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Osteochondroma in the distal phalanx of a pediatric patient: a case report

Osteocondroma en la falange distal de un paciente pediátrico: reporte de caso

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Keywords:

Osteochondroma, pediatric, bone pathology, benign tumor, surgical treatment, foot, toe, distal phalanx.

Abstract

Osteochondroma is a benign cartilage-derived tumor that, while common in the appendicular skeleton, is exceptionally rare in the distal phalanges of pediatric patients. Its clinical presentation may range from incidental findings to symptoms such as pain, local deformity, functional limitation, or recurrent infections, particularly when it affects exposed regions like the toes. These clinical features, combined with its unusual location, can complicate the differential diagnosis with entities such as exostoses, granulomas, or subungual infections, underscoring the importance of a thorough clinical and radiological assessment. We report the case of a 3-year-old girl presenting with a painful distal tumor in the fourth toe of the left foot, with a long-standing evolution and recurrent infectious episodes. Following comprehensive clinical evaluation and imaging studies, complete surgical excision was performed using Syme's technique, with subsequent histopathological confirmation of osteochondroma. This case highlights the relevance of considering osteochondroma among less common differential diagnoses and emphasizes the effectiveness of surgical treatment in terms of safety, symptom control, and functional recovery. Moreover, early intervention not only ensures a definitive resolution but also prevents future complications, ultimately improving the patient's quality of life.

Palabras clave:

Osteocondroma, pediatría, patología ósea, tumor benigno, tratamiento quirúrgico, pie, dedo, falange distal.

Resumen

El osteocondroma es un tumor benigno de origen cartilaginoso que, aunque frecuente en el esqueleto apendicular, se presenta de manera excepcional en las falanges distales de pacientes pediátricos. Su expresión clínica puede variar desde un hallazgo incidental hasta síntomas como dolor, deformidad local, limitación funcional o infecciones recurrentes, especialmente en zonas expuestas como los dedos del pie. Estas características clínicas, sumadas a su rareza en dichas localizaciones, pueden dificultar el diagnóstico diferencial con otras entidades como exostosis, granulomas o infecciones subungueales, lo que subraya la importancia de un abordaje clínico y radiológico cuidadoso. Se expone el caso de una niña de 3 años con una lesión tumoral distal en el cuarto dedo del pie izquierdo, dolorosa, de evolución prolongada y asociada a episodios repetidos de infección. Tras la evaluación clínica y la realización de estudios de imagen, se procedió a la resección quirúrgica completa mediante técnica de Syme, confirmándose posteriormente el diagnóstico de osteocondroma a través del análisis histopatológico. Este caso ilustra la relevancia de considerar el osteocondroma en diagnósticos diferenciales poco habituales y destaca la eficacia del tratamiento quirúrgico en términos de seguridad, control sintomático y mejora funcional. Además, la intervención temprana favorece la resolución definitiva y previene complicaciones futuras, optimizando la calidad de vida del paciente pediátrico.

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Introduction

Osteochondromas are benign lesions characterized by hypertrophy of cartilaginous tissue. They are among the most frequent benign tumors, accounting for 10 % to 15 % of osteoarticular tumors^{1,2}. These cartilaginous tumors originate from a fragment detached from the epiphyseal cartilage, which determines their location. They generally develop after local trauma, although they may also appear without apparent cause²⁻⁴.

They usually present as solitary lesions but may also show in multiple forms. They have been reported in nearly all bones of the skeleton, most frequently in the metaphyseal region of long bones^{1,2,5}.

Osteochondromas appear most often before the age of 20 years, and their discovery is usually incidental. When symptoms are present, these include deformity of the affected area, limitation of movement, and the presence of a palpable mass. Pain is typically related to compression of adjacent structures, as well as rubbing or friction against external objects^{6,7}. Diagnosis is primarily clinical but should be confirmed by imaging tests. Radiography is the method of choice, and osteochondromas are characterized by a bony protrusion with medullary continuity between the osteochondroma and the underlying bone. Other imaging modalities, such as ultrasound or magnetic resonance imaging, may also be used^{5,6,8}.

Surgery is indicated in cases with painful symptoms or when malignancy is suspected, such as in lesions with rapid growth or significant thickening of the cartilaginous cap^{3,7,8}. Among the most widely used techniques is the Mercado technique, which allows complete surgical resection of the tumor, including the cartilaginous cap and a small fragment of the underlying bone. This type of surgery requires full exposure of the tumor, which implies a wide approach for safe resection. It is often associated with moderate to severe post-operative pain due to greater tissue manipulation⁸⁻¹⁰.

The aim of this work is to present, through a case report, the surgical approach to an osteochondroma in the distal phalanx in a pediatric patient. In this article, the term *osteochondroma* will be used consistently to refer to the lesion, with its synonymy and differences with *chondroma* explained in the introduction to avoid terminological ambiguities.

Case report

A 3-year-old female patient, with no relevant medical history, presented with a 15-month history of lesion on the distal region of the fourth toe of the left foot. The lesion caused pain and recurrent infections.

The case was initially evaluated by the Pediatrics service, which subsequently referred the patient to a podiatry unit specialized in surgery within a hospital setting, as the intervention would require general anesthesia and specific surgical management.

