Cholesterol Crystals in Gouty Bursitis

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The simultaneous occurrence of more than one type of crystal in the same joint or bursa is an uncommon finding[1,2]. Coexistent acute gout and pseudogout, with both monosodium urate and calcium pyrophosphate dihydrate (CPPD) crystals within the same joint, has infrequently been described[1]. Studies of osteoarthritic joint effusions indicate that both CPPD and hydroxyapatite crystals may sometimes occur together ("mixed crystal deposition disease")[2]. In one pathological study[3], cholesterol ester crystalline material was observed in longstanding gouty tophi, and reference is made in the *Atlas of Synovial Fluid Analysis and Crystal Identification* to the occasional coexistence of urate and cholesterol crystals in the same joint or bursal cavity[4]. A patient with a mixed urate-cholesterol crystal olecranon bursitis is described.

The patient is a 79-year-old man, with longstanding polycystic kidneys, chronic renal failure (maintained on hemodialysis since 1996), atrial fibrillation, cardiac failure, and chronic tophaceous gouty arthritis since 1992. In April 1999, he presented with a large fluid-distended, mildly tender left olecranon bursitis. The bursal wall revealed multiple nodular lesions. A few crystal-proven urate tophi were present over the fingers. Laboratory studies showed a serum urate ranging between 494 and 680 μmol/l (normal for men 180–450 μmol/l or 3–7 mg/dl), serum creatinine 310–450 μmol/l (normal < 120), and normal fasting serum cholesterol, triglycerides, and lipoprotein electrophoresis. Aspiration of the left olecranon bursa yielded a thick, yellowish fluid containing specks of white "chalky" material. The fluid total leukocytic count was 4530×10^6/l, with neutrophils predominating. Examination of the fluid by compensated polarized light microscopy revealed few erythrocytes, acellular debris, several predominantly extracellular 10–30 μm long, needle-shaped, strongly negatively birefringent monosodium urate crystals, urate crystal clumps ("floating microtophi"), and numerous extracellular cholesterol crystals. These appeared as large, 10–80 μm, flat, rectangular-shaped, variably birefringent plates, with one or more notched corners (Figure 1). Treatment of the fluid with ether dissolved the cholesterol crystals, without affecting the urate crystals. This distinguished urate crystals from the less common and smaller needle-shaped forms of cholesterol crystals. Two further aspirates from the left olecranon bursa, over a 6 month period, again revealed both urate and cholesterol crystals. Allopurinol therapy, with gradual dose escalation to 250 mg daily over 12 months, resulted in reduction of serum urate to 291 μmol/l, cessation of gouty attacks, and decrease in the size of the finger tophi and left elbow olecranon bursitis.

Although cholesterol crystals are occasionally observed in chronic rheumatoid, osteoarthritic, bursal and other effusions, their role in causing synovial inflammation or joint damage has not been established[4,5]. Their exact origin is uncertain but local factors have been implicated[5]. Our patient had longstanding tophaceous gouty olecranon bursitis. Repeated microtrauma to the bursa, from leaning on the elbows during dialysis, could have resulted in local tissue breakdown and degradative release of cholesterol from red cell membrane phospholipids. Because of their relative insolubility and resistance to cellular degradation, cholesterol crystals tend to persist within articular and bursal tissues for prolonged periods, as in our patient.

Cholesterol crystals may rarely coexist with urate crystals in chronic tophaceous gouty bursitis, but their exact significance is not fully understood. Aspiration of periarticular swellings and crystal analysis are important for precise crystallographic diagnosis.

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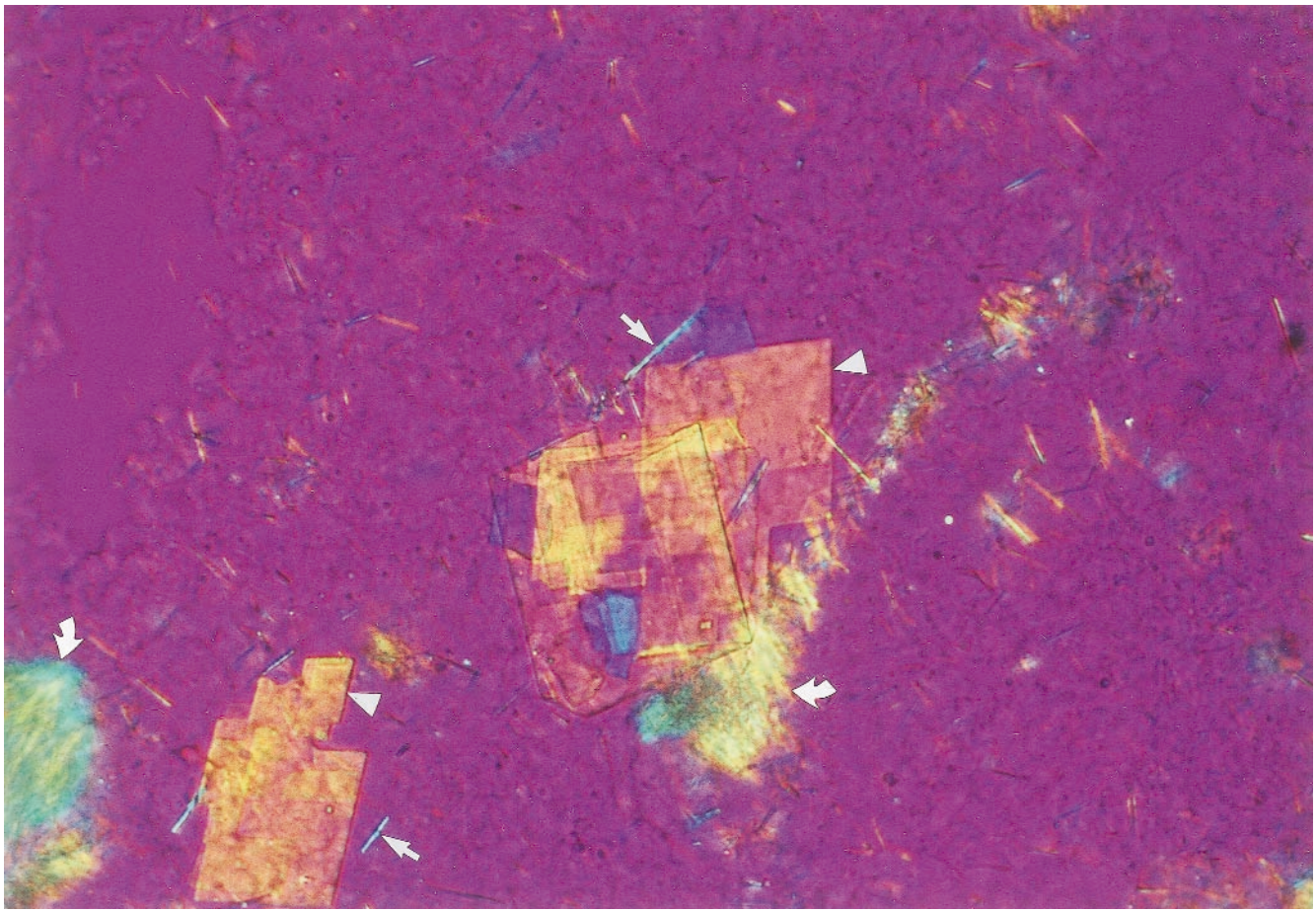

Figure 1. Multiple needle-shaped negatively birefringent urate crystals (small arrows), masses of urate crystals (curved arrows), and multiple large plate-like variably birefringent cholesterol crystals with and without notched corners (arrowheads) (compensated polarized light ×400).