

Multifocal Periosteal Chondromas in the Ring Finger of an Adolescent Boy: A Case Report

Short title: Multifocal Periosteal Chondromas in the Finger

Keywords: distal interphalangeal joint, finger, periosteal chondroma, proximal interphalangeal joint

ABSTRACT

We describe an unusual case of a 12-year-old boy who presented with a loss of motion in the ring finger caused by two separate periosteal chondromas involving the proximal and middle phalanges. Range of motion improved and a recurrence did not occur at the five year follow-up following marginal excision of both lesions.

INTRODUCTION

A periosteal chondroma is a relatively uncommon slow-growing benign hyaline cartilage bone surface neoplasm that accounts for less than 2% of chondromas.^{1,2} Periosteal chondromas often develop in the periosteal region at the metaphysis of the proximal humerus, femur, or finger phalanx in the second and third decades of life.³⁻⁵ Takada et al. detected 51 cases located in the finger phalanx out of 183 cases of periosteal chondroma.⁶ Since then, 14 additional cases have been added out of 45 cases of periosteal chondroma.^{4,7-28} Thus, out of 228 documented cases of periosteal chondroma, 65 of them (29%) were located in the finger phalanges. Among these 65 cases, the precise anatomical site in the phalanges was indicated in 22 cases,^{4,6,12,22,24,27,29-37} and ten of them had the lesion in the flexor tendon sheath.^{6,12,22,24,29-33} These findings indicate that finger phalanges, especially the volar aspect, are a common site for periosteal chondromas. However, there is a general lack of literature describing periosteal chondroma; we could find only one report where the patient required surgery because of finger dysfunction.⁴

We present a case of two separate periosteal chondromas involving the proximal and middle phalanges of the ring finger associated with painful loss of motion that were successfully treated by marginal excision. To the best of our knowledge, two periosteal chondromas in the same finger but on separate phalanges has not been previously described.

CASE REPORT

A 12-year-old boy was referred with an abnormal appearance of the middle and proximal phalanx of his right ring finger. He had noticed a loss of motion and pain at the PIP and DIP joints following a sprain treated at another hospital four months prior. At that time, abnormalities in radiographs were seen, but no further evaluation was pursued. At presentation, physical examination revealed a bony mass under the distal interphalangeal

crease and another under the proximal interphalangeal crease. There was no tenderness around the masses. PIP joint active and passive range of motion was -10 to 80 degrees and DIP joint active and passive range of motion was 10 to 45 degrees. Pain was experienced at the maximum active flexion of the joints. Plain radiographs and a computed tomography (CT) scan showed that the two lesions were on the palmar surface of the proximal and middle phalanges with saucerization of the underlying cortex and a rim of sclerosis on the underlying bone. Granular calcification was also found in the mass on the middle phalangeal site (Fig. 1). Magnetic resonance imaging (MRI) showed low signal intensity on T1-weighted images and homogeneous high signal intensity on T2-weighted images. Gadolinium-enhanced MRI revealed homogeneous high signal intensity. The masses were localized between the eroding bone surface and flexor tendon (Fig. 2).

Marginal excision of the two lesions was performed. During the operation, a zigzag incision was made. For resection of the mass on the middle phalanx, the A4 pulley was preserved but the radial side of the DIP joint volar plate was resected. A well-circumscribed white mass on the distal portion of the middle phalanx was localized on an indentation of the bone, but the borderline between the mass and bone surface was unclear. The bone surface in contact with the lesion was curetted. For resection of the mass on the proximal phalanx, the A3 pulley was cut on the radial side and the radial half of the volar plate was resected. Similar findings were seen for the mass, which was also excised by curetting (Fig. 3). Histological examination of the tumors revealed a benign hyaline cartilage tumor arranged in a lobular pattern and covered by periosteum without any cytologic atypia (Fig. 4). The diagnosis of periosteal chondroma was based for both masses on the presence of benign cartilaginous tissue in correlation with a characteristic radiographic appearance. Five years after the operation, no local recurrence has been seen. The range of motion at the PIP joint has improved to -10 to 100 degrees, and that at the DIP joint has improved to 5 to 60 degrees.

