Case report

Surgical removal of a large osteoma in the frontal bone and treatment of facial fractures: an integrated approach

Abstract

Osteoma is a benign osteogenic tumor of unknown etiology, with no predilection for nationality, race, gender, or age. It typically presents in small diameters, with large extensions being rare. The prognosis in these cases is closely tied to early diagnosis, often made during clinical inspections, identifying asymptomatic lesions or those associated with pain and asymmetry. For this reason, the dentist must be vigilant in identifying any abnormalities in patients, even those outside their specific field of practice. This paper aims to report a clinical case of a 56-year-old male patient with fair skin who presented to the hospital following facial trauma. After clinical and imaging examinations, he was diagnosed with multiple facial fractures as well as a large osteoma in the atypical region of the frontal bone, which caused visual interference on the right side. The integrated treatment involved a combination of bicoronal and circumvestibular approaches for the surgical removal of the osteoma, along with the stabilization and fixation of the frontozygomatic suture, Le Fort I fracture, and hemi-Le Fort II fracture using 2 mm titanium plates. After 5 years of follow-up, the patient remained free of complaints or sequelae, in good general health, and with no signs of recurrence. Although osteomas are often asymptomatic, in this case, the tumor caused significant facial asymmetry and visual disturbances due to the compression of adjacent structures, proportional to its size.

Keywords: Facial fracture, Frontal bone, Bicoronal approach, Osteoma, Osteogenic tumor.

Introduction

Osteoma is a benign osteogenic tumor of unknown etiology [1], which shows no predilection for nationality, race, gender, [2] or age, [3] although some studies suggest a possible association with infection or trauma [1,2]. Despite being a common bone pathology, reports of these lesions in the upper third of the face are rare, especially when they are presented in large dimensions[4,13]. Among the few cases reported, the combination of significant facial asymmetry and visual interference caused by a large osteoma in the frontal bone is exceptionally uncommon, underscoring the

distinctiveness of the present case. Furthermore, large osteomas in the frontal region following trauma are sparsely documented in the literature, making this report particularly relevant.

The prognosis is closely tied to early diagnosis, often made during clinical inspections aimed at identifying asymptomatic lesions or those associated with pain, trismus, facial asymmetry, and other disorders [1,2,6]. In imaging exams, such as routine radiographs [2,5,6,7], or computed tomography scans, individual or multiple bony protuberances are observed, typically oval in shape, radiopaque or with a density similar to bone, and attached to the cortical bone by a sessile or pedunculated base [1,2,3,4,8].

Treatment varies according to the size of the lesions. Conservative therapy is applied to small and asymptomatic tumors, which are monitored clinically and radiographically without professional intervention. Surgical treatment, on the other hand, is reserved for large lesions that cause deformities and functional changes, requiring their excision [2,3,4,7]. Recurrence of osteoma is rare, and there is no evidence of malignancy [3,7]. Thus, the objective of this study is to report an uncommon clinical case of a patient with a large osteoma in the frontal bone, causing significant facial asymmetry and visual interference. This case represents a unique addition to the literature, as the diagnosis was made in a hospital setting following facial trauma - a context that is scarcely addressed in existing studies. These aspects highlight the importance of medical attention and precise diagnosis in unusual presentations.

Case report

Male patient, 56 years old, with fair skin, a victim of facial trauma following a work-related accident, presented to the hospital for emergency care. Clinically, he exhibited bilateral periorbital edema and ecchymosis, ecchymosis in the left mandibular region, hyphema, and conjunctival chemosis in the left eye, with preserved ocular movements. Nasal passages were clear, with bony crepitus at the Le Fort I level. Dental occlusion could not be assessed due to the absence of teeth, but the patient displayed satisfactory mouth opening, with palpable and mobile condyles. Additionally, a firm, oval-shaped protuberance, approximately 3 cm in diameter, was noted in the right frontal region, causing significant facial asymmetry, as well as eyebrow ptosis over the orbital cavity, which impaired the patient's vision (Figure 1). Imaging exams, specifically computed tomography, revealed signs of Le Fort I and hemi-Le Fort II fractures on the left side, with a minimally displaced left zygomatic complex. Furthermore, a radiopaque mass was observed in the right frontal region, consistent with the clinical suspicion of osteoma (Figure 2).