At the first consultation (June 2023), the parents reported difficulty in shoe use due to pain and recurrent infectious episodes, which temporarily improved with antibiotic treatment.

On clinical examination, the patient was in good general condition, with no motor dysfunction in the lower limbs. A distal tumoral lesion was observed on the 4th toe of the left foot, compromising the

finger tip and producing nail dystrophy due to elevation of the nail plate (Figure 1). The lesion had well-demarcated borders, erythematous skin on its surface, and a small ulcerated area covered by a crust. Pain was elicited on palpation.

Plain radiography (anteroposterior and oblique views) showed a well-demarcated, bone-dense image originating in continuity with the distal phalanx of the 4th toe, consistent with the diagnosis of subungual osteochondroma.

Given the location, functional compromise, and recurrence of infections, a block resection was performed using the Syme technique with complete removal of the distal phalanx, under general anesthesia, in August 2023. The choice of this technique, more radical than the conservative curettage recommended in the literature, was justified by the size of the lesion, complete bone involvement, severe nail dystrophy, and radiological findings that, although inconclusive, warranted exclusion of malignant transformation. Complete resection allowed an adequate safety margin and reduced the risk of recurrence.

A transverse incision was designed at the level of the distal interphalangeal joint, extended elliptically around the toe in a "C" shape. Skin, fascia, and tendons were carefully dissected, and joint section was performed to extract the entire distal phalanx (Figure 2).

The specimen was sent for pathology examination. Histology revealed an "osteocartilaginous lesion with a bony base, covered by hyaline cartilage, with areas of cellular atypia: enlarged nuclei, chromatin irregularities, increased mitotic figures, and slightly irregular margins.



Figure 1. Preclinical images.



Figure 2. Intraoperative images.

These findings, although not diagnostic of malignancy, justify annual clinical and radiological follow-up to rule out recurrence or malignant transformation.

Surgical closure was performed with simple sutures, achieving a satisfactory functional and aesthetic result. A nonadherent dressing and semicompressive bandage were applied. Postoperatively, oral analgesia and weekly follow-up were indicated. Sutures were removed at 14 days, with no complications such as dehiscence, infection, or necrosis. Serial dressings were performed for 4 weeks.

The patient was discharged in September 2024 (12 months after surgery) without signs of recurrence and with good functional and aesthetic adaptation (Figure 3).

Discussion

Osteochondromas are the most common benign bone tumors, representing 20 % to 50 % of all bone tumors. They are superficial bone lesions composed of cortical and medullary bone, covered by hyaline cartilage. Continuity between the cortical and medullary bone of the lesion and the underlying bone is a pathognomonic feature that confirms the diagnosis. Osteochondromas may present as solitary or multiple lesions, the latter being an autosomal dominant condition known as hereditary multiple exostoses. Prevalence has been reported as slightly higher in women (70%), although other studies have not found significant sex differences⁵⁻⁹.

Most subungual osteochondromas are located in the 1st toe, although cases have been described in the fourth and second toes^{2,4,8}.

Regarding treatment, Alabdullrahman et al. (2024) proposed that, in most solitary osteochondromas without signs of malignancy, conservative management may be appropriate, highlighting the experimental use of retinoic acid gamma receptor agonists with promising results. In such cases, surgery—whether marginal or wide excision—would be reserved for lesions with suspected malignant transformation¹¹.

By contrast, Jarolia et al. (2024) advocated surgery as the treatment of choice, noting that resection accompanied by thorough

bone curettage is essential to reduce recurrence rates. They also emphasized the importance of submitting the surgical specimen for histopathological analysis to differentiate osteochondromas from other exostoses and to rule out malignancy, particularly in subungual lesions, which may be underdiagnosed¹².

Vázquez-Flores et al. (2004) concurred on the need for surgical resection, using in their series of 27 cases the Dubois-type technique to expose and resect the lesion from its base, followed by meticulous curettage of the bone bed. They also underscored the relevance of precise clinical-radiological diagnosis to differentiate osteochondroma from other subungual masses¹³.

Dabrowski et al. (2003), in a study of 74 patients, used a “fish-mouth” incision followed by burr curettage, identifying a higher risk of recurrence in patients younger than 18 years and in those with greater postoperative pain, although no statistically significant association was found with sex, symptom duration, preoperative pain, tumor size, or nail plate destruction¹⁴.

Although the literature often recommends a conservative approach with preservation of the phalanx and exhaustive curettage, complete resection of the distal phalanx was chosen in this case. This decision was based on total bone involvement, recurrent infections, severe nail dystrophy, and radiological and histopathological findings that, although not diagnostic of malignancy, justified a wider surgical margin to minimize recurrence risk.

In conclusion, surgical treatment of osteochondromas is essential due to the potential malignant transformation of these lesions and associated complications, such as compression of adjacent neurovascular structures and functional impairment. Complete surgical resection of the osteochondroma not only eliminates pain and prevents pathologic fractures but also reduces the risk of malignancy, particularly in rapidly growing osteochondromas or those located in atypical areas. Moreover, surgical intervention can significantly improve patients’ quality of life by restoring mobility and normal function of the affected limb.

Conflict of interest

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Contributions of the authors

Concept and design: ARM. Data collection: RRR, SSM. Drafting of the manuscript: RRM, RGP. Final review: AMRP.

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Figure 3. Postoperative image 1 year after surgery.

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