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Resection of large proportion ameloblastoma with immediate reconstruction: A case report

Everton José da Silva, Géssica Vasconcelos Godinho, Luís Ricardo Machado Magalhães, Luiz Evaristo Ricci Volpato

ABSTRACT

Introduction: Ameloblastoma is a benign odontogenic tumor, locally aggressive and highly prone to recurrence. Due to its clinical behavior and high recurrence rate, it is recommended that the treatment of ameloblastoma be radical, which creates a defect in bone continuity, requiring reconstruction of the osteotomized segment.

Case Report: A 26-year-old patient diagnosed with a large proportion ameloblastoma of plexiform type in the left mandible, resulting in facial asymmetry and volumetric increase in the left middle and lower thirds of the face sought treatment at Mato Grosso Cancer Hospital. The treatment consisted of resection with immediate reconstruction, using pre-contoured reconstruction plate aided by prototyping and costochondral graft.

Conclusion: The graft associated with the reconstruction plate demonstrated good adaptation to the mandibular fossa and preservation of joint function, in addition to minimizing the possible mechanical failures expected from the fixation material. The use of the 3D model to aid in the previous conformation of the plate resulted in less surgical time, adequate adaptation of the material to the bone segment, and better facial symmetry.

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INTRODUCTION

Ameloblastoma is a benign, intraosseous odontogenic tumor, of epithelial origin, locally aggressive, with progressive and expansive growth [1, 2], and high tendency to relapse. Its origin is related to the enamel organ, remains of the odontogenic epithelium and coating of odontogenic cysts [1].

Its recommended treatment is marginal or segmental mandibulectomy, with the need for margins of 1 to 1.5 cm [3] which commonly leads to continuity defect in the bones, requiring mandibular reconstruction usually performed with autogenous bone graft and titanium plates [4].

This work presents a case of extensive ameloblastoma resection in the mandible with immediate reconstruction using pre-contoured reconstruction plate aided by prototyping and costochondral graft.

CASE REPORT

A 26-year-old male patient previously diagnosed with ameloblastoma sought treatment presenting a hardened swelling in the face with an evolution of 10 years. The diagnosis had been made previously in an

anatomopathological analysis service, after incisional biopsy. According to the patient, in the episodes of pain, attempts were made to decompress the lesion through puncture, resulting in temporary relief. However, some of such attempts led to hemorrhage requiring hospitalization. Due to financial limitations, it took time for him to seek specialized care.

He presented facial asymmetry with volumetric increase in the middle and lower thirds of the left face, with a hardened consistency on palpation, painless and a normal colored surface. Intraorally, in the posterior region of the left mandible, there was bulging of cortical bone and nodular lesion, with an irregular, symptomatic, fixed surface, with sessile base and presence of purulent secretion. Poor oral hygiene and the left side maxillary molars occlusion on the tumor were also noted (Figure 1).

Computed tomography showed a hypodense, multilocular lesion, with bulging of cortical bone involving the left hemimandible, associated with teeth 37 and 38 (Figure 2).

A new incisional biopsy was performed in the lesion, which revealed a fragment of odontogenic lesion of epithelial origin, whose histopathological analysis consisted of plexiform and follicular parenchyma, composed of basaloid cells similar to ameloblasts. In the internal region of the lesion, a looser disposition was noted, mimicking the stellar reticulum. There was no sign of malignancy. From these findings, the diagnosis of ameloblastoma was confirmed (Figure 3).

Hemimandibulectomy with immediate reconstruction using a 2.4 mm mandibular reconstruction plate and a costochondral graft, removed from the rib, was proposed.

A 3D anatomical model generated from rapid prototyping was used for conformation prior to surgery to optimize the surgical time and improve the adaptation and fixation of the reconstruction plate (Figure 4). To reconstruct the side to be resected, the contralateral area was mirrored.