The surgical plan included the reduction and fixation of the fractures along with tumor excision in a single procedure. The bicoronal and circumvestibular intraoral approaches were used to address the Le

Fort I, hemi-Le Fort II and zygomatic fractures. Fixation was achieved with 2 mm titanium plates at the frontozygomatic suture, nasomaxillary, and zygomaxillary pillars. An electric scalpel and cauterizer were employed to control intraoperative bleeding, ensuring careful adherence to dissection planes to avoid damage to nerves and blood vessels. The tumor excision was performed with the aid of a 703-carbide bur and a Sverzut chisel (Figure 3). Next, the area was smoothed with a maxicut tungsten bur, followed by irrigation, cleaning, and layered suturing (Figure 4). The specimen was sent for histopathological examination, which was characterized by the proliferation of well-organized lamellar and compact bone tissue, with no cellular atypia or evidence of malignancy, consistent with the clinical diagnosis of osteoma. The patient was monitored weekly and remained in good general condition, with no palpable bony steps, absence of bony crepitus, preserved ocular movements and visual acuity, no aesthetic or functional complaints, no paresthesias or facial paralysis, and satisfied with the facial symmetry. The patient is currently 5 years post-operative (Figures 5 and 6).

Discussion

Osteoma is a slow-growing benign bone lesion that presents as a circumscribed mass [3]. According to Orabona et al. [3], there is no well-defined etiopathogenesis, but it is presumed that a combination of trauma and muscle activity may trigger an osteogenic process. Its incidence in the face is higher in the temporal and mandibular bones, with rare occurrences in the frontal bone, particularly in large proportions [2,4,9]. This pathology is more common in young adults, shows no gender preference, rarely recurs, and has no signs of malignancy [3,7,9]. In the case reported, the patient was a middle-aged male presenting with a circumscribed oval mass in the frontal bone region.

Although osteomas are generally asymptomatic [3], they can be locally aggressive, causing compression of adjacent structures such as the orbit and the skull base. In the fronto-orbital region, symptoms vary according to the direction of growth and may include headache, cranial deformity, brain abscess, hearing loss, seizures, pneumocephalus, cerebrospinal fluid rhinorrhea, mucocele, and ocular complications such as diplopia, displacement and proptosis of the eyeball, and/or optic nerve compression [1]. In the present case, the patient reported both aesthetic and functional complaints due to facial deformity and visual impairment, likely caused by the osteoma's large size.

The diagnosis is usually made through routine imaging exams or clinically when the osteoma reaches larger proportions [2,5,6,7].

Imaging evaluation is typically performed using extraoral radiographs or computed tomography to identify the lesion's location, extent, site of implantation, volume, and any associated lesions [9]. In the studied case, the diagnosis was made in a hospital setting after the patient suffered facial trauma. Thus, in

addition to facial fractures, the presence of osteoma was also diagnosed both clinically and via computed tomography.

The literature shows that the differential diagnoses of an osteoma include several inflammatory or tumor pathologies, but it is easily distinguishable due to its clinical, radiographic, and histological characteristics [12, 14]. The osteoma in the craniofacial region exhibit continuous, slow growth, consistent with the patient's account during anamnesis regarding the swelling's onset. Radiographically, the lesion displayed characteristics typical of an osteoma—a radiopaque appearance resembling cortical bone. This was further clarified through computed tomography, which revealed a well-defined, homogeneous, oval, sessile lesion. The diagnosis was definitively confirmed through histological examination, identifying the lesion as an osteoma in the frontal bone.

The clinical approach depends on the size and location of the lesions. For small and asymptomatic tumors, conservative management with clinical and radiographic monitoring may be employed [2,3,4,7,9,10,11]. However, in the presence of large and/or symptomatic lesions, surgical treatment is required [2,3,4,7]. In the reported case, surgery was planned for the reduction and fixation of facial fractures, along with the removal of the osteoma.

Surgical approaches to the frontal region include the supraciliary incision, the "seagull wing" incision, and the coronal approach. The choice of technique depends on factors such as the extent of the lesion and the risk of complications. Supraciliary and "seagull wing" incisions offer the advantage of causing less bleeding, reduced facial edema, and a shorter recovery period. However, they limit exposure of the operative area and are associated with a higher risk of unsightly scarring. On the other hand, the coronal approach involves an incision from ear to ear along the hairline, allowing for wide exposure and resulting in better aesthetic outcomes, as the scar is hidden in the scalp [2,9]. However, this technique carries an increased risk of bleeding, edema, alopecia, and nerve injuries. In the reported case, a bicoronal approach combined with circumvestibular intraoral access was selected to minimize visible scarring, considering the size and location of the lesion, as well as the need to stabilize bone fractures. These included the frontozygomatic suture, Le Fort I fracture, and hemi-Le Fort II fracture, which were fixed using 2 mm titanium plates. Bleeding was effectively controlled with an electric scalpel for incisions and cauterization of vessels. By carefully adhering to the dissection planes, complications involving nerves and blood vessels were successfully avoided.

