

# Challenges in the Surgical Management of Large Osteoma in the Maxillary Sinus: Case Report

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**Abstract:** Osteoma is a benign neoplasm characterized by slow growth and can be composed of spongy or compact bone. Its symptomatology is directly related to the location, size, and proximity to adjacent structures. Histologically, it is classified as compact, cancellous, or mixed. Although rarely found in the gnathic bones, they are more frequently observed in the paranasal sinuses. This study aims to report a case of osteoma located in the maxillary sinus of a male patient, describing the surgical management performed in a hospital setting. The patient, a 49-year-old male with no systemic diseases, underwent surgical procedure under general anesthesia, including intraoral access, excision of the lesion, and subsequent fixation of the bone fragment. After six months of post-operative follow-up, no recurrences were observed. It is concluded that the definitive treatment of osteoma requires adequate correlation of the clinical picture, selection of the best type of surgical access, consideration of the location, and choice of the most appropriate synthesis method to promote a good prognosis.

**Keywords:** Benign; Electrocautery; Maxilla; Osteoma.



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## 1. Introduction

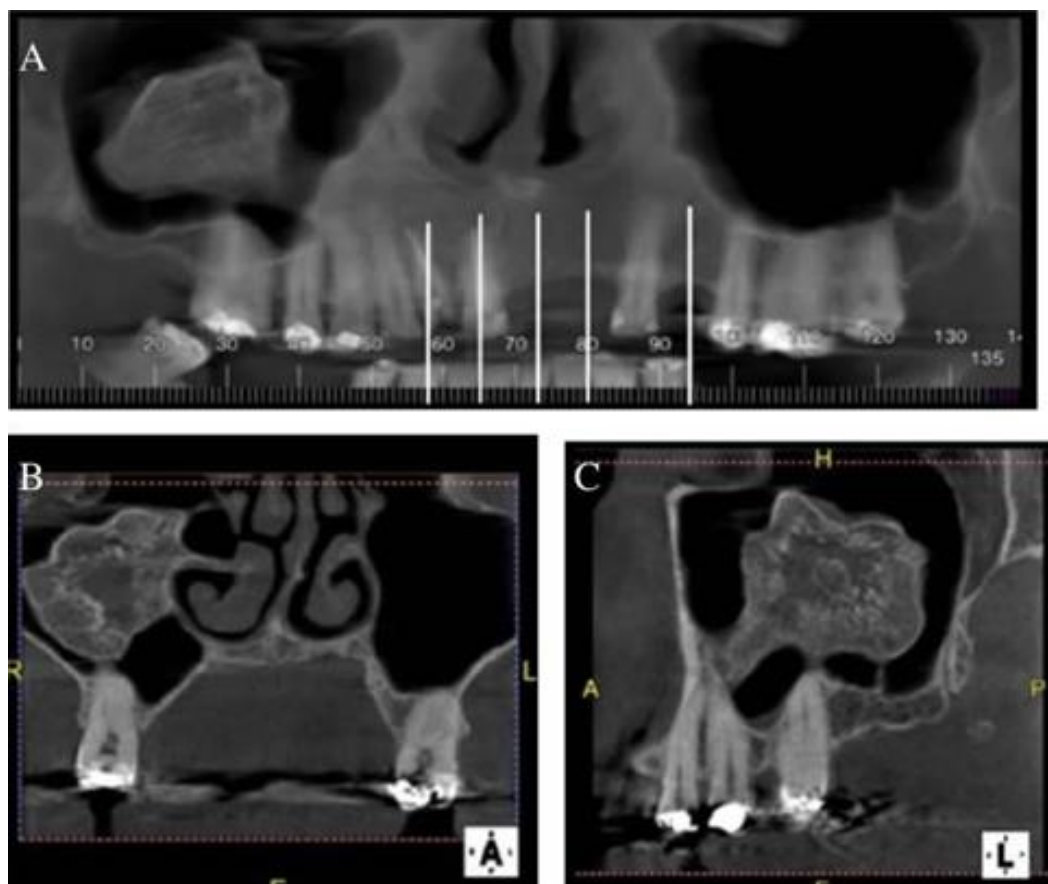
Osteomas are considered benign tumors that mainly affect the craniofacial region, especially the temporal, frontal, mandibular, and paranasal sinus bones [1]. Composed of compact or cancellous bone, these tumors grow slowly, and their symptomatology depends on the location, size, and extent of the tumor in relation to adjacent structures [2]. They represent the most common benign tumor in the paranasal sinuses, with the frontal sinus (52%) being the most frequently affected site, followed by the ethmoid sinus (22%), maxillary sinus (5.1%), and sphenoid sinus (1.7%) [3]. Though often asymptomatic, large osteomas or those causing obstruction can present symptoms such as chronic headache, sinusitis, mucocele, aesthetic deformities, cerebrospinal fluid leakage, and meningitis [4]. There are no established guidelines for the surgical management of paranasal sinus osteomas, as noted by Nguyen and Nadeau [2]. The literature suggests that paranasal sinus osteomas can be treated through endoscopic surgery combined with intraoral surgical approaches [5, 6], and laser diode treatment is also mentioned [7]. Indications for surgery include masses occupying more than 50% of the sinus space, involvement of intraorbital or intracranial regions, frontal recess, or growth exceeding 1 mm per year [8, 9]. Due to their asymptomatic nature in most cases, osteomas are incidentally identified on radiographic examinations performed for other purposes. Recognizing their radiographic characteristics and indicating the most appropriate biopsy type, as well as the different

