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Preservation of the Mandibular Condyle in Treatment of Odontogenic Myxoma in the Mandible: A Case Report

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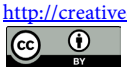

Abstract

Odontogenic myxoma (OM) is an uncommon benign tumor and the adequate management of this lesion is a challenging issue due to the high risk of recurrence. Management varies according to the location and the size of the tumor, patient age, and individual experience, ranging from minimally invasive excisional biopsies to extensive resection. The main goal of mandible reconstruction is to restore continuity of the mandibular arch and restore functionality. Limitations in mouth opening and displacement of the mandibular condyle are common in patients undergoing mandibular reconstruction. Thus, the purpose of this paper is to report a clinical case with maintenance of the mandibular condyle after mandibular resection in the treatment of odontogenic myxoma. An 18-year-old male patient presented in an orthopantomogram, an osteolytic lobulated lesion, well delimited in an ascending branch of the left mandible, with dimensions of about 25 mm × 30 mm, without any clinical sign. The incisional biopsy showed an OM. Then, it was planned and performed a resection of the lesion, with mandibular condyle preservation, and bone graft for jaw reconstruction. The patient is in a 5-year follow-up presenting no recurrence.

Subject Areas

Dentistry, Maxillofacial Surgery and Oral Pathology

Keywords

Mandibular Condyle, Odontogenic Myxoma, Jaw Reconstruction

1. Introduction

Odontogenic myxoma (OM) is an uncommon benign tumor [1] [2] [3], corres-

ponding to 3% - 6% of all odontogenic tumors [1]. Odontogenic tumors are rare lesions even in specialized centers [4]. OM has a slow growth and a high rate of recurrence and infiltration [1] [2] [3], being most commonly found in the mandible, in the molar and mandibular branch regions [1], with a higher presence in the second or third decades of life [3]. Incidence is similar between males and females [2]. Its etiology is unknown [2]. Radiographically, the lesion varies from small unilocular radiolucency to large multilocular radiolucency, which can displace teeth or C tooth roots [1]. Cortical expansion or perforation is common findings [3]. Treatment options may vary from curettage to segmental resection with wide margins for more aggressive lesions [1].

There are few cases of odontogenic myxoma described in the literature [2], and the adequate management of this lesion is a challenging issue due to the high risk of recurrence [3]. Therefore, there is no recommendation for the best management in relation to the lesion [3]. Management varies according to the location and the size of the tumor, patient age, and individual experience, ranging from minimally invasive excisional biopsies to extensive resection [3]. The main goal of mandible reconstruction is to restore continuity of the mandibular arch and restore functionality [5]-[10]. Limitations in mouth opening and displacement of the mandibular condyle are common in patients undergoing mandibular reconstruction [5].

Thus, the purpose of this paper is to report a clinical case with maintenance of the mandibular condyle after mandibular resection in the treatment of odontogenic myxoma.

2. Case Report

An 18-year-old male patient sought the oral maxillofacial surgery service at the Cancer Hospital of Cascavel, in Paraná Brazil (Uopeccan/Cascavel) with a history of consultation with a private dentist for the removal of third molars. On clinical examination, he presented normal mouth opening and preserved excursion movements, without any intra or extra oral edema (**Figures 1(A)-(C)**). On orthopantomogram, an osteolytic lobulated lesion was observed, well delimited in an ascending branch of the left mandible, with dimensions of about 25 mm × 30 mm (**Figure 2(A)**). The image was evaluated on computed tomography, and bone fenestration was observed on both the buccal and lingual surfaces (**Figure 3**). The patient underwent incisional biopsy and histopathological analysis, with a result of Odontogenic Myxoma. The case was discussed with the head and neck surgeons' team then, as the lesion was a benign tumor, it could be conducted by the oral and maxillofacial surgeons' team. Subsequently, surgical resection of the tumor was scheduled and performed under general anesthesia and nasotracheal intubation, through Risdon access (**Figure 4(A)**). Resection of the mandible branch was performed, with the osteotomy margins comprising the oblique line inferiorly to the edge of the mandibular angle, involving the coronoid process and preserving the mandibular condyle from the condylar neck

