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CASE REPORT

Pseudoseptic Arthritis Due to Acute Lipoarthrosis in a Systemic Lupus Erythematosus Patient With Osteonecrosis

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Introduction

Acute unexplained monarthritis from which purulent-appearing but sterile synovial fluid is obtained has been dubbed pseudoseptic arthritis (1). A number of entities have been described that can present in this manner. Empirical therapy for septic arthritis is still indicated in these presentations, but can be discontinued when an alternative explanation for the acute condition is identified. We encountered a patient with acute knee monarthritis from which we obtained seemingly purulent synovial fluid, but in whom we ultimately demonstrated a process illustrating an unusual mechanism by which such a presentation might develop.

Case report

A 65-year-old woman with systemic lupus erythematosus (SLE) presented with pain in her right knee that had begun acutely 2 weeks previously. Her SLE had been diagnosed 27 years previously with manifestations that included fatigue, polyarthritis, rash, thrombocytopenia, and high-titer antinuclear antibodies. She had been treated with variable doses of corticosteroids for flares of the various presenting features and other lupus complications that had included myositis and central nervous system involvement. She had received azathioprine as a steroid-sparing agent after she had developed osteonecrosis of both femoral heads. At the time her knee pain began, she was taking prednisone (14 mg/day) and azathioprine (50 mg/day) and considered her SLE to be in remission. Upon presentation to the clinic, she had a moderate sized knee effusion, from which 40 ml of brown opaque synovial fluid was aspirated. Although she denied fever and did not feel otherwise unwell, she was hospitalized for treatment of suspected septic arthritis. Synovioanalysis showed 12,705/ml white blood cells (WBCs; 30% polymorphonuclear cells) and 3,218/ml red blood cells (RBCs), no crystals, and a negative Gram stain. Cultures of synovial fluid, blood, and urine grew no organisms. Radiographs of the knee showed periosteal elevation along the distal femur, which was a new finding since knee radiographs were taken a year previously for evaluation of exertional knee pain. She was treated with intravenous ceftriaxone and daily arthrocenteses, with synovial fluid volume falling to 8 ml by the third day and the WBC count to 4,000/ml. All cell counts were done on an automated counter. Diagnoses considered at that point included culture-negative septic arthritis, osteomyelitis, crystalline synovitis, and lupus arthritis. A bone scan (not shown) demonstrated extensive uptake in the femoral shaft, femoral condyle, and adjacent tibial plateau. Because of the extent of these abnormalities, a planned magnetic resonance image (MRI) of the knee was extended to include a considerable portion of the femoral shaft. This study showed extensive osteonecrosis from the femoral condyle upward along with a focal osteochondral separation in the anterior femoral condyle, likely representing an intraarticular fracture (Figure 1). The MRI included the other knee, which also showed extensive osteonecrosis but no fracture. Because there was still concern for infection, a needle arthroscopy was performed, which showed bland appearing synovium except for some focal proliferation on the floor of the suprapatellar pouch; the hyaline cartilage was fibrillated on weight-bearing and patellar surfaces but no defect was identified over the anterior femoral condyle. Synovial biopsy results showed mild chronic inflammation and grew no organisms on culture.

The microscopy of the synovial fluid at presentation and in all subsequent samples had shown many acellular rounded structures scattered through the preparation (Figure 2). These were not birefringent under polarized light. To ascertain whether these droplets were composed of lipid, we processed a sample of synovial fluid similar to cytology (Papinicolou stain) then stained it with oil red O. This showed orange droplets of many different sizes and stages in relationship to the leukocytes in the specimen (Figure 3). We judged that this finding confirmed the pro-

