

# Acute Calcific Periarthritis of the 1st Metacarpophalangeal Joint: A Rare Diagnostic Challenge

Konstantinos G. Makiev<sup>1</sup>, Antigoni Gkoudina<sup>1</sup>, Marilia Georgiou<sup>2</sup>, Ioannis Vasios<sup>1</sup>, Paraskevas Georgoulas<sup>1</sup>, Efthymios Iliopoulos<sup>1</sup>

## Learning Point of the Article:

Acute calcific periarthritis of the thumb can closely mimic infection, and characteristic imaging findings are essential to avoid unnecessary antibiotics or surgery.

## Abstract

**Introduction:** Acute calcific periarthritis (ACP) is a self-limiting inflammatory condition most commonly involving the rotator cuff of the shoulder. Its presentation in the hand is rare and often mimics infectious processes, leading to potential misdiagnosis and inappropriate treatment. Prompt recognition through imaging is crucial for accurate diagnosis and management.

**Case Report:** We present a case report of a 84-year-old woman who presented with acute pain, swelling, and erythema of the right thumb. Clinical examination suggested an infectious etiology; however, plain radiographs were obtained to further evaluate the condition.

**Results:** Radiographic imaging revealed a well-defined, amorphous calcific deposit adjacent to the 1st metacarpophalangeal joint, consistent with ACP. No bony erosions or joint space narrowing was noted. Laboratory markers for infection were within normal limits. Under a digital nerve block, the patient underwent an ultrasound-guided barbotage procedure with needle aspiration and lavage, successfully removing most of the calcium deposits. A corticosteroid (triamcinolone) injection was then administered at the site. The patient experienced rapid symptom relief and full resolution within 2 weeks, without the need for antibiotics or surgical intervention.

**Discussion:** ACP of the hand, although rare, should be considered in the differential diagnosis of acute monoarticular swelling, especially when infection is suspected but not supported by laboratory findings. Radiographic evaluation is pivotal for diagnosis and can prevent unnecessary interventions. This case highlights the importance of clinical-radiological correlation in recognizing atypical presentations of ACP and reinforces its self-limiting nature with conservative management.

**Keywords:** Calcific tendonitis, hand, wrist, periarthritis, metacarpophalangeal.

## Introduction

Acute calcific periarthritis (ACP) is an inflammatory, self-limiting disorder most commonly found in the shoulder, particularly affecting the rotator cuff, but rarely involves the hand [1]. Also referred to as calcareous periarthritis/tendinitis or calcific/calcified tendinitis, ACP affects men and women

equally, and typically presents with severe pain of rapid onset, often atraumatic in nature, accompanied by edema, erythema, and limited range of motion of the affected joint [1,2].

The periarticular deposition of calcium hydroxyapatite crystals can be localized in tendons, peritendinous tissue, joint capsule, or collateral ligaments. Due to the superficial location of calcium

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## Author's Photo Gallery



Dr. Konstantinos G. Makiev



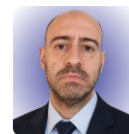
Dr. Antigoni Gkoudina



Dr. Marilia Georgiou



Dr. Ioannis Vasios



Dr. Paraskevas Georgoulas



Dr. Efthymios Iliopoulos

<sup>1</sup>Academic Department of Trauma and Orthopedics, University General Hospital of Alexandroupolis, Alexandroupolis, Greece,  
<sup>2</sup>Department of School of Medicine, Democritus University of Thrace, Alexandroupolis, Greece.

### Address of Correspondence:

Dr. Konstantinos G. Makiev,  
Department of Trauma and Orthopedics, University General Hospital of Alexandroupolis, St. Niarhos 1, Dragana, 68100, Alexandroupolis, Greece.  
E-mail: costasmakiev@gmail.com

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deposits in the hand, inflammatory responses are more prominently manifested in the overlying skin and subcutaneous tissue, thus resembling other inflammatory etiologies and leading to potential misdiagnosis [3]. Lack of familiarity with this condition, due to its rarity, has led to inappropriate management, like irrational use of antibiotics, unnecessary hospital admissions, and surgical procedures [4].

