Incidental diagnosis of middle phalanx enchondroma during surgical management of a traumatic fracture. A case report

Luis Enrique Cortés Gutierrez M.D.
Ana Cristina Rosales Nieto M.D.
Luis Arturo Rubio Arteaga M.D.
Carlos Iván Amezcua Equihua M.D.
Cecilia Estrella Bernal M.D.
Yaneli Madrid Ferto M.D.
Eduardo Paul Zaragoza Valdez M.D.

Edo. Mex, Mexico

Case Report

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Background: Chondromas are benign cartilaginous tumors and are the most common primary bone tumors of the hand. They are often discovered incidentally or associated with pathological fractures. Management strategies vary, especially when the lesion is identified during the treatment of acute trauma.

Case presentation: Female patient with 39-years-old presented with pain and swelling four days after blunt trauma to the third finger of her left hand. Radiographs showed a comminuted fracture of the proximal shaft of the middle phalanx and a well demarcated hypodense image measuring 8.9 × 11 mm, consistent with a bone cyst versus vs chondroma. Open reduction with percutaneous Kirschner pin fixation was performed, and the lesion was filled with freeze dried bone graft. Histopathological analysis confirmed the diagnosis of chondroma.

Conclusion: The incidental diagnosis of chondroma during the management of traumatic fractures highlights the importance of a thorough radiological evaluation. Freeze dried bone graft represents an effective alternative to autologous grafting, avoiding donor-site morbidity and ensuring good outcomes.

Keywords: enchondroma, phalanx, trauma, autologous bone graft, curettage, hand surgery.

Enchondromas are benign bone tumors composed of mature hyaline cartilage. They represent the most common benign bone neoplasms of the hand, accounting for up to 90% of benign tumors in this location, with a predilection for the proximal phalanges of the ulnar digits, followed by the middle phalanges, metacarpals, and rarely distal phalange [1]. Diagnosis is most frequent in young adults between the third and fourth decades of life and symptomatic enchondromas are generally treated via surgery [1,2].

Although frequently asymptomatic, they are often detected incidentally or following a pathological fracture after minor trauma. It is estimated that 40% to 60% of cases initially present with a fracture as the first clinical manifestation [1,2]. Radiographically, they appear as well-defined lytic lesions without periosteal reaction or soft tissue involvement [2].

The standard treatment consists of surgical curettage, traditionally followed by autologous bone grafting. However, recent years have seen a rise in the use of freeze-dried bone grafts as a safe and effective alternative, avoiding donor site morbidity and reducing operative time [3,4]. Comparative studies have shown that bone substitutes provide similar clinical and radiological outcomes to autografts, particularly in small or contained defects [5,6].

This report presents the case a 39-year-old woman who sustained traumatic comminuted fracture secondary to a blunt force trauma of the middle phalanx of the third finger of the left hand, in whom a chondroma was incidentally discovered during surgery, performing curettage and extraction of the lesion, followed by open reduction with percutaneous fixation with Kirschner nails, which is now used as an accessible osteosynthesis material for recurrent use, followed by placing a non-autologous lyophilized bone graft to fill the dead space, which is easily accessible in the hospital, obtaining an adequate postoperative period and favorable evolution.

Case report

We present the case of a 39-year-old right-handed female patient with a history of insulin resistance managed with metformin, and no other relevant comorbidities. She presented to the emergency department due to persistent pain, swelling,

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Figure 1. X-rays (PA and oblique views): Multifragmentary fracture at the proximal diaphysis of the middle phalanx of the 3rd finger of the left hand. Impaction of bone fragments in PA projection. Well-defined, round radiolucent lesion (9x10 mm) at the fracture site in oblique projection.

and discoloration of the third finger of the left hand following a blunt trauma with a metal object sustained four days prior. Initial management outside the institution consisted of immobilization with a circular cast. Upon evaluation, physical examination revealed ecchymosis and localized pain with slight limitation of motion, but preserved passive range of motion and distal neurovascular integrity.

Plain radiographs showed a comminuted fracture of the proximal diaphysis of the middle phalanx of the third finger, with bone fragment impaction and a well-defined, rounded radiolucent area measuring approximately 9 × 10 mm at the fracture site.(Figure 1.) CT with 3D reconstruction confirmed cortical disruption and an ovoid hypodense lesion measuring 8.9 × 11 mm within the fracture line, suggestive of an associated cystic lesion. (Figure 2 & 3.)

Complementary Studies:

- X-rays (PA and oblique views): Multifragmentary fracture at the proximal diaphysis of the middle phalanx of the 3rd finger of the left hand. Impaction of bone fragments in PA projection. Well-defined, round radiolucent lesion (~9 x 10 mm) at the fracture site in oblique projection.
- CT scan of the left hand with bone reconstruction: Fracture line at the middle phalanx. Hypodense oval lesion (~8.9 x 11 mm) at the fracture site.
- Histopathological analysis reported six fragments of cartilaginous tissue, measuring 0.8 × 0.7 cm in total, consistent with a diagnosis of enchondroma of the middle phalanx.
- Diagnostic Impression: Fracture of the proximal diaphysis of the middle phalanx of the 3rd finger of the left hand secondary to blunt trauma. + enchondroma of the middle phalanx.

Figure 2. CT scan of the left hand with bone reconstruction: Fracture line at the middle phalanx. Hypodense oval lesion (8.9x11 mm) at the fracture site.

