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CASE REPORT

MANDIBULAR OSSIFYING FIBROMA: RESECTION AND RECONSTRUCTION WITH ILIAC CREST GRAFT USING VIRTUAL PLANNING – A CASE REPORT

Fibroma osificante mandibular: resección y reconstrucción con injerto de cresta ilíaca utilizando planificación virtual – Un informe de caso

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ABSTRACT

Objetive: Ossifying fibroma is a benign bone neoplasm that predominantly affects the mandible and is classified as a fibroosseous lesion. Although generally asymptomatic, it can present with symptoms such as edema, paresthesia, and pain due to the destruction of the mandibular architecture.

Case Report: This report presents the case of a 47-year-old patient with a recurrent mandibular ossifying fibroma subjected to resection and reconstruction with a bone graft of the iliac crest. Initially, the patient was treated with enucleation and curettage, but the lesion recurred after eight years. Upon reevaluation, imaging revealed a well-defined mixed radiopaque lesion extending along the mandibular body. Histopathological examination confirmed the diagnosis of ossifying fibroma. Given the recurrence and size of the lesion, a more radical approach was chosen, including segmental resection and reconstruction using a custom-made iliac crest graft. The entire procedure was meticulously planned using virtual surgical planning, allowing for precise resection and reconstruction, minimizing surgical time and improving outcomes. The postoperative recovery was favorable, with excellent aesthetic and functional results. Complete resection, rather than curettage, and the appropriate use of bone grafts are essential to minimize recurrence and ensure proper recovery.

Conclusions: Long-term surveillance is crucial to detect and manage any early recurrence, thus ensuring a favorable prognosis for the patient.

Keywords: *Ossifying fibroma; Bone neoplasm; Autologous transplant; Iliac crest bone; Computer assisted surgery; Oral surgical procedures.*

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RESUMEN

Objetivo: El fibroma osificante es una neoplasia ósea benigna que afecta predominantemente la mandíbula y se clasifica como una lesión fibro-ósea. Aunque generalmente es asintomático, puede presentar síntomas como edema, parestesia y dolor debido a la destrucción de la arquitectura mandibular.

Reporte de caso: Este reporte presenta el caso de una paciente femenina de 47 años con un fibroma osificante mandibular recurrente. Inicialmente, la paciente fue tratada mediante enucleación y curetaje, pero la lesión presentó recidiva después de ocho años. En la reevaluación, las imágenes mostraron una lesión radiopaca mixta bien delimitada que se extendía a lo largo del cuerpo mandibular. El examen histopatológico confirmó el diagnóstico de fibroma osificante. Dada la recurrencia y el tamaño de la lesión, se optó por un enfoque más radical que incluyó la resección segmentaria y la reconstrucción con un injerto personalizado de cresta ilíaca. Todo el procedimiento fue planificado meticulosamente utilizando planificación quirúrgica virtual, lo que permitió una resección y reconstrucción precisas, minimizando el tiempo quirúrgico y mejorando los resultados. La recuperación postoperatoria fue favorable, con excelentes resultados estéticos y funcionales. La resección completa, en lugar de curetaje, y el uso adecuado de injertos óseos son fundamentales para minimizar la recurrencia y asegurar una recuperación adecuada.

Conclusión: La vigilancia a largo plazo es crucial para detectar y manejar cualquier recurrencia temprana, garantizando así un pronóstico favorable para el paciente.

Palabras clave: *Fibroma osificante; Neoplasias óseas; Trasplante autólogo; Cresta iliaca; Cirugía guiada por imagen; Procedimientos quirúrgicos orales*

INTRODUCTION

Ossifying fibroma, also known as cemento-ossifying fibroma, is a benign bone neoplasm that predominantly affects the mandible and is classified as a fibro-osseous lesion.[1–3] Its origin is attributed to multipotential cells of the pe-riodontal ligament, which have the ability to differentiate into cementoblasts, fibroblasts, and osteoblasts, and its deve-lopment may be related to trauma, dental extractions or periodontal diseases.[4] Bone tumors account for approximately 0.2% of all neoplasms, and among them, ossifying fibroma is the most common true neoplasm.[1]