possibilities of surgical management, helps the surgeon provide the best prognosis for the patient. Therefore, more case reports of osteomas in unconventional locations that may require different surgical approaches are needed. The aim of this study is to report a clinical case of a giant osteoma in the maxillary sinus, its surgical management in a hospital setting, and subsequent clinical follow-up.

## 2. Case Report

A 49-year-old male patient with leucodermic skin and no significant systemic issues was referred to the surgery department after the identification, during a routine tomographic examination for dental implant planning, of a circumscribed radiopaque mass in the right maxillary sinus, attached to the medial and inferior wall of the sinus, despite not presenting evident clinical symptoms (Figure 1). The initial diagnostic suspicion was osteoma, but osteoid osteoma, osteoblastoma, and osteosarcoma were also considered as possible differential diagnoses.

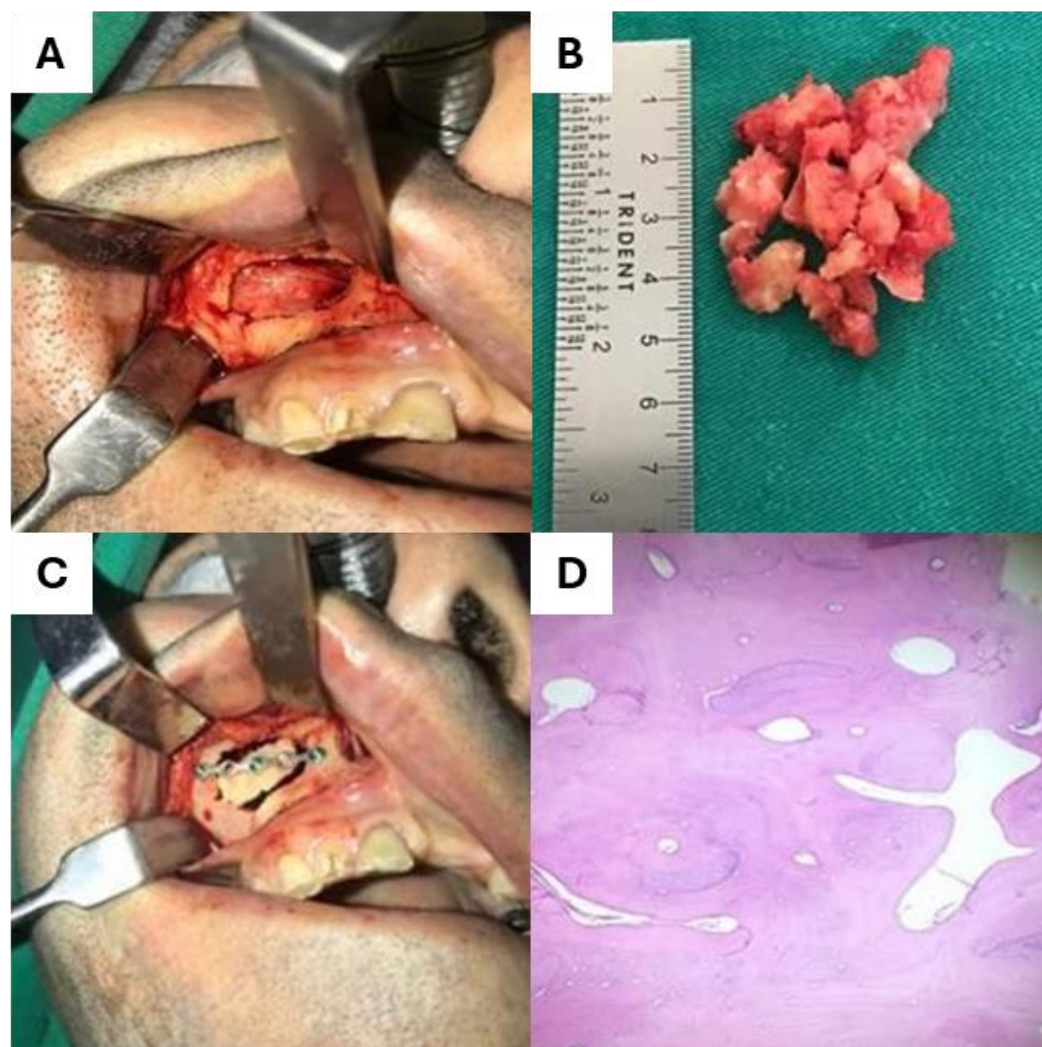
**Figure 1.** A. Tomographic image of frontal section. B. Tomographic image of coronal section. C. Tomographic image of sagittal section.