Under general anesthesia and nasotracheal intubation, lip switch with extended submandibular incision was performed for exposure and resection of the tumor. The occlusion was preserved using maxillomandibular block through locking screws and steel wire. This was followed by ostectomy in the anterior region of the mandible and resection of the tumor measuring 13 cm in its greater extension (Figure 5). The pre-conformed reconstruction plate was adapted and fixed to the mandibular remainder. The costochondral graft taken from a right rib was fixed to the plate with screws to mimic the mandibular condyle and maintain joint function (Figure 6). A vacuum suction drain was used in the immediate postoperative period to reduce the possibility of dead space formation. The patient was admitted to the intensive care unit for three days. During that time he was fed with pasty food by the oral route.

The control radiography showed good positioning of the plate and graft (Figure 7). The locking screws were maintained for elastic therapy.

Figure 1: Initial aspect of the patient presenting (A) Extraoral frontal aspect showing a volumetric increase in the middle and lower thirds of the left face. (B) Extraoral left lateral aspect showing volumetric increase extending from the preauricular and zygomatic regions to the submandibular region. (C) Intraoral view showing volumetric increase with ulcerated area in the posterior region of the left mandible, with deletion of the buccal sulcus.

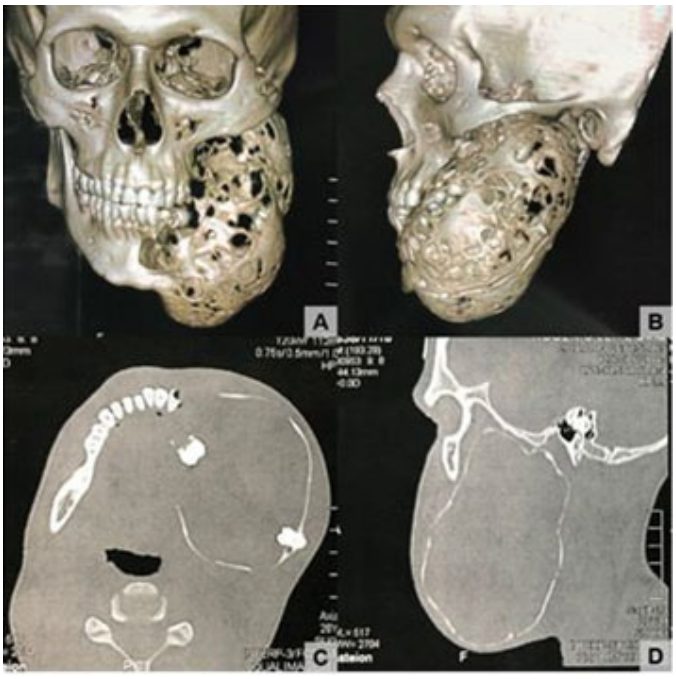

Figure 2: Computed tomography. 3D reconstruction in (A) frontal view and in (B) left lateral view, with an image suggestive of multilocular tumor lesion in the left hemimandible. (C) Axial section with an image suggestive of tumor lesion associated with embedded teeth. (D) Sagittal section with an image suggestive of tumor lesion, with integrity of the adjacent bone structures.

After 14 days, the patient evolved with stable dental occlusion, limited mouth opening, hypomobility of the lower left lip and fistula with purulent drainage in the

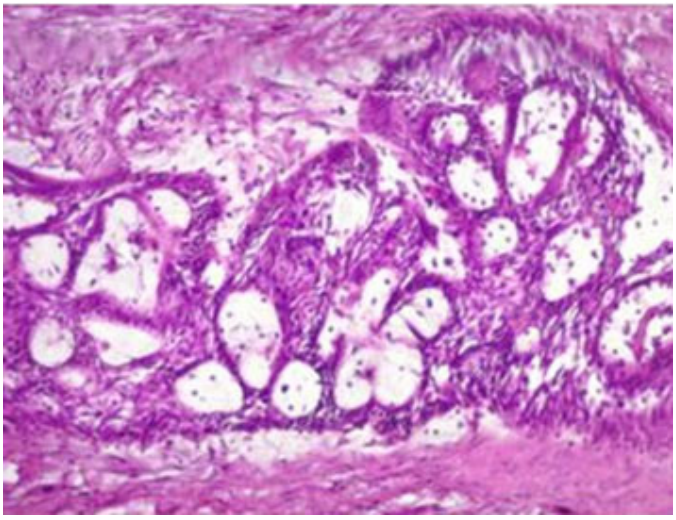

Figure 3: Histological aspect of ameloblastoma showing a parenchyma composed of basaloid cells similar to ameloblasts.

