Treatment of Solitary Enchondromas of the Hand with Curettage Alone: A Multicenter Study and Case Series of 10 Patients

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ABSTRACT
Introduction: Enchondroma is the most common benign bone tumor of the hand. Intralesional curettage is the standard treatment, although the use of bone grafting remains controversial because of its associated morbidity. **Objective:** To evaluate the safety and effectiveness of intralesional curettage alone, without bone grafting, in patients with solitary enchondromas of the hand. **Materials and Methods:** This retrospective multicenter study included 10 patients with solitary enchondromas of the hand treated with curettage alone. Demographic data, lesion location, time to radiographic healing, and functional outcomes assessed using the DASH questionnaire were analyzed. **Results:** The mean age was 34.6 years. Complete radiographic healing was achieved at a mean of 4.4 months. The mean DASH score was 4.9. No recurrences, postoperative fractures, or complications were recorded. **Conclusions:** Intralesional curettage alone is a safe and effective treatment for enchondromas of the hand, providing predictable bone healing and excellent functional outcomes while avoiding the morbidity associated with bone grafting.
Keywords: Enchondroma; hand; curettage; bone graft; DASH.
Level of Evidence: IV

Tratamiento de los encondromas solitarios de la mano con curetaje exclusivo: estudio multicéntrico y serie de 10 casos

RESUMEN
Introducción: El encondroma es el tumor óseo benigno más frecuente de la mano. El curetaje intralesional es el tratamiento estándar, aunque el uso de injerto óseo continúa siendo controvertido por la morbilidad asociada. **Objetivo:** Evaluar la seguridad y eficacia del curetaje intralesional exclusivo, sin relleno óseo, en pacientes con encondromas solitarios de la mano. **Materiales y Métodos:** Estudio retrospectivo multicéntrico que incluyó a 10 pacientes con encondromas solitarios de la mano tratados con curetaje exclusivo. Se analizaron las siguientes variables: datos demográficos, localización, tiempo de consolidación radiológica y resultados funcionales usando el cuestionario DASH. **Resultados:** La edad promedio era de 34.6 años. La consolidación radiológica completa se logró en un promedio de 4.4 meses. El puntaje DASH promedio fue de 4,9. No se registraron recurrencias, fracturas posoperatorias ni complicaciones. **Conclusiones:** El curetaje intralesional exclusivo es un tratamiento seguro y eficaz para los encondromas de la mano, la consolidación ósea es predecible y se logran excelentes resultados funcionales, evitando la morbilidad del injerto óseo.
Palabras clave: Encondroma; mano; curetaje; injerto óseo; DASH.
Nivel de Evidencia: IV

INTRODUCTION

Enchondroma is the most common benign bone tumor of the hand, accounting for approximately 47% of all bone tumors at this site.[1,2] It is most commonly located in the phalanges and metacarpals. Intralesional curettage is the standard surgical treatment for enchondroma.[3]

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Controversy persists regarding the management of the residual bone cavity after curettage. Traditionally, the defect has been filled with autologous bone graft or allograft with the theoretical aim of promoting bone healing and reducing the risk of postoperative fracture; however, this practice remains a matter of debate.[4] Autologous bone grafting entails donor-site morbidity and increased operative time, whereas allografts and bone substitutes increase costs and carry inherent risks.

We present a series of 10 patients with solitary enchondromas of the hand treated with intralesional curettage alone, without bone grafting or bone substitutes, to demonstrate the rapid and predictable bone healing and excellent functional recovery achieved with this approach.

MATERIALS AND METHODS

A multicenter retrospective study was conducted. Our working hypothesis was that intralesional curettage alone, without bone grafting, is a safe and effective treatment for solitary enchondromas of the hand, achieving adequate bone healing and good functional outcomes without graft-related morbidity.

Patients were consecutively included. The inclusion criteria were a clinical and radiographic diagnosis of solitary enchondroma of the hand and an indication for surgical treatment. The exclusion criteria were lesions >3 cm, extensive articular involvement requiring reconstruction, multiple lesions (Ollier disease or Maffucci syndrome), and follow-up <12 months. Ten patients with solitary enchondroma of the hand were included. All underwent intralesional curettage alone (without bone grafting), performed by two upper-extremity surgeons at two different centers between 2020 and 2024. The diagnosis was confirmed by imaging studies and histopathological examination.

Surgical Technique

The procedure was performed with the patient in the supine position, with the spine aligned and bony prominences protected, under regional anesthesia and sedation. The affected upper extremity was placed on a radiolucent hand table to allow adequate fluoroscopic control.