We present a rare case of ACP affecting the 1st metacarpophalangeal (MCP) joint of the thumb. The aim of the present report is to raise awareness of this pathology, emphasize its key characteristics, highlight the challenges associated with diagnosis, and provide insights by reviewing the relevant literature.

### Case Report

An 84-year-old woman presented to the Emergency Department with a three-day history of progressively worsening, excruciating pain in the right hand following exertion from housework. The patient denied any history of trauma, puncture wounds, fever, involvement of other joints, or prior systemic symptoms. Past medical history included hypertension and atrial fibrillation, while her family history was unremarkable. Physical examination revealed edema and associated erythema extending across the volar and dorsal surfaces of the radial side of the hand and localized sensitivity to the 1st MCP joint (Fig. 1a and b). There was also a restricted and painful range of motion, both active and passive, of the MCP and the interphalangeal (IP) joint of the right thumb. A palpable, soft, nodule-like mass was noted on the ulnar-volar aspect of the MCP joint. Laboratory testing demonstrated normal complete blood count and uric acid levels, while C-reactive protein was slightly elevated. Plain anteroposterior and oblique X-rays of the right hand displayed two well-defined calcified deposits at the volar aspect of the 1st MCP joint (Fig. 2a).

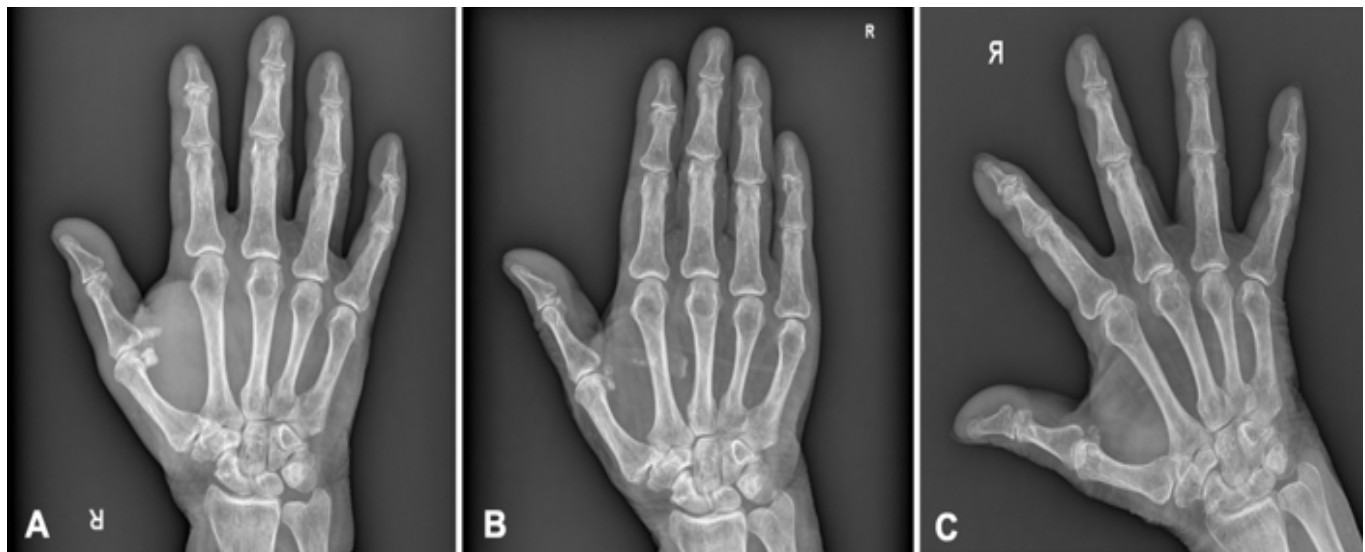
The patient was admitted to the Orthopedic Department for further investigation and management. On admission, the patient rated her pain as 8 on the visual analog scale (VAS). Systemic intravenous analgesics and non-steroidal anti-inflammatory drugs were initiated as first-line treatment. On the 1st day post-admission, a musculoskeletal ultrasound of the affected first ray was performed. The