This pathology manifests primarily in the craniofacial skeleton, especially in the mandible, and is typically present in patients in their third or early fourth decade of life with a higher prevalence in women than in men, with a ratio of 5:1 of cases.[5,6] Although it is considered mainly a cranio-facial condition, cases have also been reported in long bones.[7] Recurrence is thought to be rare; However, when treatment is limited to lesion curettage, the recurrence rate increases.[3] Clinically, it presents as a slow growing intraosseous mass that is generally painless and rarely causes facial asymmetry, but it can induce edema, paresthesia, and pain due to destruction of the normal mandibular architecture.[1,3,6]

Radiographically, it can appear as a radiolucent, mixed, or radiopaque lesion, depen-

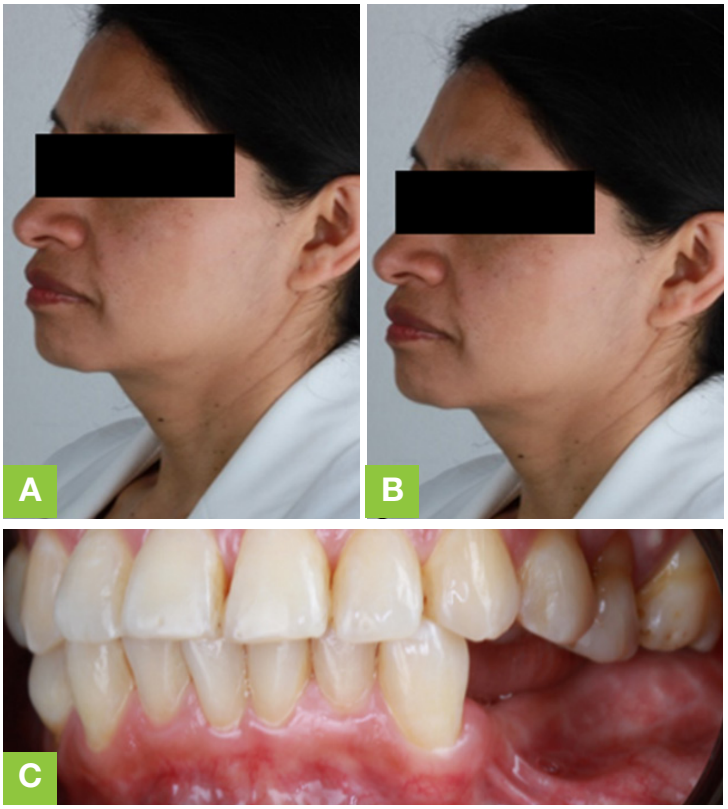
ding on the stage of maturation,[1,3,5,6] and is circumscribed in 85% of cases.[4] On tomographic examination, it appears to be a well-defined, corticalized expansive lesion with mixed density.

Histologically, it is characterized by an encapsulated proliferation of fibrous connective tissue with varying amounts of immature trabecular bone, cementum, or both.[1] This feature can complicate its differentiation from other conditions, such as fibrous dysplasia.
Therefore, a definitive diagnosis requires careful correlation of clinical, radiographic and histological findings.(3,6,8) The differential diagnosis includes fibrous dysplasia, periapical osseous dysplasia, osteosarcoma, and cementoblastoma.(8)

Treatment for ossifying fibroma is surgical, ranging from curettage of small lesions to resection of larger ones, often requiring regeneration with bone grafts.[5,6] Mandibular reconstruction after resection presents significant challenges due to the three-dimensional complexity and the functional and aesthetic importance of the mandible.[9]
Precise anatomical restoration is essential to maintain skeletal and dental relationships, as well as aesthetic and physiological function.[3,9]