The patient underwent nasotracheal intubation, followed by a surgical approach through the Caldwell-Luc access (Figure 2A). An osteotomy of approximately 4 cm was performed using a surgical drill size 702. In order to preserve the sinus structure as much as possible, the osteoma was sectioned into multiple parts until its complete removal (Figure 2B). After the total excision of the lesion, the bone fragment from the anterior wall of the maxillary sinus, which had been previously removed to facilitate access, was repositioned and fixed with a straight miniplate with five 2.0 holes and three 6.0 mm screws (Figure 2C). The removed fragments were sent for histopathological analysis, revealing

spongy bone tissue composed of trabeculae of mature bone interspersed with fibroadipose marrow (Figure 2D), consistent with the clinical diagnosis of mixed osteoma.

**Figure 2.** A. Caldwell-Luc access. B. Sectioned osteoma. C. Fixation with straight miniplate and 3 screws. D. Histopathological slide of Mixed Osteoma under 100x objective.



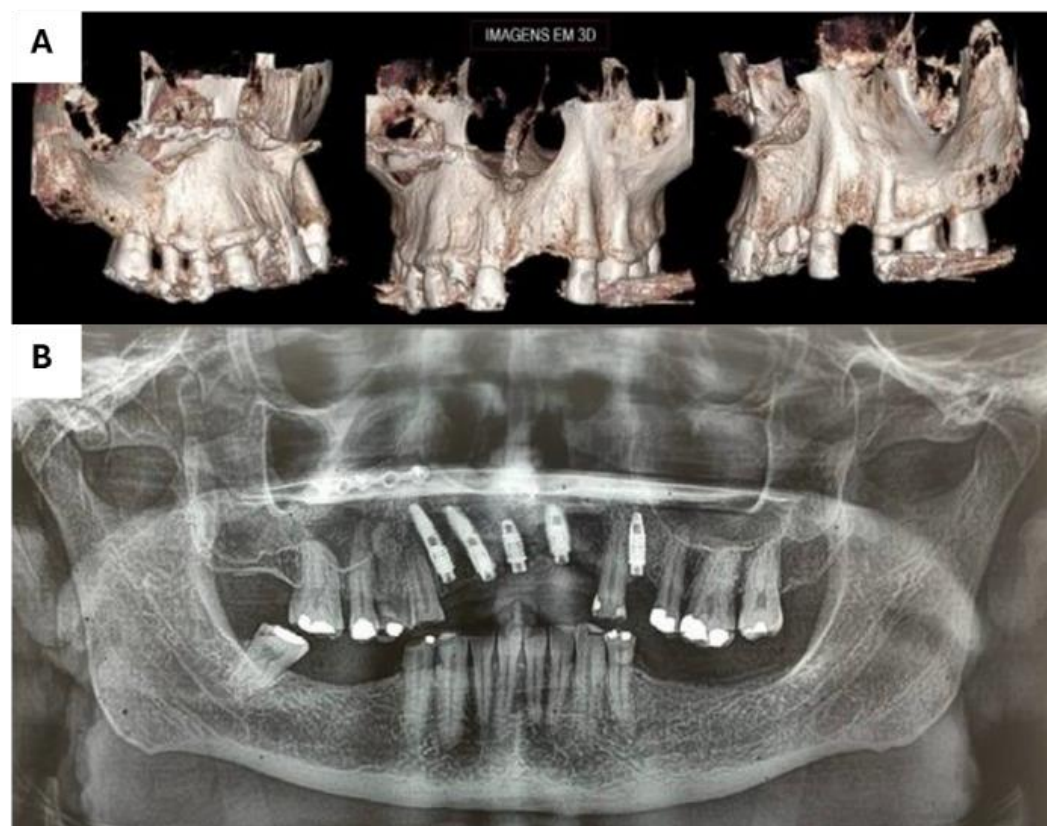
After a 6-month follow-up, the patient underwent a tomography for reassessment (Figure 3A), which showed good bone neoformation. Thus, he was able to proceed with dental implant treatment and oral rehabilitation. At the 1-year postoperative follow-up, the exams demonstrated good bone consolidation, and there was no radiographic recurrence evidence so far, suggesting a favorable prognosis (Figure 3B).