ultrasound probe was positioned longitudinally over the ulnar side of the 1st MCP joint to visualize the long axis of the larger calcific deposit according to the X-ray. A hyperechoic, homogeneous, ellipsoid, well-circumscribed peritendinous deposit with posterior acoustic shadowing could be clearly visualized at the insertion of the adductor pollicis muscle (Fig. 3). No fluid effusion in the flexor tendon sheaths or intra-articular pathology of the MCP joint was denoted. Under a digital nerve block, an ultrasound-guided barbotage procedure was performed, effectively removing the majority of the calcium deposits through needle aspiration and lavage. Following this, a corticosteroid injection (triamcinolone) was administered to the site of the calcification. After 24 h, the patient's pain was reassessed and reported as a 3 on the VAS, accompanied by a reduction in edema and erythema in the affected right hand. Active flexion of the MCP joint of the thumb was possible but painful, limited to 20°. In contrast, flexion of the IP joint was pain-free and exhibited a full range of motion. The patient was discharged with instructions for oral anti-inflammatory medication, elevation of the right upper limb with a sling, and a follow-up appointment at the outpatient clinic.

At the 2-week follow-up, edema and erythema had fully subsided, with only minimal residual sensitivity during the active range of motion of the MCP joint, which remained



**Figure 1:** (a) Clinical presentation of acute calcific periarthritis, characterized by prominent swelling and redness in the affected area, (b) clinical improvement with resolution of edema and erythema in the affected area.



**Figure 2:** (a) Anteroposterior X-ray of the affected right hand showcasing calcifying deposits at the volar aspect of the metacarpophalangeal (MCP) joint of the thumb, (b) comet-like pattern of calcification spread, aligned with the muscle fibers of the adductor pollicis at 2-weeks follow up (c) no residual calcification at the first MCP joint and complete disappearance of the comet-like calcification pattern at the 6-week follow-up.

limited to 20°. A repeat X-ray demonstrated a near-complete resolution of the calcific deposits at the MCP joint, but revealed a spread of calcification in a comet-like pattern, aligned with the muscle fibers of the adductor pollicis (Fig. 2b).

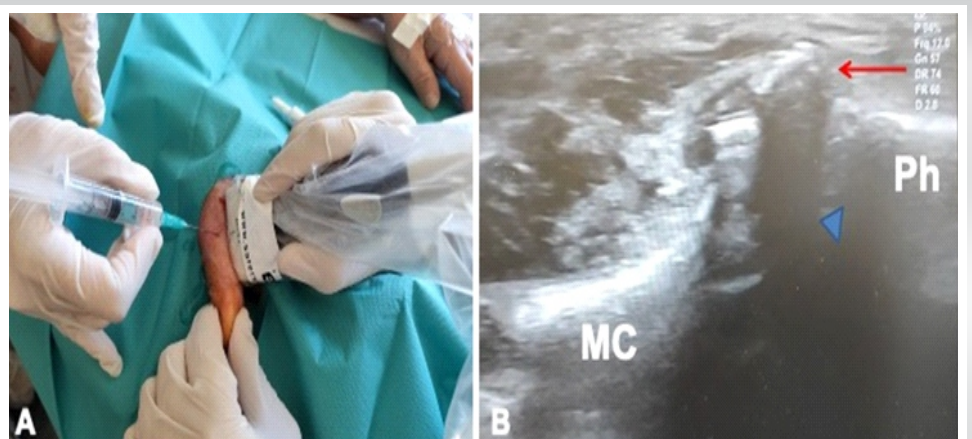
At the 6-week follow-up, the patient demonstrated a full, symmetrical range of motion in adduction, abduction, flexion, and extension of the 1st MCP joint (Fig. 4), with a VAS pain score of 0. Final radiograph showed no residual calcification at the 1st MCP joint and complete disappearance of the comet-like calcification pattern that was initially observed immediately after the barbotage procedure (Fig. 2c).