DISCUSSION

Patients with periosteal chondroma of the finger are usually asymptomatic, complaining only of non-tender, palpable masses, although one case with a chondroma on the dorsal side of the proximal phalanx of a snapping ring finger has been reported.⁴ The chief complaint at presentation in our case was pain and a loss of motion at the PIP and DIP joints due to two separate periosteal chondroma lesions.

Although the patient had a history of hand trauma, tumoral lesions were suspected because radiographs of the right ring finger obtained at presentation revealed cortical erosions involving the proximal and middle phalanx and granular calcification within a soft tissue mass attached to the middle phalanx. Our differential diagnoses included tumors originating from peri- or parosteal lesions, such as periosteal chondroma, bizarre parosteal osteochondromatous proliferation (BPOP; Nora's lesion), periosteal chondrosarcoma, periosteal osteosarcoma, and parosteal osteosarcoma, as well as soft tissue tumors occurring in the tendon sheath, such as a tenosynovial giant cell tumor and fibroma of the tendon sheath. As periosteal chondroma and BPOP have many similar physical exam findings and radiological features in common¹², histopathological examination is the best method to differentiate them.

Clinically, hand surgeons should be aware of the possibility of periosteal chondroma when evaluating space-occupying lesions with cortical erosion on the phalanges in the flexor tendon sheath. When a periosteal chondroma is suspected, the possibility of multiple lesions should also be considered, especially if abnormal radiographic findings are observed.

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Figure legends

FIGURE 1: (A) Lateral radiograph before surgery revealed saucerization of the cortex and a rim of sclerosis on the palmar surface of the proximal and middle phalanx (arrows). Granular calcification was also found (arrowhead). (B) CT scan at the level of the middle phalanx. Tumor with granular calcification (arrowheads) and flexor tendon (arrow) were visible. (C) CT scan at the level of the proximal phalanx. Tumor (arrowheads) and flexor tendon (arrow) were seen.

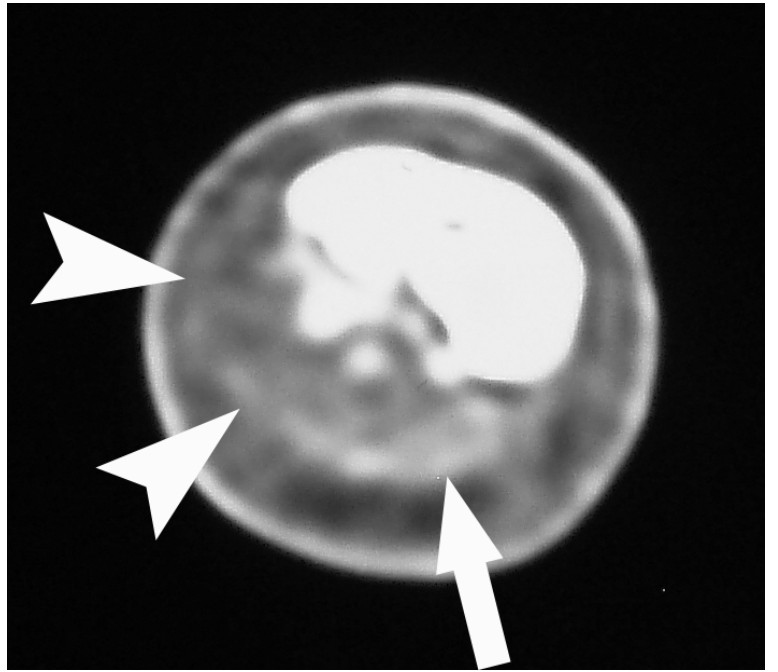
FIGURE 2: MRI (Gd-enhanced T1) showed two separate high-intensity masses between the eroded bone surface and flexor tendon.

FIGURE 3: Intra-operative findings. (A) A periosteal chondroma was found on the middle phalanx. (B) A periosteal chondroma was found on the proximal phalanx.