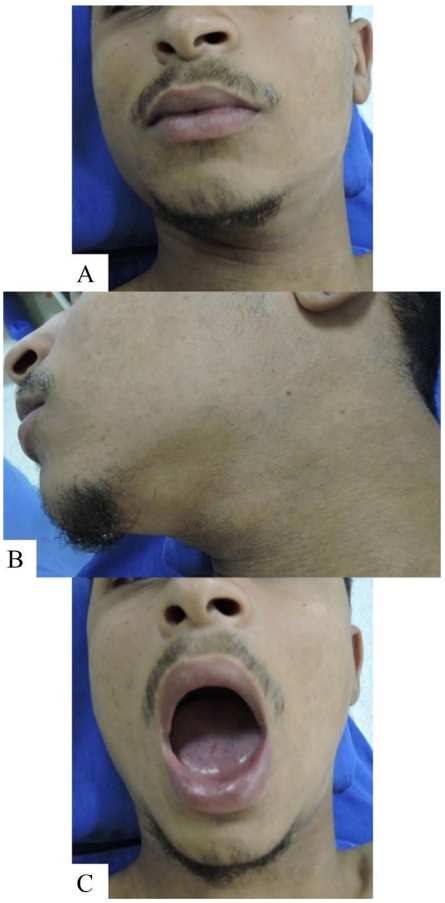

Figure 1. (A) Preoperative extraoral clinical presentation in frontal view; (B) Preoperative extraoral clinical presentation in lateral view. (C) Preoperative mouth opening.

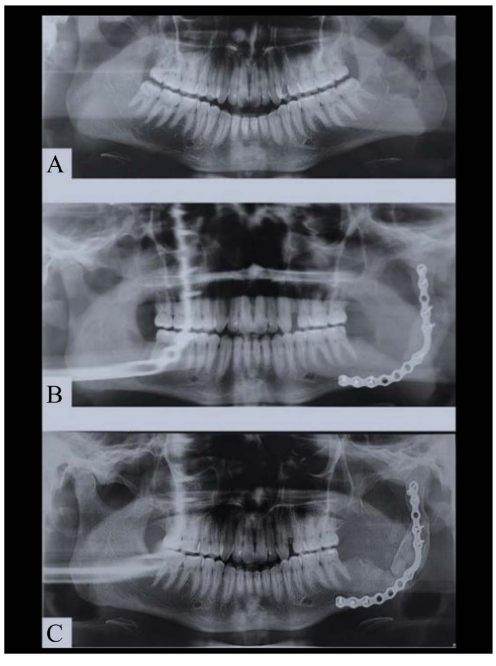

Figure 2. (A) Preoperative orthopantomogram; (B) 6 months postoperative orthopantomogram; (C) 2 years Postoperative orthopantomogram.

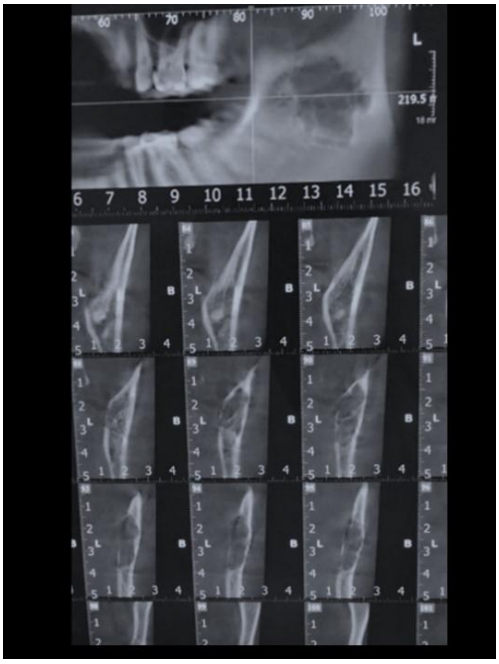

Figure 3. Computed tomography showing the fenestration on lingual and buccal surfaces.

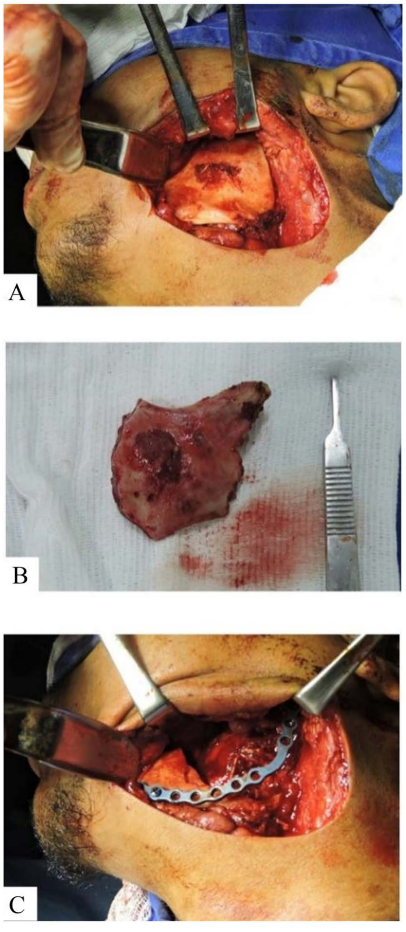

Figure 4. (A) Extraoral access and the lesion; (B) Resected part of the mandible; (C) Remaining mandible reconstructed.