### Discussion

ACP of the hand was first described by Cohen in 1924 [5]. Since then, only a few studies of ACP concerning either the wrist or the hand have been published. Sandstorm, after reviewing 329 cases of calcium deposits, reported that ACP involved the wrist or the hand in 2.4% of these cases [6]. However, the true incidence of this pathology is hard to estimate precisely, due to its self-limiting nature and, more importantly, its rarity. The joints most commonly affected are those adjacent to the insertion site of the flexor carpi ulnaris. Furthermore, ACP of MCP, distal and proximal IP joints of the fingers have also been described (Fig. 5) [1,3]. It appears that calcium deposits at the

wrist primarily concern flexor or extensor tendons, whereas in digits, they are usually found in the ligamentous structures. In contrast, intrinsic muscles are the most common site of calcification when they occur within the palm [3]. Nevertheless, involvement of the 1st MCP is extremely rare, and none from the available studies concerned the adductor pollicis insertion site, as reported in this case [7,8].

Endocrine disorders such as diabetes mellitus and thyroid dysfunction, as well as genetic predisposition, have been associated with a higher susceptibility for developing calcific tendinopathy [9]. To date, several theories have been proposed regarding its pathophysiology, including reactive calcification, endochondral ossification, and chondral metaplasia. However, the precise mechanism by which the tendon is calcified remains still unclear [10]. Reactive calcification, as described by Uthoff



**Figure 3:** (a) Ultrasound-guided barbotage of the calcific deposits of the 1st metacarpophalangeal (MCP) joint, (b) Ultrasound image-longitudinal axis of the 1st MCP joint, red arrow is demonstrating the calcification, blue arrowhead is depicting the acoustic shadow over the 1st MCP joint. MC: Metacarpal, Ph: Phalanx.



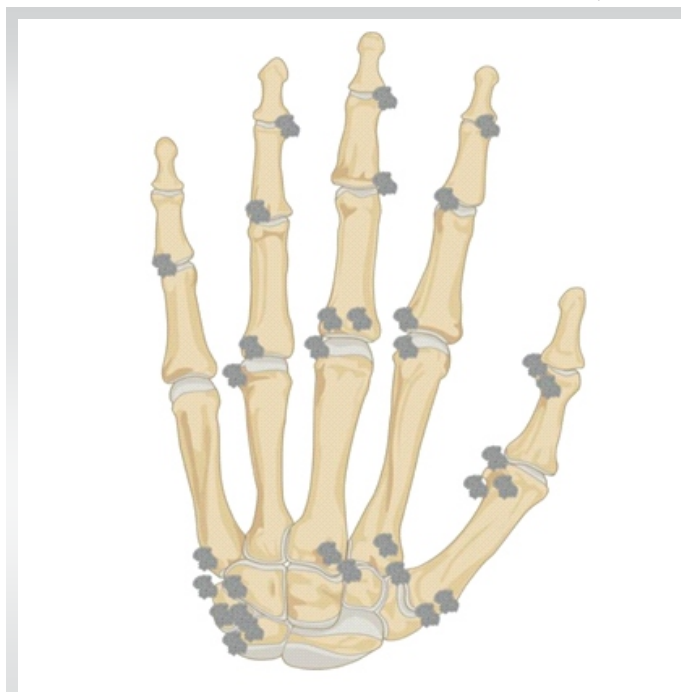
**Figure 4:** Patient demonstrating full range of motion of the metacarpophalangeal and proximal interphalangeal joint of the thumb at 6 week follow-up.

and impaired range of motion of the affected joint [15]. Clinical presentation resembles various pathologies such as fracture or dislocation, infections (cellulitis, septic arthritis, and tenosynovitis), and inflammatory arthritis (gout, psoriasis) [1,7]. This overlap complicates the differential diagnosis, contributing to high rates of misdiagnosis, which range from 58% to 70%, and subsequently leading to inappropriate management such as unnecessary surgical exploration, irrational use of antibiotics, and avoidable hospitalizations. High suspicion is imperative for the prompt and accurate diagnosis of ACP in the hand and avoid further mismanagement, as laboratory findings may as well resemble those of other pathologies [14]. Radiographic examination plays a crucial role, as the identification of distinct, homogeneous

