

Osteochondroma of Distal End Radius Presenting as Carpal Tunnel Syndrome: A Case Report

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Learning Point of the Article:

Osteochondromas can manifest in unusual ways and potentially cause symptoms that mimic other conditions. This highlights the importance of considering a broad differential diagnosis when evaluating carpal tunnel syndrome, particularly in cases with atypical presentations or patients who do not respond to standard treatments.

Abstract

Introduction: Osteochondromas are the most common benign bone tumors, typically occurring during growth. However, their occurrence in the distal radius is rare, and presentation with carpal tunnel syndrome (CTS) symptoms in pediatric patients is even rarer.

Case Report: Here, we describe a unique case of an 8-year-old female who presented with CTS symptoms and was simultaneously diagnosed with an osteochondroma of the distal radius. Surgical excision of osteochondroma of the distal radius was performed, resulting in the complete resolution of symptoms.

Conclusion: This case highlights the importance of considering osteochondromas as a possible etiology of CTS symptoms, even in pediatric patients.

Keywords: Carpal tunnel syndrome, distal radius, osteochondroma.

Introduction

Osteochondromas are the most common benign bone tumors, accounting for approximately 35% of all benign bone tumors [1]. They commonly occur during the growth period, with a peak incidence between the ages of 10 and 20 years. Osteochondromas typically involve the metaphysis of long bones. However, their occurrence in the distal radius is rare, and presentation as carpal tunnel syndrome (CTS) symptoms is even rarer, especially in children [2].

CTS is a common medical condition that affects the hand and wrist. It occurs when the median nerve, which runs from the forearm to the hand, becomes compressed or irritated as it passes through the carpal tunnel, a narrow passageway in the wrist surrounded by bones and a tough retinaculum. It is most

commonly seen in individuals between 30 and 60 years old.

Several risk factors contribute to the development of CTS. These include repetitive hand and wrist motions, work-related factors, anatomical variations, underlying health conditions (such as rheumatoid arthritis, diabetes, and hypothyroidism), pregnancy, obesity, and wrist trauma or injury.

The presence of an osteochondroma at the distal end of the radius can lead to the development of CTS through several mechanisms. First, the tumor can directly compress the median nerve as it traverses the carpal tunnel. This compression leads to the typical symptomatology, including pain, numbness, and tingling in the thumb, index, and middle fingers [3]. The nerve compression can also result in weakness in grip strength, which was observed in this case. In addition to direct compression, the

Author's Photo Gallery



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Figure 1: Pre-operative radiographs showing a well-defined bony outgrowth arising from the distal end of the radius protruding medially.

growth of the osteochondroma can cause mechanical impingement on the surrounding structures within the carpal tunnel, such as the flexor tendons. This impingement further exacerbates the compression of the median nerve. The inflammation and swelling resulting from the mechanical impingement can increase the pressure within the carpal tunnel, amplifying the compression [4].



Figure 3: Computed tomography showing a bony outgrowth arising from the surface of the distal end of the radius, continuous with the underlying bone.

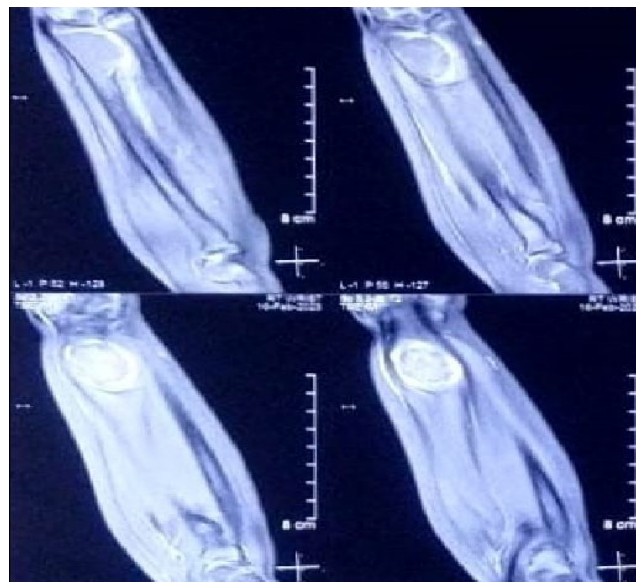


Figure 2: Magnetic resonance imaging showing a lobulated bony outgrowth (~20.5 × 17 × 12 mm) with a cartilaginous cap (~3.8 mm) arising from the distal metaphysis of the radius protruding medially.

