

## Looking for Occupational Disease

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**ABSTRACT**

Calcium pyrophosphate dihydrate crystal deposition disease (CPPD) is an inflammatory arthritis produced by the deposition of calcium pyrophosphate crystals. Its pathogenesis is not fully understood, but some risk factors were associated such as aging, previous trauma or some metabolic conditions. The involvement of joints like the metacarpophalangeal, which are not typically affected by osteoarthritis, should raise the suspicion of CPPD. Diagnosis is based on the clinical manifestations, radiographic and laboratory findings.

The authors present a case report in which occupational exposure, through the contribution of chronic microtrauma, appears to be the main etiological factor for CPPD, an association never reported before. This case refers to a 63-year-old man, who worked as a medical pathologist for 30 years, specialized in cellular microscopy. His daily tasks consisted of using the microscope about 8 hours per day and involved highly repetitive precision movements of fingers and hands at high rate with insufficient recovery time.

After 25 years in this job, he gradually developed complaints of bony enlargement, tenderness, warmth, erythema and swelling referred to the metacarpophalangeal and 1st interphalangeal joints of the 2nd and 3rd right fingers. Secondary causes of CPPD were excluded and the immunological study was normal, but the radiographic images showed intra-articular calcifications and arthrosis in the metacarpophalangeal joint of the 3rd finger of the right hand and marginal osteophytosis in this topography in the likely context of deposition of calcium pyrophosphate crystals. This case opens the possibility of a new etiology for CPPD as well as his classification as a work-related disease.

**Keywords**

Calcium pyrophosphate, Occupational Medicine, Repetitive movements, Chronic microtrauma, Work-related disease.

**Introduction**

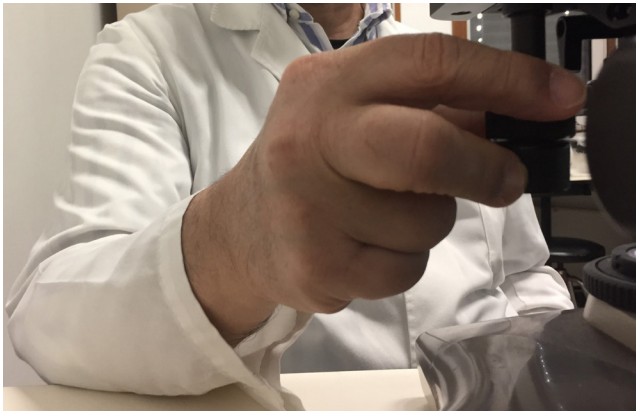
An occupational disease can be defined as a disease that results from exposure during work activities to conditions or substances that are detrimental to health. Establishing a work-related cause of a disease is one of the most challenging aspects of occupational medicine and implies a clinical diagnosis, assessment of past exposure and exclusion of other potential causes [1]. CPPD is an inflammatory arthritis produced by the deposition of calcium pyrophosphate crystals. There are several established risk factors for his development such as age, sex, heredity and some metabolic diseases, however a work relationship was never proposed

[2,3]. Diagnosis is suspected based on clinical manifestations, radiographic and laboratory findings [4,5]. In this report we present a case of a 63-year-old man whose work as medical pathologist may be the main etiologic factor for CPPD, an association never made before.

**Case Presentation**

A 63-year-old-man, physician specialized in Pathological Anatomy worked in cellular microscopy for 35 years. His daily tasks were the exclusive use of the microscope, at least 8 hours a day, with highly repetitive precision movements of hands and fingers, especially of the right hand, that included flexion, extension and rotation at high rate with insufficient recovery time (Figure 1). After 25 years in this job he gradually developed complaints of continuous pain, bony enlargement, tenderness, warmth, erythema and swelling

referred to the 1st and 3rd metacarpophalangeal (MTP) and 3rd proximal interphalangeal joint. Over the years the clinical picture worsened with an increase in pain to a 7 in 10 in the pain scale. The symptoms were aggravated by the use of the microscope and were absent in vacation periods. Physical examination showed a painful, erythematous and enlarged MTP joint of the 3rd finger of the right hand. The pain was exacerbated by palpation of the 1st and 3rd MTP joints, resisted contraction and stretching of the 1st and 3rd fingers. The X-ray showed changes in the 3rd MTP joint of the right hand with joint space narrowing and hook-like osteophyte (Figure 2).



**Figure 1:** Work tasks. Work task that causes repeated flexion and extension of the 2nd and 3rd fingers of the right hand.



**Figure 2:** X-ray of the right hand. Radiographic image taken in the beginning of the clinical picture already showing changes compatible with CPPD with joint space narrowing (white arrows) and hook like osteophyte (red arrow) in the 3rd MTP of the right hand. Image taken in 2011.

Ultrasound showed proliferative arthropathy without active synovitis and lack of erosion. The MRI showed degenerative changes in the 3rd MTP joint of the right hand with subchondral

cysts in the metacarpal head. To exclude auto-immune causes of arthritis it was performed an immunological study with C3, C4, Rheumatoid factor, Anti-CCP, Anti-Nuclear and Anti-dsDNA that came all negative. As CPPD diagnosis became more probable it was performed an analytic study to exclude secondary causes like hemochromatosis, hyperparathyroidism, hypomagnesemia and hypophosphatasia. The study included hemogram, leukogram, platelets, erythrocyte sedimentation rate, C-reactive protein, magnesium, calcium, phosphorus, alkaline phosphatase, ferritin, transferrin saturation, thyroid hormones and PTH, that did not reveal any changes.

## Discussion

In the case presented, the clinical manifestations and the radiologic evidence of involvement of the MCP joints that are not typically affected by osteoarthritis led to the suspicion of CPPD [4]. The lack of erosion revealed by the ultrasound was also in favour of CPPD, as opposed to other arthritis, where erosion is present, like gout or arthritis rheumatoid [6]. Furthermore, since all auto-immune arthritis were also excluded by the immunological study, CPPD became the most likely diagnosis. Considering all secondary causes for CPPD were excluded and taking into account the occupational history and the strong association between the symptoms and work, occupational exposure was placed as the probable main etiological factor, through the contribution of chronic micro trauma caused by repetitive movements of flexion, extension and rotation of the fingers to operate the microscope. This case places for the first time CPPD in the spectrum of work-related diseases and highlights the importance of awareness to the occupational etiology.

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