Musculoskeletal

Acute calcific periarthritis of the thumb: Correlated sonographic and radiographic findings

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\begin{abstract}
The diagnosis of acute calcific periarthritis is traditionally confirmed from a radiograph demonstrating periarticular calcifications in the affected area. Care must be taken when using ultrasound as the presentation of periarticular calcification is easily mistaken for a cortical avulsion fracture, requiring a radiograph to distinguish between the 2 differential diagnoses. We present the correlated ultrasound and radiographic findings of the hand of a 37-year-old man who was suffering from a dull ache in his thumb followed by acute severe pain 1 week later, and make the diagnosis of acute calcific periarthritis of the first metacarpophalangeal joint.

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\begin{case_report}

A 37-year-old left–hand dominant male interventional radiologist developed a dull ache in his left thumb followed by acute severe pain 1 week later. The thumb appeared swollen and tender with maximal pain localized to the first metacarpophalangeal (MCP) joint. The patient had no history of recent acute trauma, infection, or arthritis, and there was also no family history of arthritis or similar pathology.

Predisposing factors for injury included repetitive strain from performing interventional procedures, and repetitive strain from using a dictation machine. The patient was unable to perform interventional procedures for 2 weeks, which have subsequently changed the way he uses the handheld voice recognition; the patient no longer places his thumb on the record button, but instead the index finger is used to start and stop dictation with the thumb now being placed to the side, helping to reduce the strain.

Ultrasound (US) was the first test performed, followed by radiographic imaging, as demonstrated in Figure 1. On the initial US, a linear echogenic focus was noted within an abnormally thickened hypoechoic radial collateral ligament of the first MCP joint. The radiographic image demonstrates a curvilinear

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calcific density adjacent to the first MCP joint, corresponding to the US findings.

If one were to consider the clinical picture alone, diagnostic considerations would include infection, trauma, acute calcific periarthritis, and gout. The US image also supports a diagnosis of cortical avulsion fracture (incorrect diagnosis). The proximal phalanx and the first metacarpal bones are indicated to aid with the image orientation. (B) The corresponding radiograph with (C) a magnified view of the first metacarpophalangeal joint. Areas of periaricular calcifications are indicated by the white arrows and correlate with the ultrasound echogenic focus. A diagnosis of acute calcific periarthritis was made.

No specific treatment was given other than oral NSAID analgesia and the previously mentioned changes to the patient's professional routine. After the acute onset, the pain slowly subsided over several months. Follow-up radiographic and US images, taken 6 months after the initial onset of symptoms, are demonstrated in Figure 2. The radiodense region and the corresponding US linear echogenic focus are no longer present in the images, and the previously swollen radial collateral ligament has returned to near-normal size and echogenicity, as can be seen in the US image.

Discussion

Painful periarticular soft-tissue calcium deposits, described as early as 1907 by Painter [1], is a well-studied and documented phenomenon within the literature using various terms, including calcific tendinitis or bursitis, calcareous tendinitis, periarthritis or peritendinitis calcarea, and hydroxyapatite pseudopodagra or rheumatism [2–5]. Cases are typically monofocal and self-limited, with tendons of the shoulder being the most commonly affected site, followed by soft tissues of the hip and the knee [2,4]. Periarticular calcifications of the hand
and wrist have also been reported in both adult [2,6-9] and pediatric [10] cases, with flexor carpi ulnaris involvement near the pisiform bone being the more common site in these cases.

Because of the relatively uncommon occurrence of periarticular calcification in the hand, misdiagnoses can be common, resulting in unnecessary treatments, including surgeries and antibiotic use [8,11,12]. It is therefore essential that both clinical and radiological signs be well recognized to prevent misdiagnoses. We present a case of acute calcific periartritis of the thumb, demonstrating that the US findings can closely mimic the appearance of a cortical avulsion fracture, requiring the aid of radiographic evidence for a correct diagnosis.

The diagnosis of acute calcific periartthritis requires both clinical and radiological findings, relying on the radiographic evidence and supported by the US image. Based on the clinical presentation, infection must be considered within the differential diagnosis; however, the presence of calcification in the radiograph makes infection unlikely. Although calcifications may be present in gout, the characteristic findings of periarticular erosions are not present. Cortex and internal trabeculation characteristic of heterotopic ossification are not present, nor is the calcification visualized consistent with chondrocalcinosis, which is required to diagnose calcium pyrophosphate deposition disease. There are many potential causes for metastatic calcification. However, the clinical evidence does not support this diagnosis.

The presentation of acute calcific periartthritis varies but typically exhibits signs of localized inflammation, including swelling, redness, pain, and restricted joint movement [3]. The presentation of the pain also varies, presenting within days of the onset of symptoms in some cases, and slowly increasing in severity up to a month before presentation in others [13]. Consistent with the findings of our case, significant trauma to the affected area is typically not reported, and lab blood values are typically normal (erythrocyte sedimentation rate may be mildly elevated) [3,11,13].

The underlying causes and the pathophysiology of the eventual resolution of acute calcific periartthritis are not yet fully understood, but are believed to be related to a degenerative process of the involved or adjacent tendon, ligament, or capsular structure resulting in calcific deposition. Patients are typically asymptomatic until a calcific deposition ruptures into adjacent soft tissues, resulting in pain as part of an inflammatory response to it. The deposits are cleared by macrophages, and the tendon, ligament, or capsular structure returns to its normal structure on resolution [3,11,14].

In addition to the broad radiographic description of periarticular calcifications within the literature, magnetic resonance imaging findings have also been presented [7,15]. However, magnetic resonance imaging is typically used only to support radiographic imaging as secondary evidence. Although US findings of periarticular calcification in the cases of chondrocalcinosis and CCPD have previously been described [16,17], to the best of our knowledge, we are the first to provide a typical US description of acute calcific periartthritis of the thumb.

In summary, the increasing reliance on US when making an initial diagnosis makes it essential for radiologists to recognize typical US findings of diseases. We have demonstrated that periarticular calcification in the thumb can closely resemble a cortical avulsion fracture, and a radiograph should be acquired to differentiate between the two.

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