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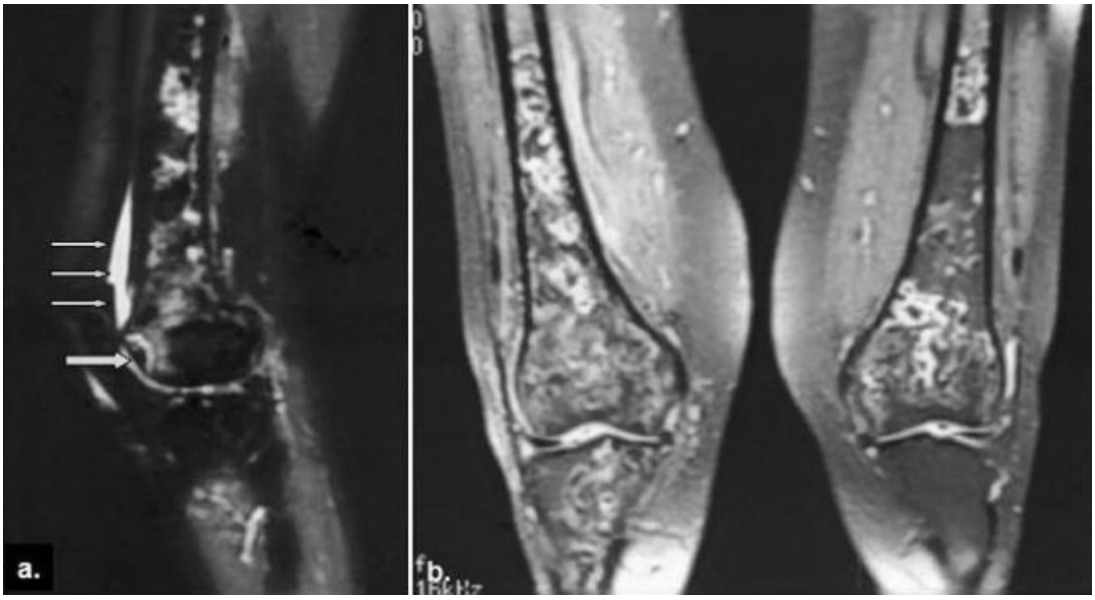

Figure 1. Magnetic resonance image of the patient's right knee, lateral view (**a**), and both knees, anteroposterior view (**b**). Note the subchondral defect with focal osteochondral separation in anterior right femoral condyle (**thick arrow**) and effusion (**thin arrows**).

cess as an acute lipoarthrosis with an inflammatory reaction to marrow fat released through the osteochondral fracture.

Antibiotics were discontinued and the patient was prescribed nabumetone and advised to limit weight-bearing activity. Two weeks after discharge, her effusion had re-

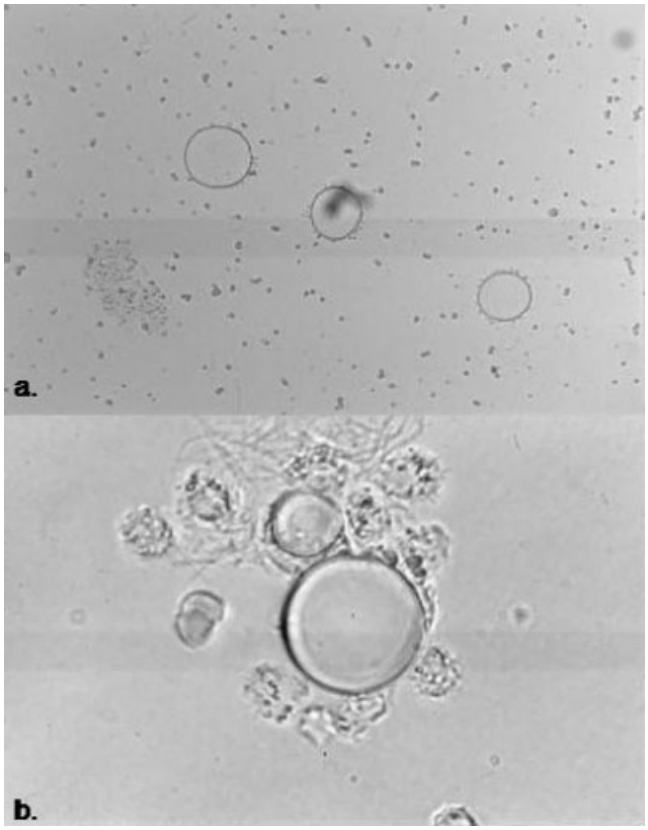

Figure 2. Plain light microscopy of patient's synovial fluid, original magnification × 10 (**a**), note nucleated cells surrounding lipid droplets, original magnification × 80 (**b**).