(**Figure 4(B)**). Fixation of the remaining bone segments was performed using the 2.4 system reconstruction plate (**Figure 4(C)**). The bone defect was reconstructed using an iliac crest bone graft, collected by the head and neck surgeon's team, and fixed with screws from the 2.4 system (**Figure 4(C)**). The suture was performed on the deep tissues in the planes with Vicryl 3-0 and in the skin with nylon 5-0. The patient is in 5-year postoperative clinical and radiographic follow up (**Figure 2(B)**, **Figure 2(C)**), presenting no aesthetic sequelae, with normal mouth opening and normal occlusion (**Figures 5(A)-(C)**). Signed consent was obtained from the patient.

3. Discussion

The treatment of tumors in the facial maxillary region is a challenging process [3], with various types of bone osteotomies being proposed, such as marginal and segmental bone resections of the mandible. Marginal mandibulectomy contributes to the maintenance of bone architecture, preserving muscle insertions in the mandible, resulting in a lower level of functional and aesthetic deformity [11] [12]. Unlike segmental resection, only part of the mandible is removed with preserved mandibular continuity, thereby improving treatment results [13]. Nevertheless, marginal mandibulectomy can limit dependence on free fibular grafts, especially in centers where such flaps are preferentially made [11]. Conversely, segmental mandibulectomy is an invasive procedure that results in significant morbidity related to both function and aesthetics [14]. Mandibular defects due to segmental resections interrupt muscle connections, impair mastication, speech and aesthetics, and may impair the closing of the lips, contributing to the poor quality of life of the patients [15]. Segmental mandibulectomy, however, is required to reach an adequate margin of the tumor bone lesion [14]. Additionally, the surgeon must trust the preoperative images and intraoperative findings to decide which treatment is most appropriate [12] [16]. Thus, tumor resection through segmental mandibulectomy was carried out, aiming at better results to the patient.

Figure 5. (A) Long term postoperative extraoral clinical presentation in frontal view. (B) Long term postoperative extraoral clinical presentation in lateral view. (C) Long term postoperative mouth opening.

In the preoperative evaluation, panoramic radiography has been used since the early stages of the development of the technique, despite the overlapping of images [17]. Other suggested treatments have involved the use of lateral cephalometric radiography and computed tomography [18]. The evolution of technology applied to surgery is constant, and virtual planning with 3D models has improved surgical results and optimized occlusion restoration [10] [17] [19]. Angiograms are also performed preoperatively in order to improve planning [19]. Nevertheless, not all reference centers have such technology available, given its costs [19]. In this case, we used panoramic radiography and computed tomography, making it possible to evaluate and plan the procedure properly. It is mandatory that both surgeons, the one in charge of the resection and the one responsible for the reconstruction, participate in the planning, in order to minimize the probability of intraoperative complications [19]. This case was carried out by the maxillofacial surgery team, which was responsible for removing the tumor and performing reconstruction with iliac crest graft, and by the head and neck surgery team, which was responsible for removing the iliac crest graft.

The restoration of function and aesthetics in mandibular reconstruction is usually achieved with bone grafting and the use of metal plates [6] [8] [12] [18]. Defects in the mandible by resection can be complex and difficult to reconstruct [17]. Regarding the most appropriate method, it is necessary to individualize each case, depending on the situation, while considering comorbidities, disease prognosis, patient tooth status, amount of loss of intraoral and extraoral soft tissues, and possible complications in the donor area [8] [12]. Reconstruction can occur at the moment of surgery or later, and it is suggested that lesions with high rates of recurrence should receive a late graft [3]. Although the present diagnosed lesion has high rates of recurrence, immediate reconstruction was chosen, given to the patient's age and the search for better local conditions for reconstruction, as late reconstructions face mainly soft tissue fibrosis. Materials for implants or autogenous bone can be used [15]. Among the autogenous alternatives, the vascularized free graft is a technique with low rates of dehiscence, when well-vascularized tissues [18] are applied, with low infection rates and high success rates [6] [9]. Although microvascular reconstructive procedures require many hours in the operating room and prolonged administration of anesthetics, with increased morbidity that can also involve the donor area [12], the use of free vascularized fibular graft has been one of the most widely recommended options for reconstruction of large bone defects [6] [8] [9] [12] [15] [18] [20], as it is a versatile option, with great length and the possibility of being folded for vertical increase [8] [9]. The non-vascularized bone graft is an alternative method, which involves lower costs, being simpler to obtain and providing less morbidity to the donor area [15], with the iliac crest being an option to be considered, as it is similar to the mandibular bone, being used as a block [6] [8] [21]. It provides adequate bone volume, contour and tension distribution [15] [21], offering medullary and cortical bone [17]. The cortical part provides the structure, while the medullary part contains osteoblasts, osteoprogenitor cells, and

bone marrow [17]. It is thus a favorable option for osteogenesis, allowing efficient healing of the autogenous bone graft [17]. There is no consensus as to the size limit of the graft, but it is recommended for defects up to 6 cm [21]. For grafts larger than 12 cm, the loss rate can be 75% [21]. Studies show that it can bring results similar to that of vascularized grafts [15]. In the case in question, an extensive graft removed from the iliac crest was used, offering the conditions already mentioned, which are essential for successful treatment.