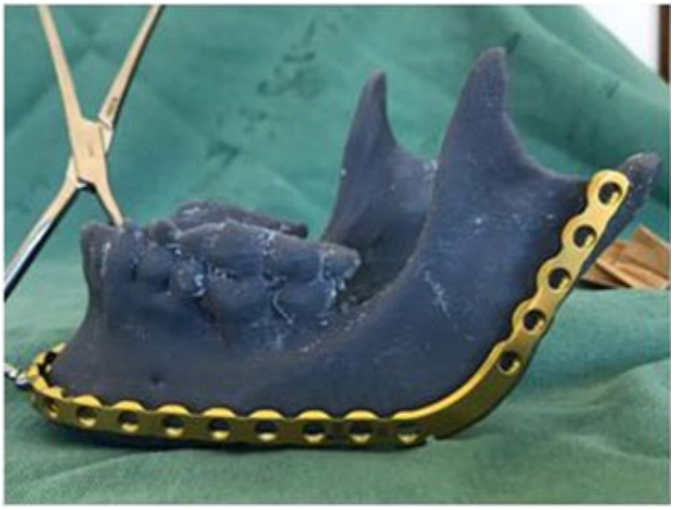

Figure 4: 3D anatomical model with reconstruction plate conformed in position.

Figure 5: Resected anatomical specimen measuring approximately 13 cm in its greatest extension.

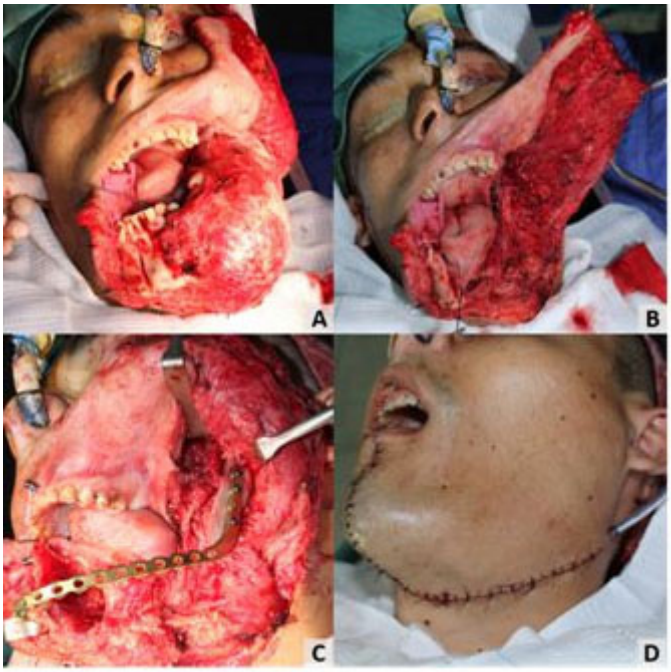

Figure 6: Transoperative images. (A) Osteotomy in right mandibular parasymphysis and exposed tumor lesion. (B) Clinical aspect after tumor resection and hemimandibulectomy. (C) Remaining mandible with maxillomandibular block and fixed reconstruction plate and costochondral graft. (D) Suture.

Figure 7: Radiograph on the 3rd postoperative day.

submental region. Irrigation was performed with 0.9% saline and culture and antibiogram tests were requested for appropriate antibiotic therapy. The patient used oral 500 mg ciprofloxaxin, 12/12 hours, for 10 days and underwent local care in the fistula region, progressing satisfactorily.