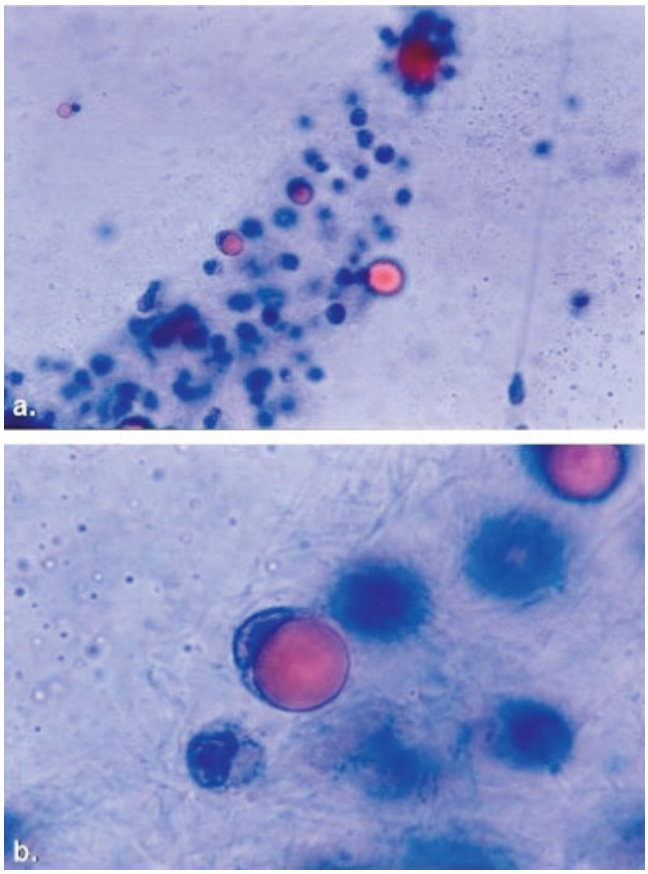

Figure 3. Synovial fluid Papinicolou preparation stained with oil red O, original magnification × 40 (**a**), note engulfed lipid (orange) droplets, original magnification × 200 (**b**).

solved, and she was walking without difficulty and experiencing only intermittent knee pain.

Discussion

Release of fat into the synovial space was originally described as a consequence of trauma (2). The description of traumatic arthritis cases in which lipid spherules associated with an inflammatory synovial fluid indicated such droplets can be phlogistic (3). Lipid droplets within synovial fluid have subsequently been described in neuropathic joints (4), osteonecrosis (5), pancreatitis with arthritis consequent to fat necrosis (6,7), and also in cases where no inciting process could be identified (8,9). The source of lipid droplets in acute arthritis is likely from the marrow of disrupted bone, although in some reported cases only extensive intraarticular damage without bone pathology could be demonstrated (4,6). However, bone disruption can be occult, as shown in one case of osteonecrosis in which a path from the joint space to marrow could not be seen on an MRI (unlike our case) but was apparent only at the time of surgery (5). While the intraarticular lipid accompanying pancreatic fat necrosis has been ascribed to synovial necrosis, pathologic fractures and osteonecrosis have been described in some reported patients (7). Bone disruption may not be necessary to produce lipids in a traumatized joint, since experimentally induced hemarthrosis has been shown to produce intrasynovial lipid droplets (10,11).

Lipid is present in all synovial fluids, usually at 40–60% of blood levels (12). Patients with extreme elevation of blood lipids and an associated inflammatory condition of the joint can elaborate a chylous effusion (13). On gross appearance, lipid-containing effusions appear opaque or bloody, with a layer on top of bloody synovial fluid indicating abundant synovial lipid (although this finding is not universal in lipid-containing hemarthroses) (14). Chylous effusions can contain either polar lipids or cholesterol; in contrast to acute effusions containing (polar) lipid droplets, cholesterol effusions are generally chronic phenomena occurring in longstanding inflammatory arthropathies and demonstrate birefringent planar crystals rather than droplets (15). The reasons why only some lipid droplets appear as "Maltese crosses" under polarizing light have not been discerned, but may relate to source of lipid (RBC membranes versus marrow fat) (10).

The opaque appearance of synovial fluid in our patient with an acute presentation raised concern for septic arthritis. In retrospect, discordance between a relatively modest synovial leukocytosis and the fluid's purulent appearance should have prompted more immediate consideration of an alternative process. Nevertheless, treatment for septic arthritis seemed prudent, since synovial leukocytosis is not always profound in joint infection (16), and the patient's fluid volume and counts improved with treatment that included empirical antibiotics and repeated closed drainage. Other reported cases of acute lipoarthrosis mounted synovial fluid leukocyte counts that were higher than in our case and also raised concern for joint infection (4,5,8,9). Therefore, we believe that acute lipoarthrosis consequent to occult bone disruption should be listed among the conditions capable of presenting as pseudoseptic arthritis. Finding abundant lipid droplets in seemingly purulent culture-negative synovial fluid can avert the lengthy empirical medical and surgical therapy that would need to be directed at septic arthritis.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Ike had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Ike.
Acquisition of data. Ike, Bole.
Analysis and interpretation of data. Ike, Bole.

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