et al., describes calcium deposition as a cell-mediated process that can be divided into four phases. The pre-calcific first phase is characterized by fibrocartilaginous metaplasia of the tendon. The formative second phase is represented by the formation of cell-mediated calcific deposits by chondrocytes. In the resorptive third phase, phagocytes penetrate the area and absorb the calcium. When the calcium dissolves, a localized inflammation is generated, causing pain and other clinical features. The final post-calcific fourth phase allows for the restoration of the normal collagen pattern [11]. In endochondral ossification, like in cases of insertional Achilles and patellar tendinopathy, the calcification process mimics physiologic endochondral bone formation, characterized by chondrocyte-like cells, increased Type II, III, and X, and reduced Type I collagen. Another supported theory is that improper differentiation of tendon-derived stem cells into chondrocytes or osteoblasts rather than tenocytes, under the influence of certain proteins (bone morphogenetic proteins, biglycan/fibromodulin), can lead to chondral metaplasia [12].

ACP in the hand affects males and females equally. While the age of patients at presentation typically ranges from 30 to 60 [3,7], singular pediatric cases have also been reported [13]. The main complaint is sudden and acute pain in the wrist or the hand. Usually, patients are not able to recall any specific injury or strain, and a history of precipitating trauma is only mentioned in one third of the cases [3,14]. Tenderness is well-localized, often marked by a specific spot of maximal pain. Typical findings are severe edema with associated erythema

juxta-articular densities without trabeculae or cortex is pathognomonic of ACP [7]. However, care should be taken not to mistake them for an avulsion fracture or accessory ossicle.



**Figure 5:** Illustration showcasing the typical sites of calcific deposits in the hand. Flexor carpi ulnaris is the most common site of calcification in the hand, followed by metacarpophalangeal, proximal interphalangeal and distal interphalangeal joints. Acute calcific peri-arthritis at the wrist primarily concerns flexor or extensor tendons, whereas in digits, they usually involve the ligamentous structures. Intrinsic muscles are typically affected, when these occur within the palm.

Moreover, Ultrasound can help exclude infective processes such as tenosynovitis and also identify calcifications, which are depicted as hyperechogenic structures with or without acoustic shadow [1].

ACP is a self-limiting condition, in which the initial acute pain subsides substantially after 3–4 days, even without treatment [3,16]. Typically, it takes around 3 weeks for both symptoms and calcifications to resolve completely, but in some instances, complaints have persisted for months [1,3]. Carroll, in the largest available series, demonstrated that providing any form of treatment significantly decreases the duration of symptoms. Particularly, after the injection of local anesthetic with or without corticosteroids, complete cessation of pain was attained within an average of 9 days. In contrast, when no treatment was implemented, 20 days on average were needed for the symptoms to resolve [3]. This can be explained by the fact that fluid injections can help dissolve calcium deposits, facilitate calcium resorption, and thus reduce local inflammation more promptly [15]. However, migration of the calcification within the belly of the affected muscle after aspiration, lavage, and injection, as observed in this case, has never been described before. Even though it did not affect or complicate the course of the condition, clinicians should be

aware of this phenomenon as well and closely monitor the patient. Other conservative treatment modalities include warm water soaks, splint immobilization, and non-steroidal anti-inflammatory drugs. Surgery is rarely indicated, and is reserved only for persistent cases of ACP that do not respond to the aforementioned therapeutic options [13,17].

### Conclusion

ACP of the 1st MCP joint is an extremely rare condition. Clinical presentation resembles various other pathologies. Therefore, high suspicion is essential for the accurate diagnosis and to avoid unnecessary interventions. Characteristic radiographic findings can assist in confirming the condition. Due to its self-limiting nature, most cases resolve spontaneously with conservative treatment, and surgery is rarely indicated.

### Clinical Message

Acute calcific periarthritis of the thumb should be considered in patients with acute monoarticular swelling and erythema of the hand, particularly when inflammatory markers do not support infection; early radiographic recognition can prevent unnecessary antibiotics, hospitalization, or surgery.

**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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