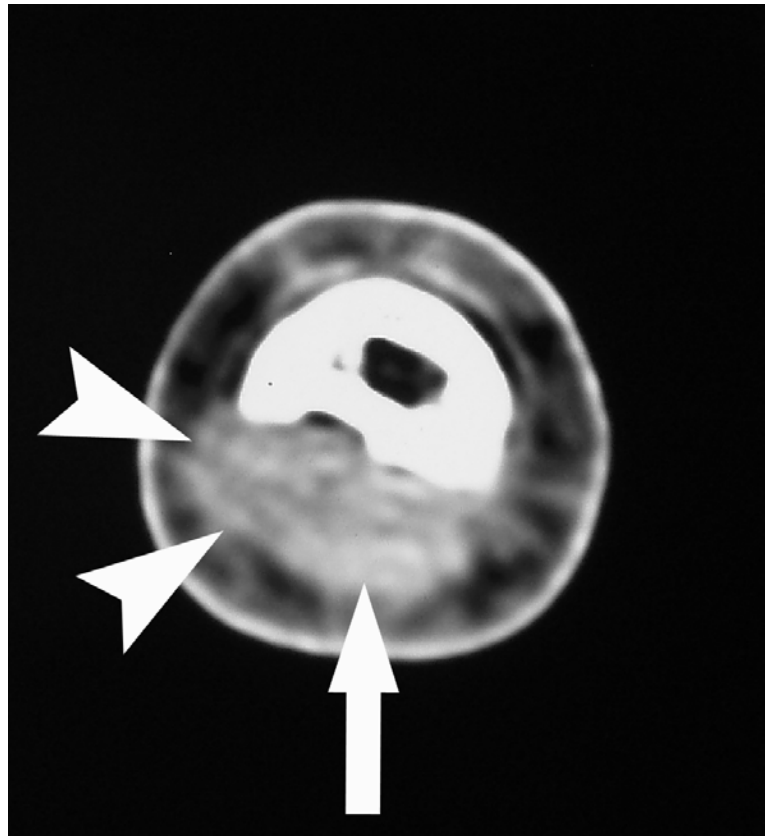
FIGURE 4: Histology of the resected specimen (hematoxylin and eosin staining). (A) Benign hyaline cartilage tumor covered with periosteum (arrowhead) ($\times 40$). (B) Hypocellular cartilage tumor without any cytologic atypia ($\times 200$)



(A)



(B)



(C)

FIGURE 1. (A) - (C)