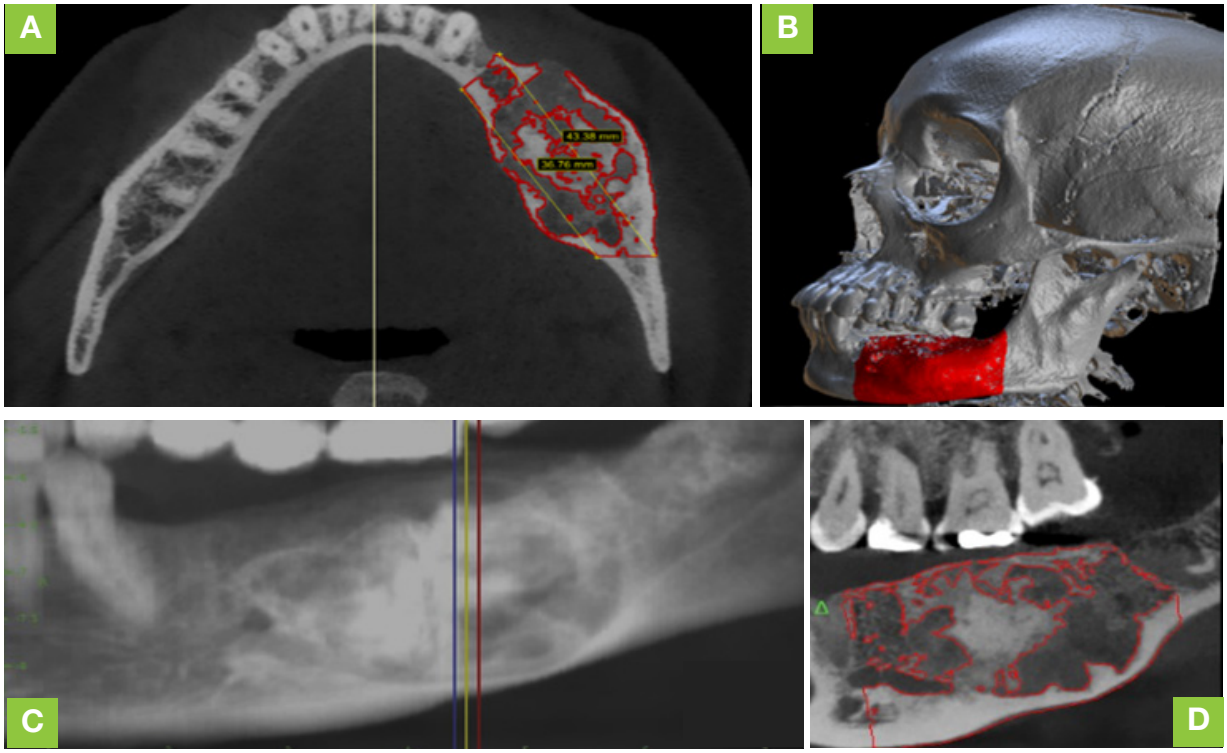
In cases of extensive mandibular defects, greater than 5 centimeters, especially in patients who have undergone radiation therapy, the use of microvascular bone grafts may be necessary to ensure tissue viability.[9,10]

Figure 1.
Extraoral and intraoral photographs



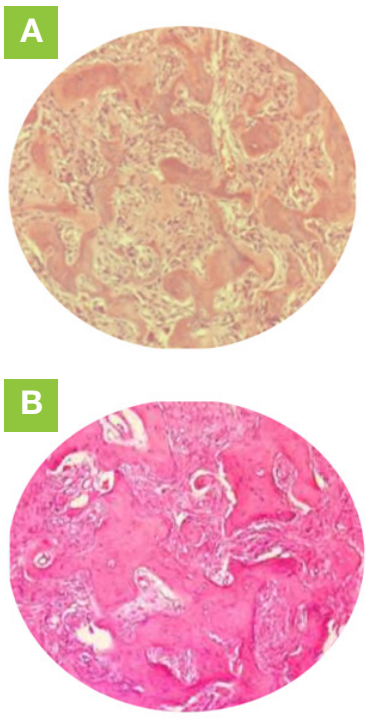
A: Left lateral view. **B:** Frontal view. **C:** Lateral view.

Figure 2.
Cone beam computed tomography



A: Axial view. **B:** 3D reconstruction. **C:** Panoramic view. **D:** Sagittal view.

Figure 3.
Microscopic images of the histopathological study



A: Initial study. **B:** Current study

For smaller defects, a free iliac crest graft, which involves the extraction of bone from the patient's hip, is a common option for this complex reconstruction, providing sufficient bone volume and minimizing complications associated with vascularized grafts.[9,11]

The purpose of this article is to present a clinical case of mandibular ossifying fibroma, in which a segmental resection of the affected area was performed, followed by reconstruction with an iliac crest graft using virtual planning and cutting guides.