Prevention or treatment of common surgical complications is necessary, and one of the main complications after application of the bone graft is chronic infection, with subsequent dehiscence [15]. For the success of the graft, it is ideal that there be no infection at the site, with ample soft tissue coverage. In addition, the graft fixation must be adequate and without movement [21] [22]. An option to ensure better adaptation of the musculature, ligaments and tendons is the use of suture anchors [22]. In this present case, fixation was performed using the system 2.4, with only periosteum and musculature sutures, flat and without tension, without application of other devices. The evolution of the case presented no postoperative complications. In addition, mandibular reconstruction with non-vascularized grafts depends on the surgeon's experience and familiarity with the technique [21].

It is also important to note that the main concerns in mandibular reconstruction are restoration of occlusion in dentated cases and obtaining of a functional mandible in toothless cases, hence the need for restoration of postoperative dental occlusion [8]. A number of patients opt for removable dentures instead of dental implants, which may be related to economic conditions [15]. The patient in the case reported presented the lesion in the mandibular branch region, a region without dental elements, therefore not requiring other rehabilitation procedures, which favored the treatment.

Although the grafts showed good results, the management of the condyle remains a challenge [8]. The mandibular condyle plays a key role in mastication, swallowing, and articulation, and thus, its preservation has major implications regarding quality of life [14]. The decision to preserve the condyle must be carefully studied, with adequate surgical margins to reduce the risk of recurrence [14]. Even with extensive injury, tumor resection with a safety margin was possible, maintaining the mandibular condyle. Maintenance of the condyle was shown by Wang *et al.* (2017) as a better option to maintain temporomandibular functions than resection or removal, freezing and reinsertion, with resection presenting the worst results [8]. The literature explains that complications are generally caused by contraction of the scar in the temporomandibular joint and in the set of masticatory muscles [5]. Structural problems involving displacement of the jaw head and protruding disorders may also be related [5]. Displacement of the mandibular head and protrusion disorders can develop when there is an imbalance in the action of the masticatory muscles, as each has a specific function [5]. The rotational and translational movements of the temporomandibular joint work together to enable the mandibular head to travel a com-

plex path [5] [8]. The literature shows that, after mandibular reconstruction, physiological protrusive excursion may not occur, and the mouth opens only through rotational movement [5]. Conversely, it is also said that protrusion happens, albeit imperfectly [5]. When the branch, including the coronoid process, is resected, there is a greater chance of dislocation of the articular head [5]. Even after mandibular reconstruction, there may be rotation of the mandibular head and protrusive excursion, similar to that observed in healthy patients [5]. Such movements can be considered to occur normally, as there is no change in the mouth opening and no mandibular deviation in opening or closing, and the patient is able to perform mandibular protrusion.

Procedures for mandibular tumor resection lead to mandibular bone adaptation, according to Wolf's law, with mechanical and physiological changes, which can be harmful, with toothed patients and normal muscles being at greater risk [13]. What we observe in the present case is a positive adaptation, as the mandibular condyle adapted in the articular fossa and the mandibular movements were maintained. Given the type of lesion diagnosed, myxoma, a follow-up period is necessary, and it is advisable that it is performed at least in the first 2 years after surgery, which represents the period during which the neoplasm is more likely to recur [3]. Additionally, it is suggested that the non-recurrence would be verified with 5 years of follow-up, despite being necessary for an indefinite period [3]. The patient has been monitored for 5 years and, as of the present time, is without signs of recurrence. Even so, as a service protocol, the patient will continue to return periodically. Although the future remains uncertain as to the expansion of possibilities for reconstruction options, the basic principles in maxillofacial reconstruction should remain [20].

4. Conclusion

Maintenance of the mandibular condyle in major resections is a valid form of treatment that must be programmed preoperatively. The choice to maintain the mandibular condyle after resections must follow the criteria of good surgical practice, as this bone remnant must be free of disease and a safe surgical margin should be managed, always considering the nature and histopathology of the tumor.

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Conflicts of Interest

The authors declare no conflicts of interest.

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