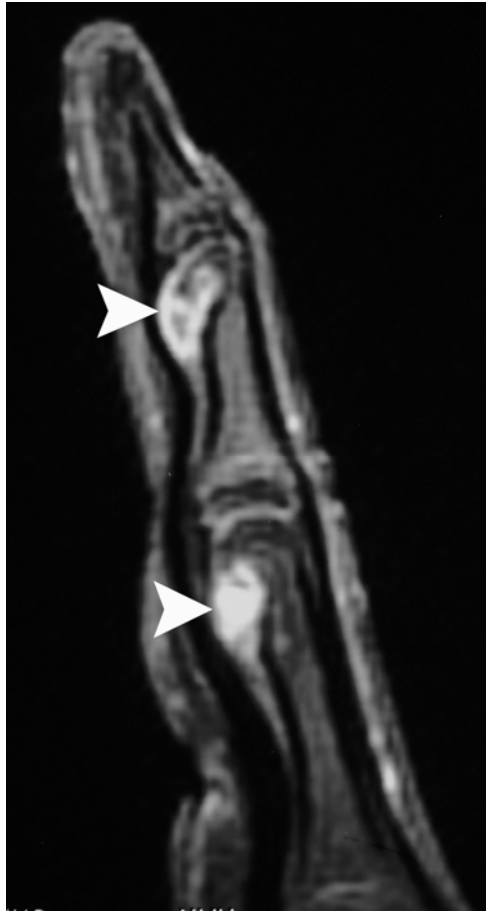
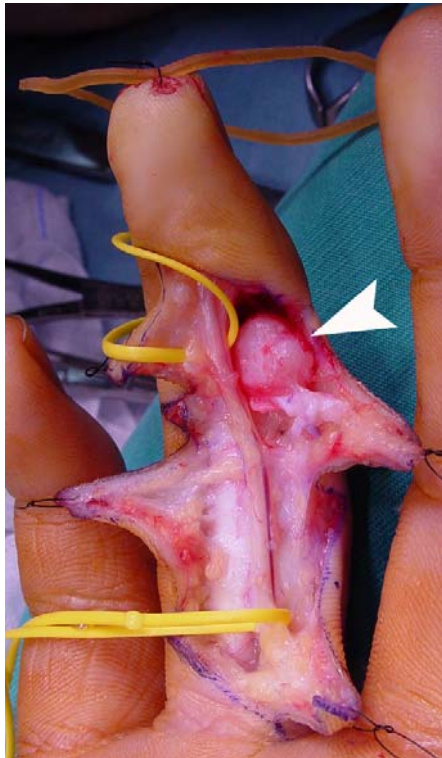
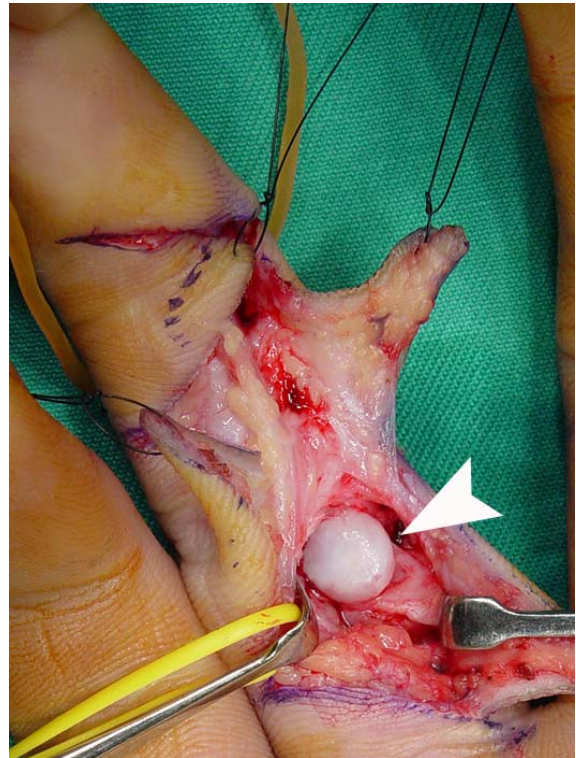