Postoperative complications may arise from surgical access, tumor excision, or fracture fixation. These complications can include extradural abscess, cerebrospinal fluid fistula, meningitis, paralysis of the frontal branch of the facial nerve, frontal deformity, facial asymmetry, pseudoarthrosis, among others [2]. The reported patient did not experience any postoperative complications. Currently, with 5 years of

follow-up, the patient is in good general health, with no complaints, adequate facial symmetry, stable fixation of the facial bones, and preserved facial movements.

Conclusion:

Despite being an uncommon condition, a large osteoma in the frontal bone, combined with facial fractures, can complicate the clinical case. Thorough surgical planning and treatment are essential for the case's success. The bicoronal approach has proven to be a viable alternative in such cases due to the extent and location of the lesion, as well as its characteristics, thereby avoiding visible scars and aesthetic sequelae.

Consent:

Written informed consent was obtained from the patient, who authorized the reproduction of the case and its images for publication in scientific journals

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Figure 1: Initial clinical photograph. **A)** Frontal view; **B)** Lateral view.

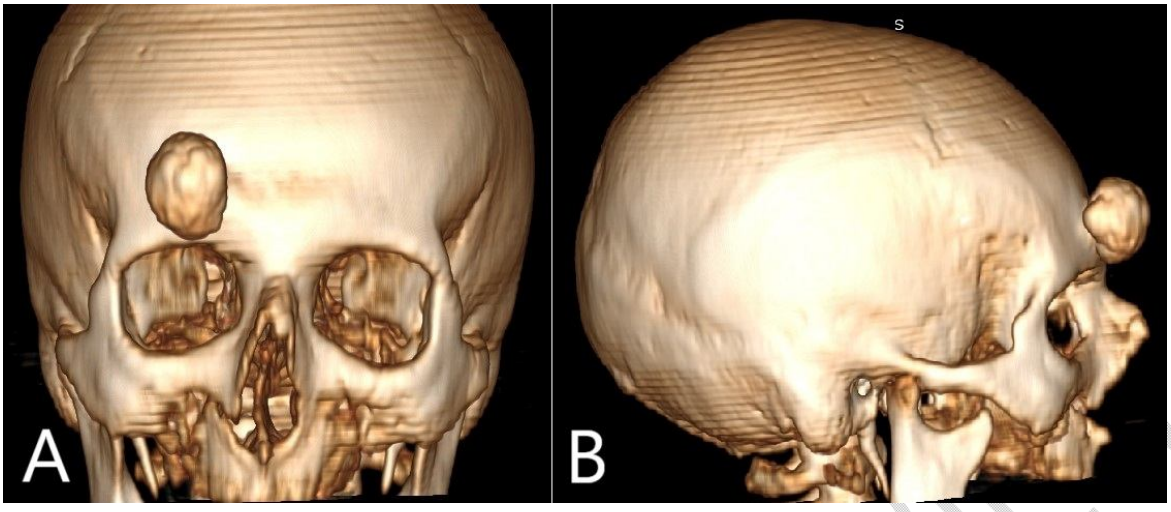

Figure 2: Three-dimensional reconstructions from computed tomography scans in **A)** frontal view; and **B)** right lateral view.