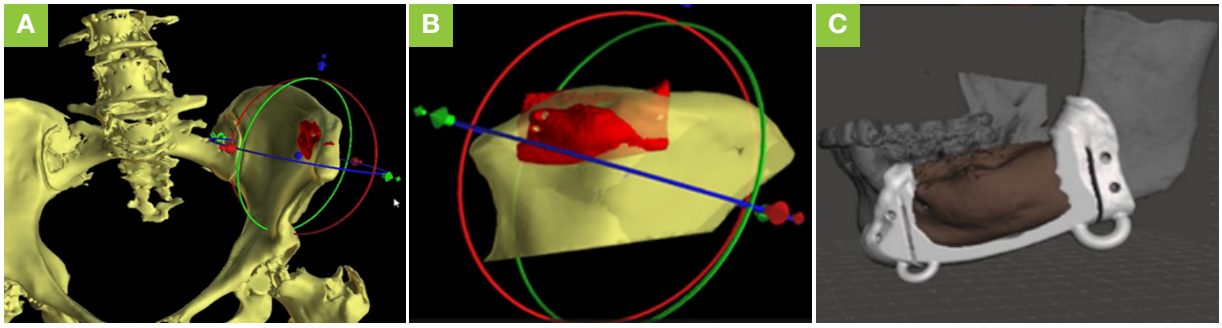
CASE REPORT

A 47-year-old woman patient presented to the oral and maxillofacial surgery service with a 2-month history of constant headaches. There were no signs of cutaneous involvement, lymphadenopathy, or

sensory disturbances, and the functional examination was normal.

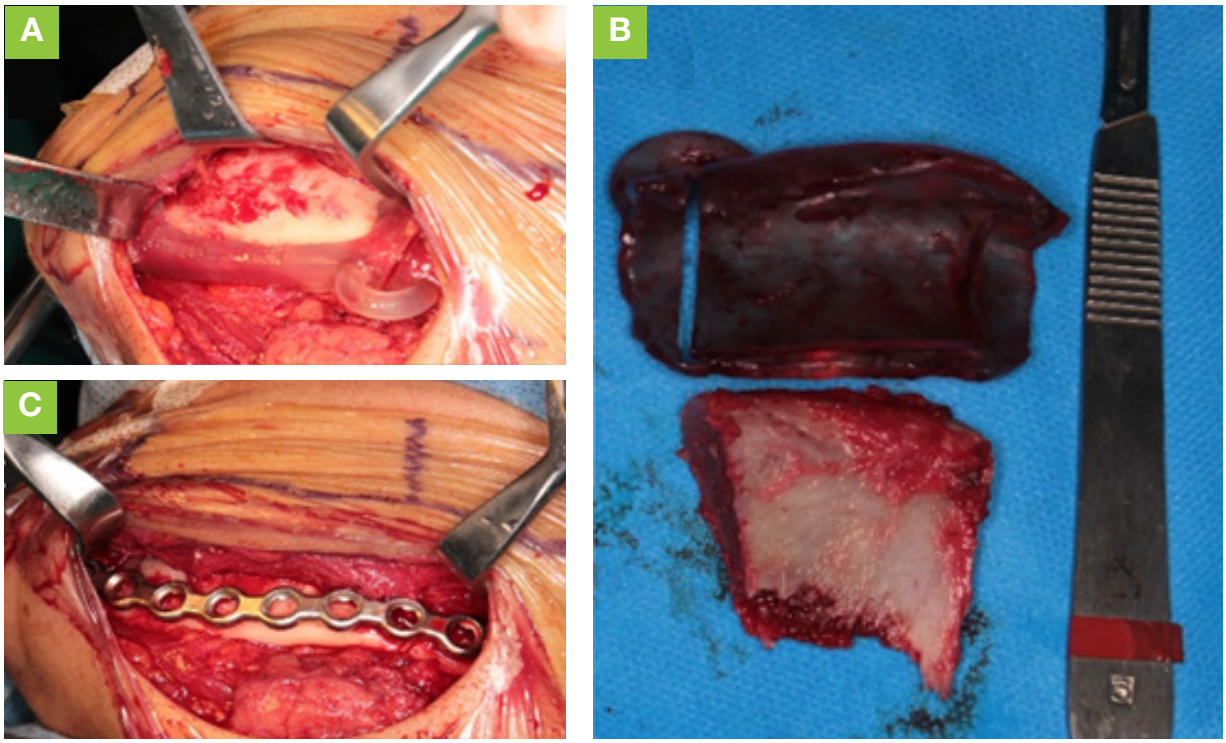
Intraoral examination revealed the absence of the second premolar, first, and second mandibular molars on the left side. A slight increase in volume was detected in the first premolar area of the left mandibular, with a hard consistency, painless on palpation, and covered by pinkish-appearing mucosa (Figure 1). Paraclinical tests revealed that the patient had hypothyroidism and hyperparathyroidism.