FIGURE 2

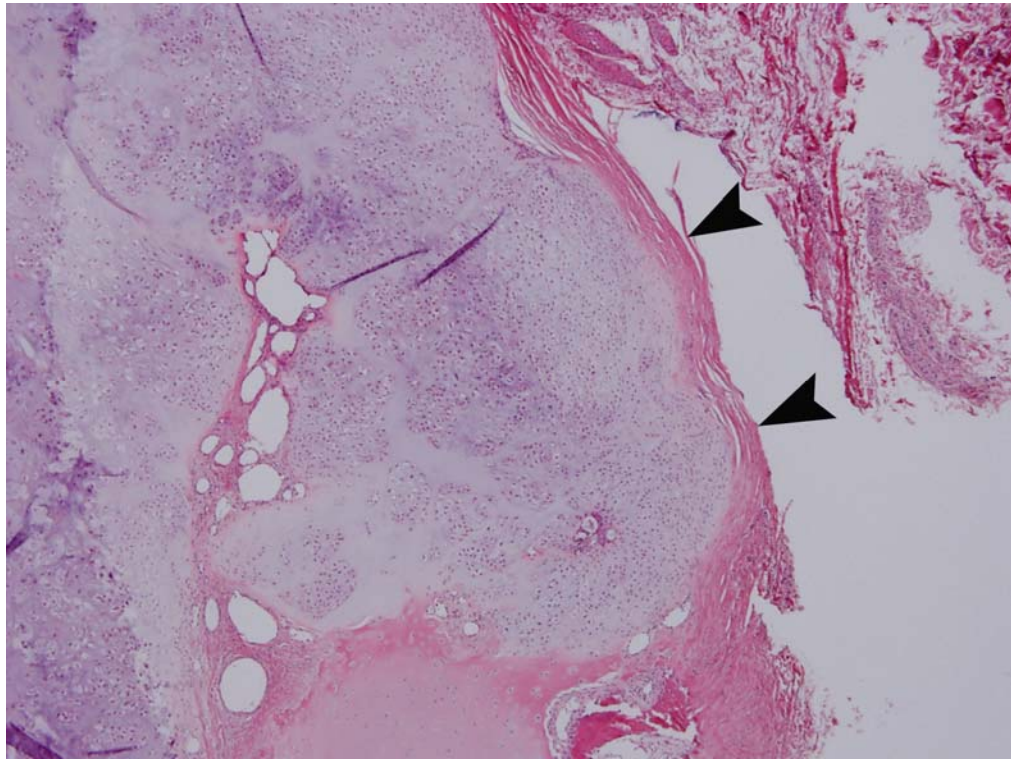


(A)

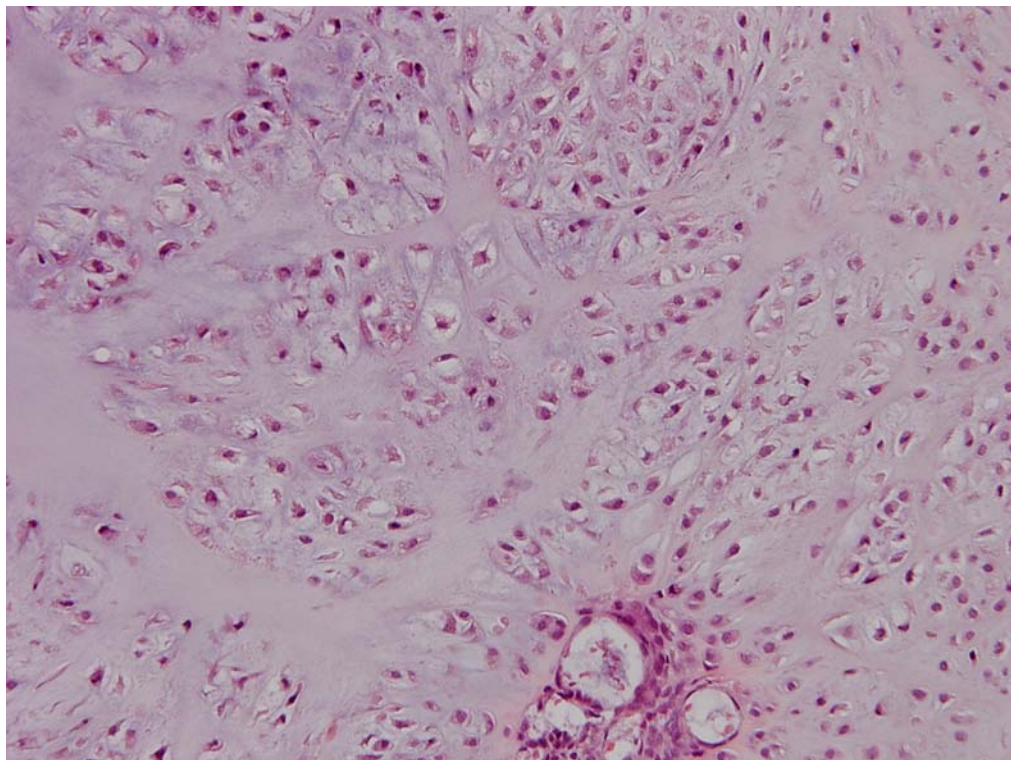


(B)

FIGURE 3. (A) - (B)



(A)



(B)

FIGURE 4. (A) - (B)