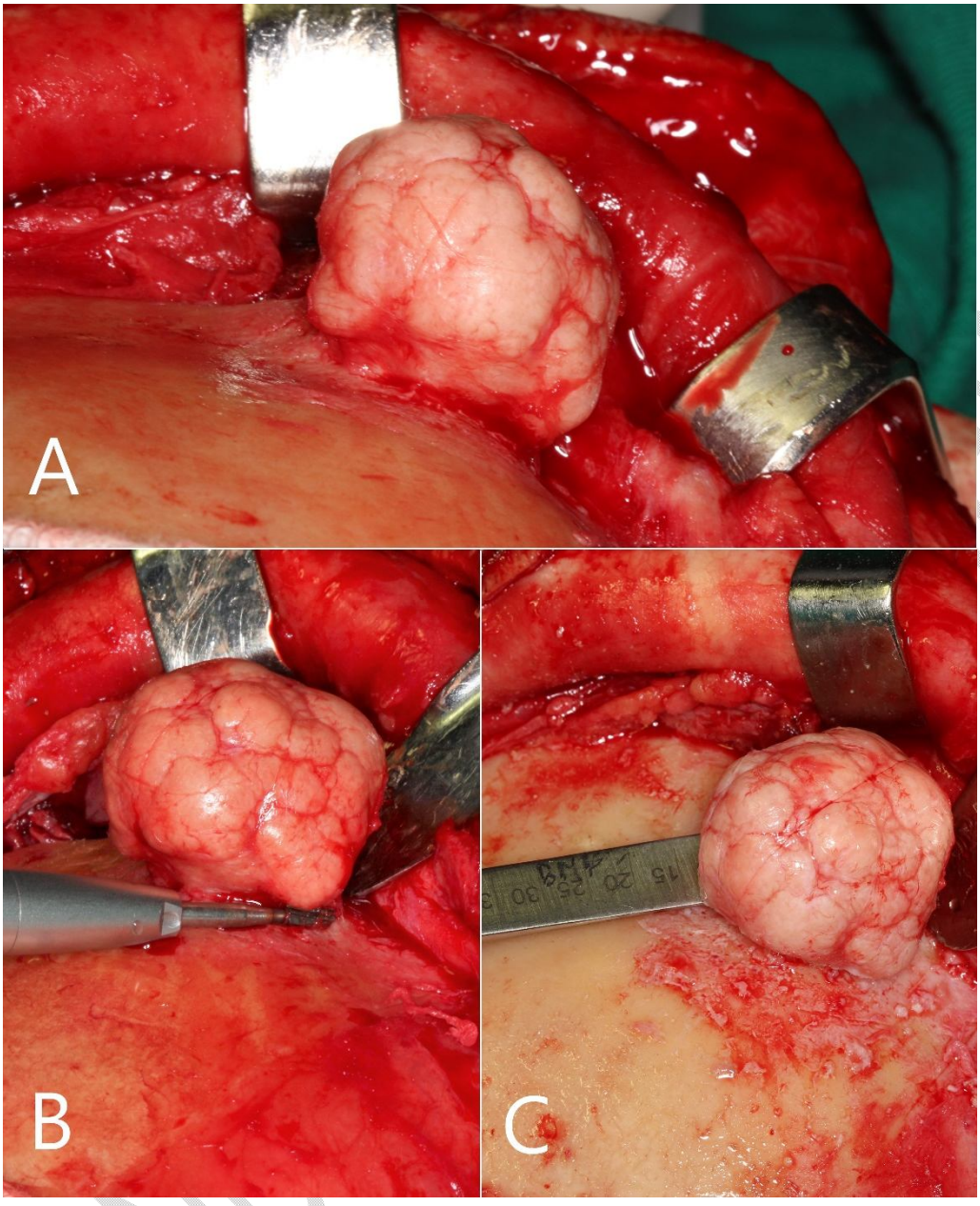

Figure 3: Intraoperative images. **A)** Osteoma exposure through bicoronal access; **B)** Osteotomy with a carbide bur; **C)** Excision with a Sverzut chisel.

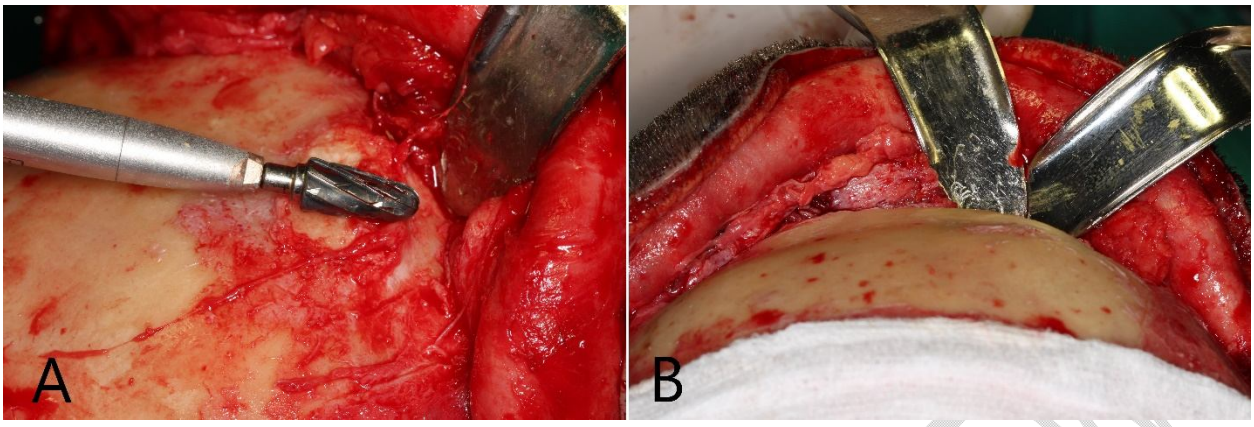

Figure 4: Intraoperative images. **A)** Bone smoothing with a maxicut bur; **B)** Final appearance.