A standard approach was used, and a cortical window was created to access the lesion. Meticulous curettage was then performed. The residual cavity was not filled with any material. In cases of pathological fracture, bone stability was assessed; additional internal fixation was not required in any case. Three of the 10 patients presented with a pathological fracture (two involving the fifth metacarpal and one the proximal phalanx). All patients, both with and without pathological fractures, were immobilized for the same 5-day period. No additional restrictions were imposed between removal of the immobilization and complete radiographic healing, and progressive use of the hand was allowed as tolerated.

Postoperative Management

The rehabilitation protocol consisted of immobilization with a forearm-based palmar plaster splint, with the hand in a functional position, for the first 5 days to protect the surgical site and allow adequate soft-tissue healing. Limb elevation was recommended during the first 48-72 hours to reduce edema. After the first 5 days, early active finger mobilization was initiated to restore normal hand function, regain joint range of motion, and prevent stiffness.

RESULTS

The study included 10 patients (4 men and 6 women) with a mean age of 34.6 years (range 27-50). The most common locations were the fifth metacarpal (4 cases) and the phalanges (6 cases). The patient with distal phalanx involvement underwent surgery because of persistent pain and an imminent risk of pathological fracture due to severe cortical thinning.

The mean follow-up was 12.8 months. The following parameters were evaluated: 1) radiographic healing, defined as the time to complete filling of the residual cavity with trabecular bone; serial radiographs were obtained every 4 weeks; 2) functional outcome using the *Disabilities of the Arm, Shoulder and Hand* (DASH) questionnaire at 12 months; and 3) complications, including tumor recurrence, postoperative fracture, and infection.

Detailed data for the series are summarized in the Table.

The mean time to radiographic healing was 4.4 months (mean 4.4, range 2-6).

The mean DASH score at the final follow-up was 4.9 (range 0.8-7.3), reflecting minimal residual functional impairment and satisfactory clinical recovery.

Table. A series of 10 cases of enchondromas of the hand treated with curettage alone.

Case	Sex	Age	Location	Classification by Takigawa	Healing (months)	DASH
1	M	27	Fifth metacarpal, left hand	Type 1 (central)	4.0	0.8
2	F	32	Distal phalanx, right index finger	Type 1 (central)	4.6	1.7
3	F	45	Middle phalanx, right little finger	Type 2 (eccentric)	5.3	2.5
4	M	30	Proximal phalanx, right index finger	Type 1 (central)	4.2	3.2
5	F	39	Fifth metacarpal, right hand	Type 1 (central)	4.8	4.0 .
6	M	28	Fifth metacarpal, right hand	Type 1 (central)	6.0	5.4
7	F	50	Left index finger, proximal phalanx	Type 2 (eccentric)	6.0	6.1
8	F	40	Fourth metacarpal, left hand	Type 2 (eccentric)	3.0	7.3
9	F	34	Middle phalanx, right middle finger	Type 1 (central)	4.0	3.2
10	F	29	Fifth metacarpal, right hand	Type 1 (central)	2.0	6.1

DASH = *Disabilities of the Arm, Shoulder, and Hand.*

No complications, including tumor recurrence, postoperative fractures, or infections, were recorded in this series. Figures 1–3 show clinical cases 3, 4, and 5, respectively.

