Case report

Multiple-crystal acute polyarthritis

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SUMMARY A patient with acute polyarthritis due to crystal-positive simultaneous gout and pseudogout affecting different joints is described. The case emphasises the importance of aspirating more than one involved joint and carefully searching for crystals in patients with acute arthritis involving 2 or more joints, particular those in whom the diagnosis of multiple crystalline joint disease is considered.

Gout and pseudogout are the most common types of crystal-induced arthritis, and their diagnosis is based to a great extent on identification of the respective crystals in synovial fluid specimens. The 2 diseases share many clinical similarities, and cases of co-existent gout and pseudogout, with both monosodium urate (MSU) and calcium pyrophosphate dihydrate (CPPD) crystals within the same joint, have been described.^{1–4}

A case of acute polyarthritis due to crystal-positive, simultaneous gout and pseudogout affecting different joints, is described. The case emphasises the importance of aspirating more than one involved joint and carefully searching for crystals in patients with acute polyarthritis, particularly those in whom a diagnosis of multiple crystalline joint disease is suspected.

Case history

An 81-year-old woman presented in November 1981 with acute polyarthritis of the right knee and both feet of 2 days' duration. Three days prior to admission she suffered a minor fall. Four years earlier gout was diagnosed on the basis of recurrent attacks of arthritis and hyperuricaemia. During the past year she had received allopurinol. On examination the temperature was 38°C and the right knee was warm, tender, and swollen. The right 1st and 4th and the left

1st metatarsophalangeal (MTP) joints were acutely inflamed, and there were no tophi.

The right knee was aspirated on admission, and 50 ml of turbid fluid was obtained. The synovial fluid leucocyte count was $39 \times 10^9/l$ (85% neutrophils), glucose 31 mg/dl (1.7 mmol/l) (concurrent blood glucose 119 mg/dl = 6.6 mmol/l) and total protein 4 g/dl (40 g/l). Gram stain and culture were negative. Under compensated polarising light microscopy (cPLM), numerous, positively birefringent, intra- and extracellular CPPD crystals 1–10 μm in length were identified. Scanning electron microscopy (SEM) with energy-dispersive x-ray analysis⁵ showed that the crystals contained calcium and phosphorus in a ratio of 1:1. No monosodium urate crystals were detected. X-ray powder diffraction analysis identified the crystals as mono- and triclinic CPPD (Fig. 1). Knee radiographs demonstrated evidence of degenerative arthritis and faint calcification of articular cartilage. Radiographs of wrists, shoulders, and pelvis failed to reveal chondrocalcinosis. A diagnosis of acute polyarticular pseudogout with bilateral 'pseudopodagra' was made, and indomethacin therapy was initiated.

The next day the left and right 1st MTP joints were aspirated, and highly inflammatory synovial fluid containing numerous intra- and extracellular negatively birefringent, needle-shaped crystals of MSU was obtained. The identity of these crystals as MSU was later confirmed by x-ray powder diffraction analysis (Fig. 1). The right knee was reaspirated on days 3 and 5 and studies on the synovial fluid, including cPLM, SEM with energy-dispersive x-ray

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Fig. 1 X-ray powder diffraction analysis of synovial fluid aspirates from right knee (top) and metatarsophangeal joints (bottom).

analysis, and x-ray powder diffraction analysis, showed only CPPD crystals. Other laboratory results included haemoglobin 14.2 g/dl, leucocyte count $14 \times 10^9/l$ (76% neutrophils), ESR 47 mm/h, and negative tests for rheumatoid and antinuclear factors. She was still on allopurinol when serum uric acid measured 6.4 and 6.9 mg/dl (1.06 and 1.15 mmol/l). Serum creatinine was 1.9 mg/dl (168 $\mu\text{mol/l}$) and serum calcium, phosphorus, alkaline phosphatase, magnesium, iron, and total iron binding capacity were normal. The acute polyarthritis resolved within 6 days. A needle synovial biopsy of the right knee demonstrated mild synovial lining hyperplasia, mononuclear cell infiltrate, and fragments of articular cartilage embedded in the synovial membrane. No crystals were found in either the formalin- or alcohol-fixed preparations.

Discussion

The patient described here meets clinical criteria for both 'definite' pseudogout¹ and acute gout.⁶ She had acute polyarthritis with 4 simultaneously affected joints. CPPD crystals were demonstrated in 1 joint, MSU crystals in 2, while the fourth joint was not aspirated. The absolute identity of these crystals was established by x-ray powder diffraction analysis.

The case raises a number of interesting observations. It is likely that antecedent trauma triggered both gout and pseudogout in this patient; provocation of acute attacks by trauma is common in both types of crystalline joint disease.^{1,7} Gout is estimated to occur in 5% of patients with pseudogout.¹ There is also an increased prevalence of chondrocalcinosis, the radiological hallmark of pseudogout, in patients with gout.⁸ The coexistence of gout with MSU crystals and pseudogout with CPPD crystals in the same joint, although rare, has also been reported.¹⁻⁴ A common 'soil' factor conducive to crystal nucleation and growth has been suggested.⁷ We believe our patient is the first reported example of an acute poly-

arthritis due to both gout and pseudogout simultaneously affecting different joints. The possibility that the acute arthritis of the right knee was due to both gout and pseudogout and that MSU crystals were not seen on initial synovial fluid examination was considered in this patient. Previous studies have indicated that initial cPLM examination of synovial fluid from patients with gout may not reveal urate crystals,^{3,9} though they may be subsequently found on reaspiration of the joint⁹ or electron microscopic examination of the fluid.³ This was not the case in our patient. Three spaced synovial fluid analyses from the right knee revealed only CPPD crystals by cPLM, which was confirmed by SEM and x-ray diffraction analysis. The finding of cartilage fragments embedded in the synovial membrane of this patient's knee biopsy is compatible with degenerative arthritis.¹⁰ The failure to demonstrate crystals in the biopsy may have been due to adverse sampling or to lack of crystal deposits in the synovial membrane.

Acute gout and pseudogout affecting different joints may occur simultaneously in the same patient. As these entities may resemble each other clinically, it is conceivable that a physician diagnosing one might not search diligently for the other. Pseudogout was initially diagnosed in our patient by aspiration of right knee and demonstration of CPPD crystals. The diagnosis of coexistent gout would have been missed if the MTP joints had not also been aspirated. On the basis of this report alone it is not feasible to suggest that every patient presenting with acute polyarthritis should be subjected to multiple joint aspirations and cPLM examination of synovial fluids. However, in certain clinical situations, such as the patient described here, where the initial findings strongly suggested more than one type of crystalline arthritis, or in patients with acute polyarticular gout and widespread chondrocalcinosis, it is important that more than one joint be aspirated. The detection of one type of crystal in one joint should not deter the physician from looking for the same or other crystals in other

joints. Accurate diagnosis of the type or types of crystalline joint disease is important because of its prognostic and therapeutic implications.

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