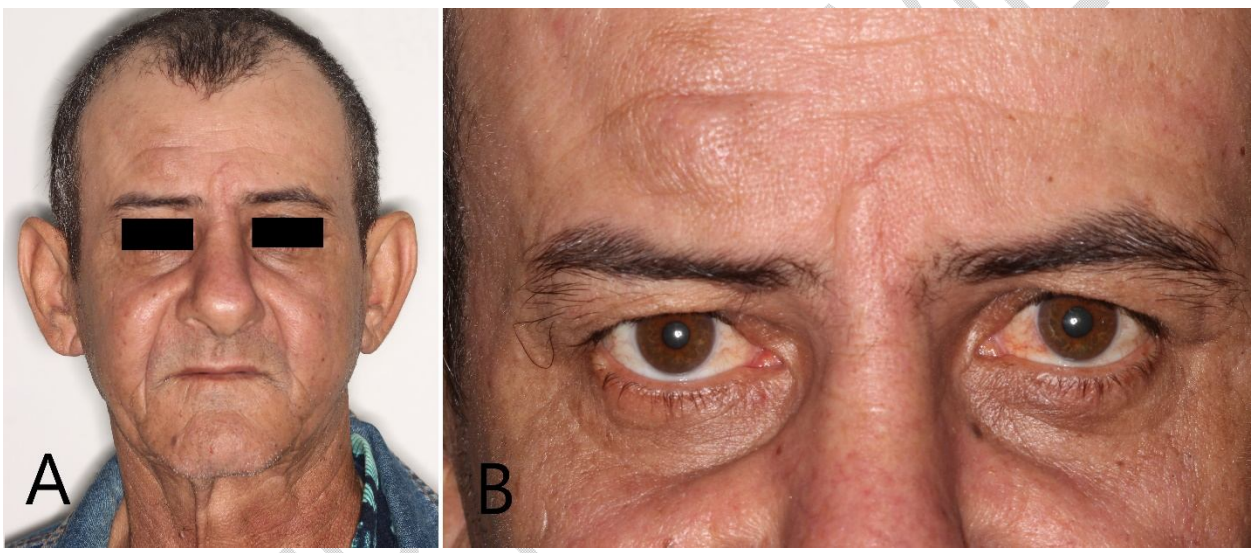

Figure 5: Five-year postoperative images. **A)** Frontal view photograph; **B)** Close-up of the surgical area.

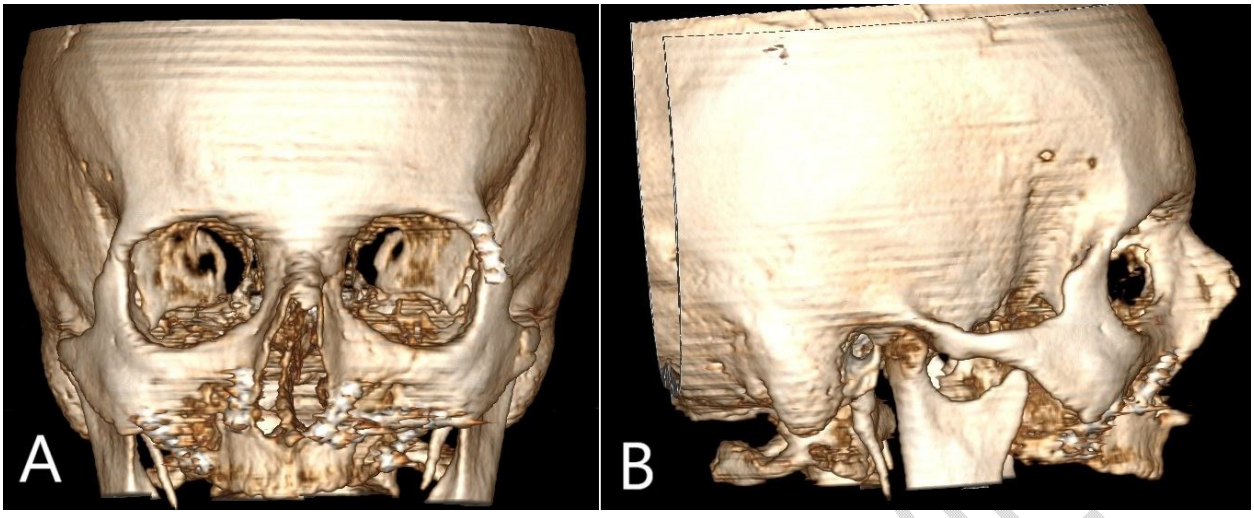

Figure 6: Postoperative three-dimensional reconstructions from computed tomography scans in **A)** frontal view; and **B)** right lateral view.