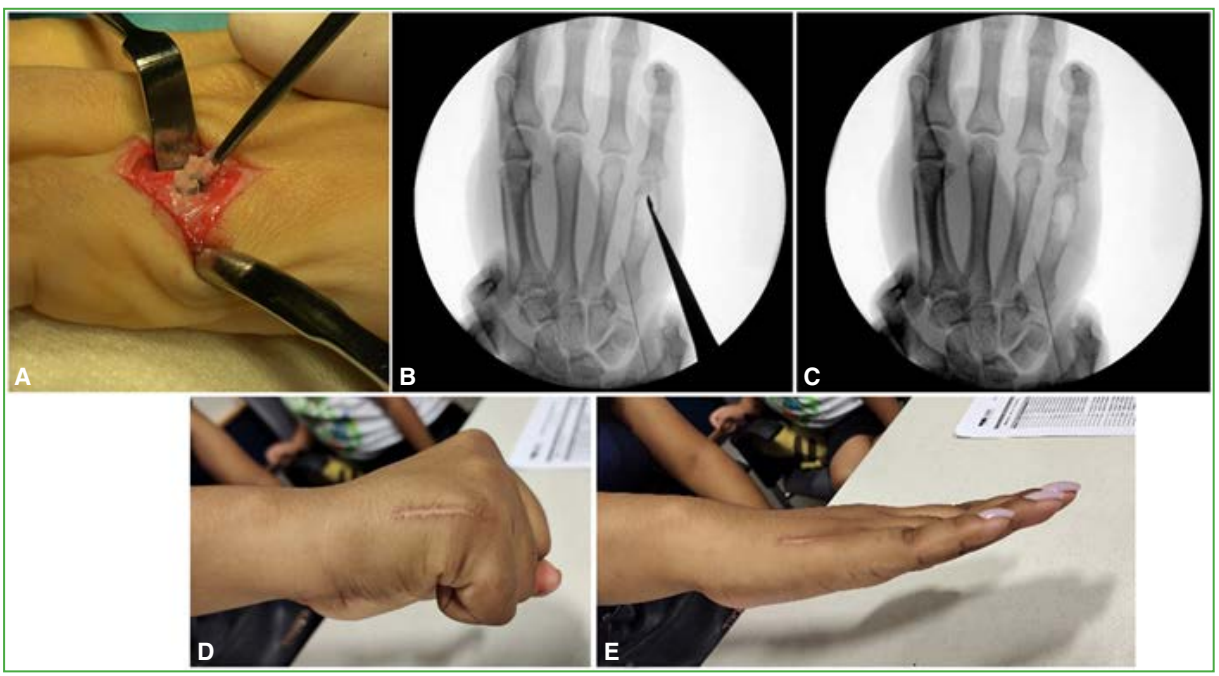

Figure 1. Case 5. **A.** Intraoperative clinical image showing curettage of the lesion. **B.** Intraoperative anteroposterior radiograph of the hand showing intralesional curettage. **C.** Intraoperative anteroposterior radiograph of the hand after lesion resection. **D and E.** Final clinical outcome.

Figure 2. Case 3. **A.** Intraoperative clinical image showing the lesion bed. **B.** Intraoperative anteroposterior radiograph of the fifth digit showing intralesional curettage. **C.** Postoperative anteroposterior radiograph of the fifth digit showing bone healing. **D and E.** Final clinical outcome.