Clinical and imaging findings consistent with a middle phalanx fracture. Incidental imaging finding of a lesion suggestive of an old lesion, possibly a bone cyst vs. enchondroma. Due to the nature of the fracture, surgical management was indicated, and open reduction with percutaneous fixation using a Kirschner wire was performed. During the procedure, the cystic cavity was filled with lyophilized bone graft, and a bone biopsy was obtained. Histopathological analysis reported six fragments of cartilaginous tissue, measuring 0.8 × 0.7 cm in total, consistent with a diagnosis of enchondroma of the middle phalanx.(Figure 4.)

The patient was subsequently evaluated by the hospital's oncology service, who determined that no oncologic follow-up was necessary due to the benign nature of the lesion. She remains under outpatient follow-up by the plastic and reconstructive surgery department. (Figure 5.)

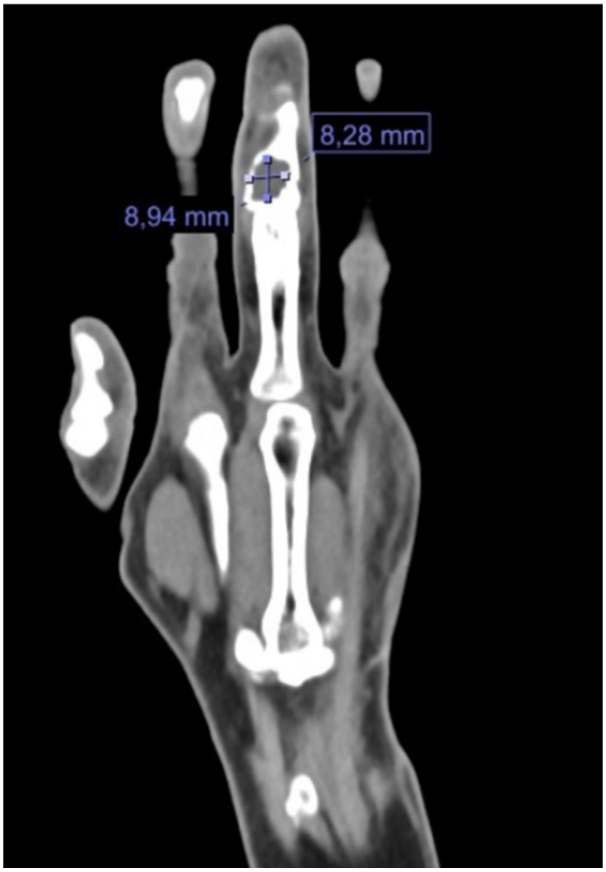

Figure 3. CT scan of the left hand coronal section. Hypodense oval lesion (8.9 x 8.2 mm)

Figure 4. Post operative radiographic evaluation in anteroposterior (AP), lateral, and oblique projections shows the proper placement of Kirschner wires, in situ lyophilized bone graft, and satisfactory fracture reduction.

Discussion

The incidental finding of an enchondroma during the management of a fracture is well described in the literature. up to 60% of hand enchondromas are discovered following pathological fractures, often in the absence of major trauma [1,2]. In such cases, careful radiographic evaluation is crucial, especially when the mechanism of injury seems disproportionate to the resulting fracture.

In our case, computed tomography revealed a well-defined hypodense lesion (8.9 × 11 mm) within the fracture line, raising suspicion of a benign lesion such as a bone cyst or enchondroma. Advanced imaging techniques, particularly 3D CT reconstructions, are essential for accurately characterizing such intraosseous lesions and differentiating them from low-grade malignancies [2,4].

Surgical treatment included open reduction, percutaneous Kirschner wire fixation, and curettage of the tumor cavity, which was then filled with freeze dried bone graft. The use of freeze dried grafts has been validated as an effective alternative to autologous grafts, offering comparable outcomes while avoiding the risks associated with donor site morbidity [4,5,6].

Ciobanu et al. and Nazarova et al. compared autologous grafts, injectable substitutes, and spontaneous healing in enchondroma cavities, demonstrating that freeze-dried grafts achieve similar consolidation rates and functional outcomes [5,6]. Their immediate availability and ease of use in the operative setting further support their application in hand surgery [3,6].

This case aligns with current best practices favoring a one-stage surgical approach that addresses both the fracture and the benign tumor, minimizing patient morbidity and reducing the need for future procedures [1,7].

Conclusion

The incidental diagnosis of enchondroma should be considered when encountering atypical fracture patterns, particularly following low-energy trauma. This case underscores the importance of comprehensive imaging evaluation to identify underlying bone lesions.

Freeze-dried bone grafts represent a safe and effective alternative to autologous grafts in the management of post-curettage defects. Current evidence supports their clinical and radiological efficacy and their growing role in hand tumor

Figure 5. Radiograph of the left hand in AP and oblique projections, taken six weeks after surgery and following the removal of osteosynthesis material, shows appropriate callus formation, with no evidence of osseous injury at this level, and with proper articular alignment.

reconstruction [3,5,6]. In this case, their use enabled definitive treatment in a single operation, with a favorable clinical outcome and no complications.

One-stage surgical management should be considered a valid therapeutic strategy in similar scenarios, supported by recent literature and high reproducibility [1,4,7].

Conflicts of interests

None declared by the authors.

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Luis Enrique Cortés Gutierrez
Cirugía Plástica y Reconstructiva
Hospital Bicentenario de la Independencia ISSSTE
Edo. Mex. México.