Figure 4.
Virtual planning



A: Iliac crest measurement. **B:** Creation of the graft harvesting guide. **C:** Shaving and cutting guide for the mandible.

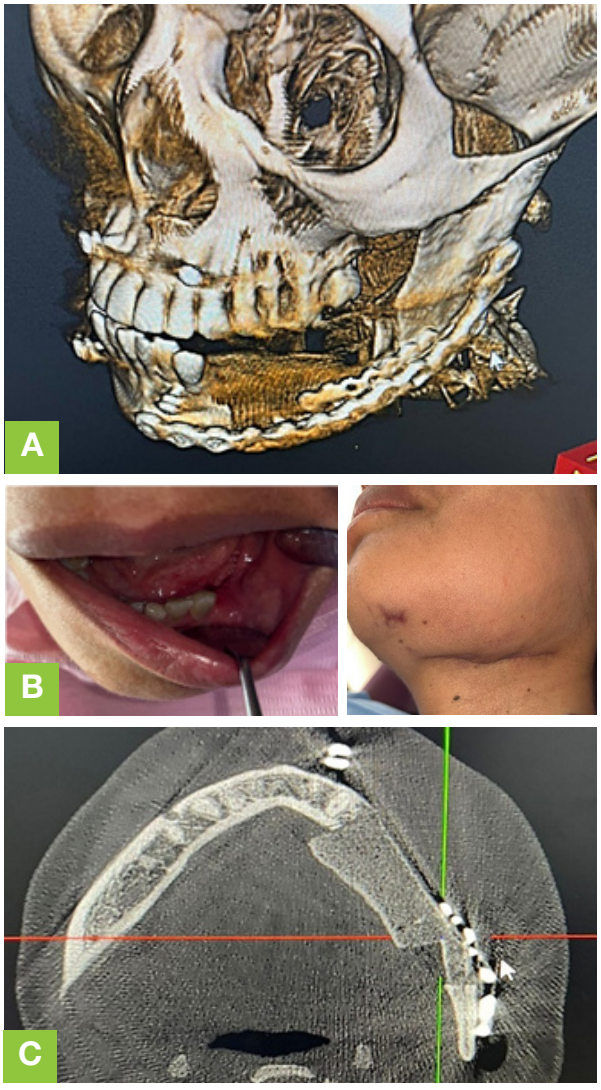
Figure 5.
Intraoperative photos.



A: Placement of the mandibular cutting guide. **B:** Harvesting of iliac crest graft with cutting guide. **C:** Fixation of the free iliac crest graft.

A cone beam computed tomography (Figure 2) revealed a lesion affecting the left mandibular body, approximately 4 cm in length and 2 cm in width, along with thinning of the cortical bone, both vestibular and lingual, with more significant involvement of the vestibular plate. The lesion extends towards the basilar edge and compromises the inferior alveolar nerve canal.

Figure 6.
Postoperative at 1 month



A: 3D reconstruction. **B:** Intraoral and extraoral photographs. **C:** Axial section.

The surgical history included enucleation at the same site eight years earlier. Histopathological examination at that time revealed a benign neoplasm composed of a hypercellular stroma consisting of fibroblastic cells with hyperchromatic nuclei, mineralized matrix foci, and bone deposits interwoven with few osteoclasts, leading to a diagnosis of ossifying fibroma (Figure 3A).

An incisional biopsy of the lesion was performed. Histopathological examination with hematoxylin-eosin staining revealed irregular, branched and anastomosed bone spicules, some with a morphology similar to Chinese characters, separated by a proliferation of spindle cells with focal osteoblastic rimming and calcified bone trabeculae. The diagnostic impression favored ossifying fibroma over fibrous dysplasia; Clear margins and clinical presentation suggested a recurrence of ossifying fibroma (Figure 3B).

The initial surgical phase involved extraction of the first premolar and residual roots of the second mandibular molar on the left side to ensure proper healing of the oral mucosa prior to the extraoral approach to the lesion. Virtual planning (Blue Sky Plan, Blue Sky Bio) was then performed for the lesion resection using cutting guides. Two guides were created for the mandible with a design software (Meshmixer): one for bone shave and another for lesion resection.