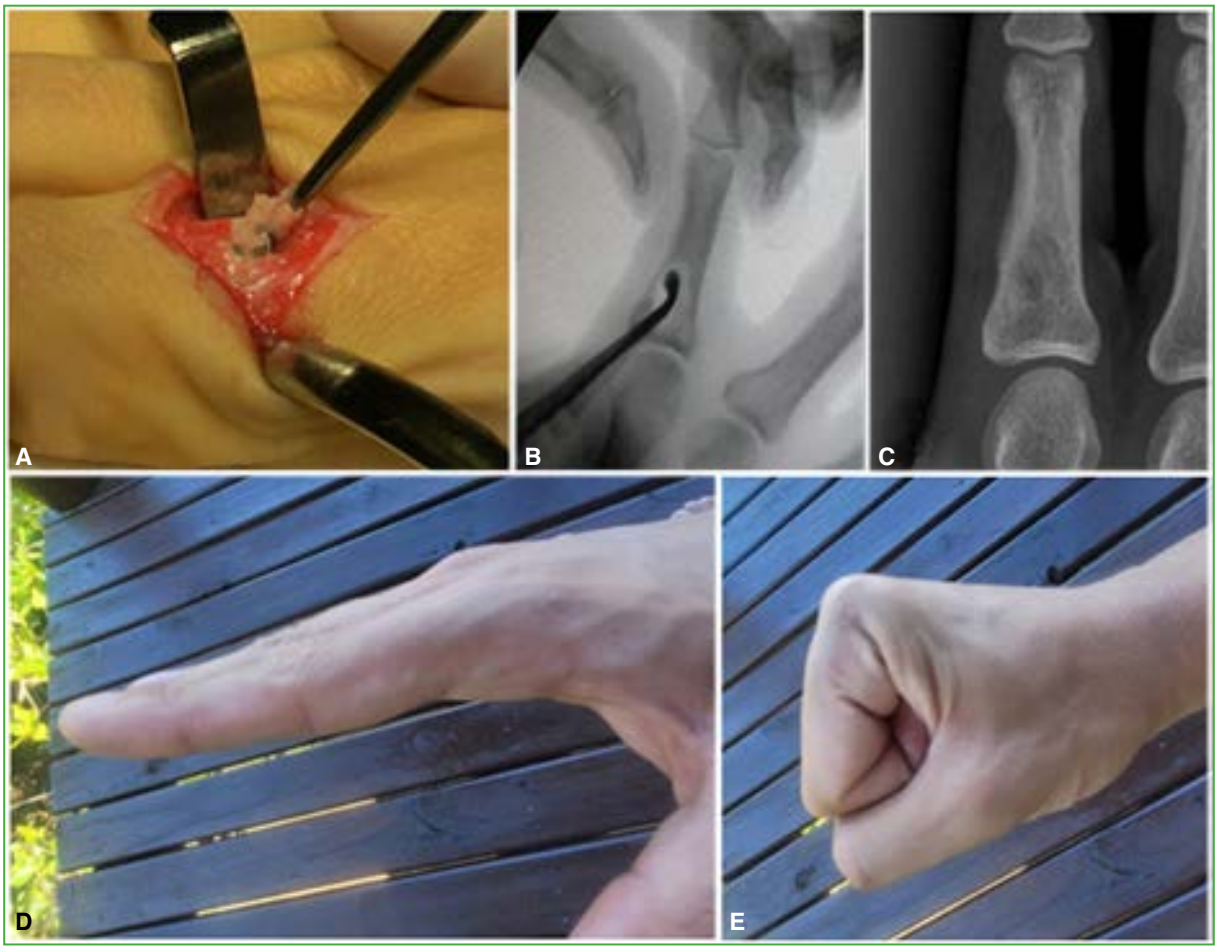

Figure 3. Case 4. **A.** Intraoperative clinical image showing the tumor. **B.** Intraoperative anteroposterior radiograph of the index finger showing intralesional curettage. **C.** Postoperative anteroposterior radiograph of the index finger showing bone healing. **D and E.** Final clinical outcome.

DISCUSSION

The results of this multicenter study of 10 cases strongly support the hypothesis that intralesional curettage alone is sufficient for the treatment of solitary enchondromas of the hand.

The controversy surrounding management of the cavity after curettage centers on concerns regarding the risk of postoperative fracture and healing time. However, our experience and recent scientific literature suggest that these concerns are unfounded in most cases.

The mean healing time of 4.4 months in our series is comparable to, or even shorter than, that reported in studies using bone grafts.[4] This may be explained by the intrinsic osteogenic potential of the bones of the hand. The spontaneous bone healing observed in our series may be attributed to the osteogenic potential of the remaining endosteum and intact periosteum, a biological mechanism widely accepted in the literature for short tubular bones.[5] In this context, the bone defect following curettage may behave similarly to a stable fracture, with the capacity for spontaneous healing. Goto et al. demonstrated spontaneous bone healing after curettage without grafting in enchondromas of the foot, suggesting that similar biological mechanisms may be expected in the short tubular bones of the hand.[6] Spontaneous bone healing is therefore a predictable phenomenon in short tubular bones.

Morbidity and Cost-Effectiveness

The main benefit of avoiding bone grafting is reduced morbidity and increased cost-effectiveness.

The use of autologous bone graft requires a donor site (such as the iliac crest or distal radius), introducing the risk of additional complications. Studies such as that by Migliorini et al. have documented morbidity associated with graft harvesting, including chronic donor-site pain, risk of iatrogenic fracture, hematoma, and increased operative time.[7] By avoiding this step, donor-site morbidity is eliminated and the procedure is simplified.

A 2015 systematic review by Bachoura et al. reported that simple curettage had the lowest complication rate (0.7%) compared with autografting (3.5%).[8] Our series of 10 cases without complications further supports this trend.

From the perspective of rational and cost-effective management, Akoh et al. analyzed the clinical and economic impact of overtreatment in patients with enchondromas and highlighted the importance of avoiding unnecessary interventions when they do not alter the final clinical outcome.[9] In this context, omitting bone grafting after intralesional curettage is consistent with a simpler and more efficient therapeutic approach without compromising safety or functional outcomes.

Functional Outcome

The excellent functional outcomes in all our patients, with a mean DASH score of 4.9, underscore that the absence of bone grafting not only does not compromise the final outcome but also, by avoiding the morbidity associated with a second surgical site, allows for early rehabilitation and a rapid return to activities of daily living.

The main limitations of this study are its retrospective design and small sample size. However, the consistency of the results across two different centers and their agreement with recent high-level evidence in the medical literature[8,10] lend support to our findings.

CONCLUSIONS

Intralesional curettage alone is a safe, effective, and cost-effective treatment option for solitary enchondromas of the hand. Spontaneous bone healing is a predictable phenomenon, occurring at a mean of 4.4 months and allowing for rapid functional recovery. Based on our results and the available evidence, intralesional curettage alone represents a valid, safe, and effective treatment option for solitary enchondromas of the hand, particularly for stable lesions, while avoiding the morbidity associated with bone grafting.

Conflicts of interest: The authors declare no conflicts of interest.

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