Diagnosing osteochondroma-associated CTS often involves a comprehensive evaluation, including clinical assessment, radiographic imaging, and electrophysiological studies. Radiographs are typically the initial diagnostic tool, providing valuable insights into the presence and characteristics of the bony outgrowth. In some cases, additional imaging modalities such as magnetic resonance imaging (MRI) and computed tomography (CT), may be required to assess the extent of the tumor and its relationship to surrounding structures and visualize and measure the cartilage cap.

Treatment for osteochondroma-associated CTS generally involves surgical intervention. The primary objective of surgery is to remove the osteochondroma, thereby relieving the compression on the median nerve. Following surgery, rehabilitation is essential to restore hand function. This typically includes hand therapy and splinting to optimize recovery and promote optimal growth and development in affected children.

The primary message of this case report is to raise awareness about the occurrence of osteochondromas in uncommon locations, such as the distal end of the radius, and their potential to cause CTS. By highlighting this unique case, the report emphasizes the importance of early recognition and appropriate surgical management to alleviate symptoms, prevent long-term complications, and restore hand function.

Case Report

An 8-year-old female came to our outpatient department with

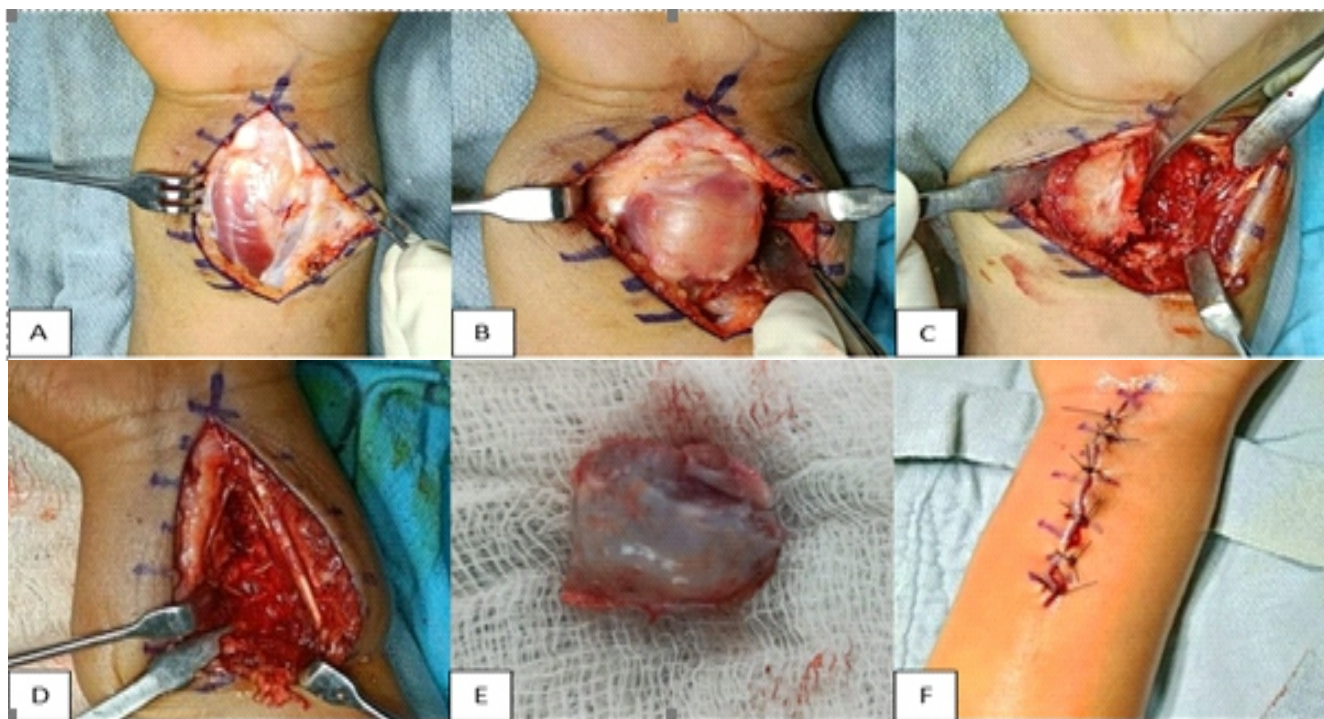


Figure 4: (A) Volar approach was used (B) Careful dissection was performed to expose the osteochondroma © Mass was meticulously dissected from the surrounding soft tissues (D) Complete excision of the tumor (E) Mass measuring 4 × 2.5 × 2 cm was sent for histopathological examination (F) Closure was done in layers.

complaints of progressive pain, tingling, and numbness in her right hand for 6 months. The symptoms were exacerbated during activities requiring fine motor skills, such as writing or drawing. There was no significant history. Examination revealed tenderness over the distal end of the right radius, and Tinel’s sign was positive over the carpal tunnel area. The patient exhibited decreased sensation over the thumb, index, and middle fingers. Motor strength was preserved, and there were no signs of muscle atrophy. The contralateral hand and upper extremities were normal.