### 3. Discussion and conclusions

This study reported the surgical removal of a giant osteoma in the maxillary sinus. Although osteomas are common in the paranasal sinuses, their occurrence in the maxillary sinus accounts for only 5.1% of reported cases [3]. The etiopathogenesis of osteomas is still uncertain, but they are often associated with embryological origins or reactive lesions that stimulate osteogenic processes. However, chronic inflammatory processes of the paranasal sinuses can also promote the proliferation of osteoblasts, resulting in calcification around the inflamed tissue and consequently in the development of the osteoma [10]. In the case of this study, there was no reported history of trauma or infection, favoring the embryological theory of osteoma development.



**Figure 3.** A. Tomographic reconstruction image 3D postoperative at 6 months. B. Postoperative panoramic radiograph at 1 year.



Macroscopically, osteomas present a smooth and lobulated surface (Figure 2A) and can be sessile or pedunculated. In the case at hand, the osteoma was pedunculated to the inferior and medial wall of the maxillary sinus, as observed in Figure 1. Histologically, osteomas can be classified into three types: compact, cancellous, or mixed [2]. In the clinical case under analysis, the classification was considered mixed due to the presence of cancellous bone tissue and trabeculae of mature bone (Figure 2D). Osteomas larger than 30 mm are considered giant [6]. In this case, the osteoma measured 3.2 cm (Figure 2B), classified as giant.

Computed tomography is the imaging examination of choice for the diagnosis of osteomas due to its accuracy and the possibility of different cuts (axial, coronal, and sagittal), which assists in surgical planning [11]. Radiographically, osteomas are characterized by a dense and well-defined mass [6]. Magnetic resonance imaging can help differentiate osteomas from other lesions and can also identify complications such as mucocoeles associated with the osteoma and intracranial or intraorbital involvement [12]. In the present study, computed tomography was the method used for evaluation and diagnosis of the osteoma.

Although osteomas are considered benign and there are no reported cases of malignant transformation, they can cause intracranial complications such as mucocoeles, meningitis, abscesses, and intraorbital lesions affecting vision [13, 14]. Surgery is indicated when the osteoma fills more than 50% of the volume of the maxillary sinus, shows rapid growth, clinical symptoms, chronic sinusitis, facial deformities, bone erosions, or associated complications [15]. The choice of surgical procedure depends on the location, extent, and possible intraoperative complications [16].

Surgical options for removing osteomas in the paranasal sinuses include external approaches, endoscopic resection, or a combination of both techniques [17]. The most common external approaches are lateral rhinotomy, coronal access, and Caldwell-Luc [17].

The decision on the approach to be adopted depends on the surgeon's experience and the characteristics of the osteoma [18]. External approaches offer better exposure of the lesion and control of complications but have higher morbidity and hospital stay [18].

Advancements in endoscopic sinus surgery have expanded its indications in osteoma removal, preserving vital structures and reducing postoperative morbidity [16]. This approach is preferred for small osteomas without significant orbital extension [19]. However, possible surgical complications increase with the size of the tumor and its adherence to surrounding structures [10].

Çelenk et al. [13] conducted a retrospective study analyzing the management of 25 patients with osteomas in the paranasal sinus region. Only two cases involved osteomas in the maxillary sinus, and the approach used was the intraoral Caldwell-Luc access associated with endoscopic surgery. Verma et al. [5] reported the removal of an osteoma in the maxillary sinus, using the endoscopic technique in conjunction with the extraoral Weber-Ferguson approach. Aydin et al. [15] described an osteoma in the maxillary sinus associated with an ectopic tooth, where an uncinectomy and antrostomy were performed to visualize the ectopic tooth, followed by Caldwell-Luc access for osteoma removal.

The choice of Caldwell-Luc access in this case was based on the surgeon's experience and the location and dimensions of the osteoma. Postoperative radiological follow-up is recommended, especially when complete resection is not achieved. Osteomas are benign and do not undergo malignant transformation reported in the literature, providing a good postoperative prognosis for the patient.

### 3. Conclusions

In conclusion, this study provides a significant contribution to the understanding and management of osteomas in the maxillary sinus. Documenting the successful surgical excision of this type of tumor, albeit relatively rare in this location, underscores the importance of early diagnosis and appropriate intervention. The uncertainty regarding the etiology of osteomas emphasizes the ongoing need for research to elucidate the underlying mechanisms of their formation. Additionally, the association with chronic inflammatory processes suggests the importance of effective control and treatment of inflammatory conditions of the paranasal sinuses. Ultimately, this study highlights the complexity of these bone lesions and the importance of a multidisciplinary approach to their clinical management.

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**Research Ethics Committee Approval:** We declare that the patient approved the study by signing an informed consent form and the study followed the ethical guidelines established by the Declaration of Helsinki.

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**Conflicts of Interest:** None.

**Supplementary Materials:** None.

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