Considering the limitations of this type of reconstruction, the definitive rehabilitation planned would be through a customized temporomandibular joint prosthesis. About three and a half months after the operation, the patient informed that he would no longer attend the return visits, making the treatment unfeasible.

DISCUSSION

A case of ameloblastoma of large proportions in a patient of atypical age group, who underwent resection with immediate reconstruction using a reconstruction plate and costochondral graft, with the aid of a 3D anatomical model was reported.

Ameloblastoma represents about 1% of all head and neck tumors and is the commonest odontogenic tumor. It is more frequent in men (1.2: 1) between 30 and 60 years of age, with a peak around the fifth decade of life, affecting in 80% of cases, the posterior mandible region [5]. In the case presented, the patient was a 26-year-old male and already with an important tumor dimension.

The recurrence rate of ameloblastoma varies according to the treatment modality: 8% after resection and 41% after enucleation and curettage. Considering the aggressive nature of the tumor and the possibility of malignization in recurrences, the treatment of choice is resection with a safety margin of 1 cm, generally requiring reconstruction [5, 6]. In this case the segmental resection of the mandible was performed with immediate reconstruction.

Titanium reconstruction plates are biocompatible, adaptable to bone surfaces, offer acceptable functional results and give stability to the mandibular segment, preventing its deviation when in function. Planning based on a 3D model includes advantages, such as a special understanding of bone morphology, accurate and previous conformation of the plate and an adequate measure of the graft to be removed, therefore, decreasing the time of surgery and, consequently, the time of exposure of the patient to general anesthesia [4, 7, 8]. In this case, the use of the pre-contoured reconstruction plate in 3D model allowed adequate adaptation and symmetry, a considerable reduction in the patient's exposure time to general anesthesia and a lower risk of infections due to prolonged wound exposure.

Since this reconstruction involved the ramus and condyle regions, it was decided to use costochondral grafts in order to maintain joint function [7, 9, 10]. As observed in the intraoperative and imaging exams, the graft was satisfactorily positioned in the mandibular fossa.

A vacuum suction drain was used to reduce the possibility of dead space formation. Suction drains are also used to reduce the formation of bruises, a factor that can predispose to infections. On the other hand, the drain can act as a source of contamination, in addition to preventing the natural tamponade that occurs when surgical wounds are only closed by sutures [11]. As noted, the use of the suction drain did not prevent the development of postoperative infection in the case.

Restoration of masticatory, speech and respiratory functions is the main objective of mandibular reconstruction, followed by preservation of dental occlusion and temporomandibular joint, possibility of dental rehabilitation and satisfactory aesthetic results, considering that facial deformities can induce great social impact and psychological repercussions [7]. Maintenance of occlusal function was observed, with joint movements and mandibular perimeter preserved, favoring facial symmetry.

The majority of ameloblastomas relapses in a period of 5–6 years, however, recurrence was observed in a period of up to 20 years, justifying prolonged preservation. Radical resection is the only independent predictive factor for reducing the chance of recurrence [12]. The patient's non-attendance at postoperative consultations was a limiting factor for the follow-up and assessment of success of this case. Although the treatment was performed by a modality with low potential for recurrence, the possibility is not ruled out.

CONCLUSION

Reconstruction using a fixation system and costochondral graft minimized the possible mechanical failures expected from the plate and made it possible to adapt the graft to the mandibular fossa, preserving joint function. The prototyping aid for pre-contouring the plaque enriched the treatment, favoring better facial symmetry, adequate adaptation to bone segment, and decreased transoperative time. The importance of diagnosis and treatment in the initial stages of the injury is emphasized, in order to result in less surgical morbidity and possible functional and aesthetic deficiencies.

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Author Contributions

Everton José da Silva – Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Géssica Vasconcelos Godinho – Design of the work, Acquisition of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Luís Ricardo Machado Magalhães – Conception of the work, Design of the work, Acquisition of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Luiz Evaristo Ricci Volpato – Conception of the work, Design of the work, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.