual and vestibular groove, and the fragility of the soft tissues complicate the subsequent application and stability of a prosthesis [25].

Mandibular resection prostheses for partially edentulous patients can be predictably fabricated using conventional removable partial denture prosthesis framework design principles and a functionally generated approach for the edentulous area[25].
Regarding the masticatory rehabilitation of these patients, the use of a removable prosthesis, not supported by implants, may be difficult or even impossible due to the post-surgical alteration of the anatomy, the low salivary flow and the acceptability of the patient[30].
Rehabilitation with implant therapy is therefore potentially more acceptable and reliable for the restoration of masticatory and aesthetic functions.
However, patients without implants should be informed that their restorative prognosis can be compromised because of the lack of prosthesis retention or stability.So, an implant-supported fixed prosthesis is a most common treatment choice for restoring partially edentulous arches after mandibular resection[30]. However, it is not considered since no bone graft is used [26]. Generally, implants placement are delayed. Immediate placement of fixtures may increase surgical duration for an already long microvascular procedure and compromise flap vascularity, the operative procedure, or resulting implant malposition. For these reasons, many authors recommend the implant placement at least 6 months after the bone reconstruction [31].

IV. Conclusion:

The management of ameloblastoma requires a multidisciplinary team that covers not only the ablative part but also the reconstructive, oral rehabilitation (dental implants, mastication, deglutition, speech, etc.), social and emotional aspects of this disease. A long-term commitment and collaborative effort from the team, as well as patients and their families, are crucial to optimize outcomes.

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