Additionally, a guide for the harvesting of iliac crest grafts was designed (figure 4). Five months after the indicated extractions, the surgical procedure was performed under general anesthesia, with prior local administration of tumescent anesthesia (Klein solution). A submandibular approach was used to expose the entire lesion, bone

shaving was performed, and a reconstruction plate, previously conformed to a three-dimensional model, was adapted, followed by resection of the lesion, measuring 4 cm in length with an additional 0.5 centimeters on each side as a safety margin, giving a total of 5 centimeters (Figure 5A). Simultaneously, an iliac crest graft was harvested using the cutting guide (Figure 5B) and fixed to the mandible using a 2.4 system reconstruction plate and a 2.0 system plate (LeForte, South Korea), (Figure 5C). Closure was carried out in layers, using 4/0 polyglactin 910 for deep layers and 4/0 nylon for superficial layers of the neck and hip.

The day after surgery, the patient was discharged with an elastomeric pump for controlled analgesia (lidocaine, ketamine, metamizole, tramadol, ketorolac, ondansetron, and dexamethasone). Additionally, clavulanic acid (400mg/57mg per 5ml) was prescribed at 12.5 ml every 12 hours for 7 days, Pregabalin 75 mg every 24 hours for 30 days, Sodermix cream, and a scar-reducing patch. The patient was advised to have absolute rest for 5 days, a soft diet for 15 days, and apply local ice for 48 hours, along with other general recommendations.

Postoperatively, the patient underwent physiotherapy for 20 days and low-level laser therapy (diode laser, 0.28 W, 30 kHz, 200 ns pulse, 0.6% duty cycle, 61.2 J/cm^2 total power density) on the third day, re-peated twice every 7 days. After 7 days, the intermaxillary fixation and extraoral sutures were removed. One month later, proper occlusion and facial symmetry were confirmed, with no signs of infection or wound dehiscence (Figure 6).
Two months after surgery, adequate healing of the extraoral and hip wounds was observed, along with adequate mandibular function and favorable facial aesthetics.

The patient expressed satisfaction with the treatment, understanding that the pathology could have continued to grow and required more radical treatment in the future. Aesthetically, the patient was pleased, as the lesion was expansive and deformed her face.

Ethical considerations

The patient consented to the use of clinical information and photographs for anonymous submission to a scientific journal.
All patient information was anonymized to ensure confidentiality and the study was conducted in accordance with ethical guidelines and institutional protocols.

DISCUSSION

This case report describes the treatment of a recurrent ossifying mandibular fibroma in a 47-year-old patient. Ossifying fibroma is a rare but significant benign neoplasm due to its potential for recurrence and its impact on the mandibular structure.[3,6]

Management depends on the nature of the lesion, its size, and location. The risk of recurrence after curettage is high, reaching up to 85%, while recurrence rates after resection are reported to be between 0% and 4%.[4,6] This high recurrence rate justifi-es the decision to opt for a block resection instead of repeat curettage. However, the safety margins should not exceed 5 millimeters, as the tumor does not infiltrate the surrounding bone more than 1 to 2 millimeters.[4,6,12]

In the early stages, the differential diagnosis of ossifying fibroma includes pathologies such as central giant cell granuloma, periapical disease, and ameloblastoma.[6]

As the lesion matures and increases in size, it becomes necessary to differentiate it from other conditions such as fibrous dysplasia, osteoblastoma, odontoma, and osteosarcoma.[3,6-8] Fibrous dysplasia is the primary condition with which ossifying fibroma must differentiate, as both can be histologically indistinguishable, necessitating a diagnosis based on a detailed clinical and radiographic evaluation.[8-12] Radiographically, ossifying fibroma is characterized by concentric, encapsulated borders, while fibrous dysplasia presents poorly defined, nonen-capsulated borders. Furthermore, ossifying fibroma causes concentric bone expansion around a defined epicenter, altering bone morphology, in contrast to fibrous dysplasia, which typically causes minimal bone alteration and rarely leads to root resorption.[6,8,12]

Furthermore, the diagnosis of hyperparathyroidism in this patient was a significant clinical finding, as there is a documented association between hyperparathyroidism and the development of ossifying fibromas, known as hyperparathyroidism-jaw tumor syndrome, which also predisposes to the formation of parathyroid tumors, and renal and uterine cystic and neoplastic abnormalities.[13,14]
The presence of hyperparathyroidism in this patient may have contributed to both the initial development and the recurrence of ossifying fibroma.