Radiographic imaging of the right hand revealed a well-defined

bony outgrowth from the radius’s distal end, consistent with an osteochondroma (Fig. 1). An MRI of the right wrist was performed to assess the extent of tumor involvement and evaluate the adjacent soft tissues. MRI revealed a lobulated bony outgrowth (~20.5 × 17 × 12 mm) with a cartilaginous cap (~3.8 mm) arising from the distal metaphysis of the radius and protruding medially (Fig. 2). CT revealed a bony outgrowth from the surface of the distal end of the radius, continuous with the underlying bone (Fig. 3). Considering the patient’s symptoms, surgical excision of the osteochondroma was planned. Under general anesthesia, a volar approach to the



Figure 5: Post-operative radiographs confirmed complete excision of the tumor.



Figure 6: Radiographs at 6 months post-surgery did not reveal any evidence of recurrence.

Author	Year	Age of patient	Treatment	Outcome
Nather and Chong [5]	1986	47	Excision	Complete recovery
Hofmann et al. [6]	1990	75	Excision	Complete recovery
Boudart et al. [7]	2003	18	Excision	Complete recovery
Wong et al. [8]	2012	78	Excision	Complete recovery
Franz et al. [9]	2014	32	Excision	Complete recovery
Motomiya et al. [10]	2020	78	Excision	Complete recovery
Kale et al. [11]	2021	12	Excision	Complete recovery

Table 1: Recently reported cases of osteochondroma-associated carpal tunnel syndrome.

distal end of the radius was used. A longitudinal incision was made over the volar aspect of the wrist, and careful dissection was performed to expose the osteochondroma (Fig. 4). It was found to cause a mass effect over the adjacent flexor muscles with significant edema. The mass was then meticulously dissected from the surrounding soft tissues and sent for histopathological examination. The closure was done in layers, and a below-elbow slab was given for 4 weeks to prevent a pathological fracture.

Following the surgical excision of the osteochondroma, the patient experienced immediate relief from pain and tingling sensations. Post-operative radiographic imaging confirmed the complete excision of the tumor (Fig. 5). Histopathological examination confirmed the diagnosis of osteochondroma. The patient underwent a short physical therapy and rehabilitation period to regain hand strength and mobility. At the 1-year follow-up, the patient remained symptom-free, with complete resolution of her CTS (Fig. 6).

Discussion

CTS is a relatively uncommon condition in children, and when it occurs, it is often associated with underlying factors such as congenital anomalies, trauma, or systemic diseases. However, in this unique case, an 8-year-old female presented with CTS caused by osteochondroma located at the distal radius. This

atypical and rare case highlights the importance of considering unusual underlying factors when evaluating pediatric patients with CTS.

Diagnosing osteochondroma-associated CTS in children requires a comprehensive evaluation. The initial step often involves a thorough clinical assessment, including a detailed history and examination. During the physical examination, decreased sensation in the affected fingers and weakness in grip strength can be observed. However, given the rarity of this condition, it may not be initially suspected.

A comprehensive literature search was conducted in major scientific databases and identified limited cases reporting an osteochondroma presenting as CTS (Table 1). The age range of affected patients varied from 12 to 78 years, with only one pediatric case reported.

A 12-year-old male with a solitary mass on the volar aspect of the distal radius who presented clinically with CTS was reported by Kale et al. [11]. Excision biopsy confirmed the diagnosis of osteochondroma and also relieved all symptoms.

Though there are few reports of CTS due to osteochondroma in the literature, the current case is the youngest, which makes it unique in its presentation and worth reporting.

By presenting this case, we hope to contribute to the existing literature and enhance clinicians' understanding of the assessment and management of similar cases in the future.

Conclusion

In conclusion, osteochondroma of the distal end of the radius can uncommonly present as CTS in pediatric patients, even as young as an 8-year-old female. Although osteochondromas are typically benign bone tumors, their presence near the carpal tunnel can lead to compression of the median nerve, resulting in CTS symptoms.

Clinical Message

Early intervention can help alleviate symptoms, preserve hand function, and ensure optimal development in affected pediatric patients.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None



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