Regarding dental extractions, they should be performed at least six weeks prior to the main surgery to ensure adequate soft tissue healing.[9] The recommended surgical approach is submandibular, as the success of the treatment depends on maintaining a closed surgical wound, preventing oral contamination, avoiding infections, and ensuring the continuity and stability of bone tissue, as well as maintaining its volume.[10] There should be no communication with the oral mucosa, so extractions must be performed before surgery. If there is minor mucosal dehiscence during surgery, a hermetic closure can be performed, but if the dehiscence is significant, the surgery should be postponed until the mucosa has fully healed.[9]

Virtual planning in the regeneration of mandibular defects with free iliac crest grafts has proven to be a valuable tool in enhancing precision and postoperative outcomes. Specifically, the integration of computer-assisted surgery (CAS) and rapid prototyping has increased the predictability of procedures, allowing surgeons to anticipate potential complications and precisely tailor bone reconstructions, thus reducing the likelihood of errors and complications.[15]

In mandibular reconstruction, iliac crest grafts face challenges related to the complex angulations of mandibular anatomy, which makes it difficult to accurately restore its configuration.[15] The use of virtual planning allows pre-emptive simulation and adjustment of these angles, improving the fit and optimizing both functional and aesthetic outcomes.
Previous studies have highlighted the importance of assessing postoperative angular deviations, and this approach has been validated in this study, which showed a high degree of agreement between virtual preoperative and postoperative measurements.[15,16] In addition, virtual planning not only aids in the proper selection of the graft and recipient site but also improves the choice of the graft region. Specifically, the use of software to determine the size of the bone defect and select the optimal area for the removal of the iliac crest graft enables greater precision and predictability

in the surgical results. The creation of personalized cutting guides for graft extraction contributes to reducing surgical time and associated morbidity, while also preserving nearby critical structures such as nerves and vessels, thus preventing further complications.[16]

However, despite the clear advantages of virtual planning and computer-assisted surgery, some limitations persist, such as the additional cost, limited availability, and potential delays in surgery due to the preparation of the technology. However, the use of CAD/CAM-manufactured tools and patient-specific implants (PSIs) can enhance the precision and effectiveness of these procedures, offering a more efficient transition from virtual planning to surgery.[17]

One of the main strengths of this case is the use of virtual surgical planning, which allowed precise resection of the ossifying fibroma and personalized anatomical reconstruction with an iliac crest graft, as well as precontouring of plates to reduce surgical time and intraoperative complications. Furthermore, the inclusion of comprehensive management that addresses the underlying hyperparathyroidism demonstrates a multidisciplinary approach that may be the key to preventing future recurrences. However, a significant limitation of this report is the short follow-up period, which excludes a full evaluation of the long-term durability of the reconstruction and the potential for tumor recurrence.

Furthermore, since this is a single case study, findings and conclusions may not be generalizable to all patients with man-dibular ossifying fibroma, underscoring the need for additional studies with larger sample sizes and prolonged follow-up. It is also suggested that appropriate research designs be implemented to evaluate the impact of virtual planning with cutting guides for mandibular tumor resection and graft harvesting.

CONCLUSION

Management of recurrent mandibular ossifying fibroma requires a strategic surgical approach to ensure complete resection and minimize recurrence.

This case highlights the importance of precise surgical planning using virtual tools to optimize outcomes. The use of a custom iliac crest graft allowed for functional and aesthetic restoration, demonstrating the effectiveness of personalized reconstruction techniques. Further-more, the identification of underlying conditions, such as hyperparathyroidism, is crucial in understanding possible contri-buting factors to recurrence.

Long-term follow-up remains essential to monitor bone integration, detect any signs of recurrence, and evaluate the durability of reconstruction. This case underscores the need for a multidisciplinary approach that combines advanced imaging, virtual surgical planning, and personalized grafting techniques to achieve optimal patient outcomes.

CONFLICT OF INTERESTS

There is no conflict of interest to disclose with respect to this manuscript.

ETHICS APPROVAL

The patient consented to the use of clinical information and photographs for anonymous submission to a scientific journal.

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AUTHORS' CONTRIBUTIONS

Pablo Tenorio-Peñafiel: Contributed to the conception and design of the case report. Review of the literature. Contributed study materials. Drafted the article. Critically reviewed the article. Approved the final version of the article.

Daniel Delgado-Piedra: Provided academic and clinical advice. Critically reviewed the article. Approved the final version of the article.

Juan Marcos Parise-Vasco: Provided academic and technical advice. Critically reviewed the article. Approved the final version of the article.

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