Mycobacterium avium Complex Septic Arthritis Presenting as Osteonecrosis of the Femoral Head in a Patient With Systemic Lupus Erythematosus

Alexander B. Christ, MD; Elena V. Zininberg, MD; Kethy M. Jules-Elysee, MD; Michael L. Parks, MD

Abstract

Mycobacterium avium complex is a rare cause of musculoskeletal infection, usually occurring in patients with compromised immune systems. Obtaining the diagnosis requires a high index of suspicion, and treatment can be delayed because of difficulty with isolating the organism. Treatment involves prolonged, targeted combination antibiotic therapy, and it is unclear whether eradication of the infection can occur in the presence of a foreign body, such as antibiotic spacers. The authors report a case of M avium infection presenting as presumed osteonecrosis of the femoral head in a young woman with systemic lupus erythematosus. She presented with collapse of her femoral head coinciding with several months of progressive, debilitating hip pain. She had mild fevers during that time, but results from multiple infectious workups, including hip aspiration, were negative. Purulent fluid was found in the operating room, but diagnosis was delayed for 5 weeks while waiting for cultures. The patient required 3 subsequent operations, eventually being left with a resection arthroplasty. Pertinent issues concerning diagnosis, therapy, and treatment challenges in M avium infections of the musculoskeletal system are discussed in this case report. [Orthopedics. 2017; 40(3):e549-e552.]

Case Report

A 38-year-old woman with systemic lupus erythematosus presented with a 3-month history of rapidly progressing right hip pain. She had experienced intermittent fevers during that period, but had several septic workups, including a hip aspiration, performed by an infectious disease specialist with negative results. She had been diagnosed with systemic lupus erythematosus 11 years prior and had been receiving chronic steroid therapy since then. She was taking prednisone, mycophenolate mofetil, belimumab, and opiates on a daily basis for pain. Plain radiographs showed complete joint space loss of the right hip, subchondral lucency, and collapse of the femoral head (Figure 1). The patient was diagnosed with osteonecrosis of the femoral head (Figure 1). The patient was diagnosed with osteonecrosis of the femoral head.

The authors are from the Hospital for Special Surgery (ABC, KMJ, MLP) and New York Presbyterian–Weill Cornell Medical College (EVZ), New York, New York.

Drs Christ, Zininberg, and Jules-Elysee have no relevant financial relationships to disclose. Dr Parks has received grants from and is a paid consultant for Zimmer Biomet.

Correspondence should be addressed to: Alexander B. Christ, MD, Hospital for Special Surgery, 535 E 70th St, New York, NY 10021 (chris7a@hss.edu).

Received: September 26, 2016; Accepted: December 12, 2016.
doi: 10.3928/01477447-20161229-04
During the procedure, purulent fluid was encountered underneath the short external rotators and on entering the hip capsule. Histopathology showed greater than 5 polymorphonuclear cells/high-power field, and a modular antibiotic cement spacer was placed with additional vancomycin and tobramycin added to the cement (Figure 2).

Postoperatively, the patient was seen by an infectious disease specialist and administered vancomycin and piperacillin-tazobactam. Mycobacterium infection was considered, but sputum was negative for acid-fast bacilli and QuantiFERON-TB Gold (Cellestis Limited, Carnegie, Victoria, Australia) test results were indeterminate. After 14 days in the hospital and without an identified organism, the patient was discharged with daptomycin and doxycycline.

At 5 weeks postoperatively, operating room cultures showed M. avium by rpoB sequencing. The patient had persistent pain and drainage. Six weeks after the initial procedure, she underwent incision and drainage and removal of the antibiotic spacer. Her laboratory test results at that time were WBC of 2.2×10^9/L, erythrocyte sedimentation rate of 15 mm/h, and C-reactive protein of 2.1 mg/dL. Postoperatively, she was administered ethambutol, clarithromycin, and rifampin.

Because of persistent drainage, the patient underwent another incision and drainage procedure 1 month after removal of the antibiotic spacer. Ultrasound-guided aspiration of the hip prior to the procedure yielded purulent fluid with 101,750 WBC/mm^3. Laboratory tests had been performed as well, which showed a WBC of 2.5×10^9/L, erythrocyte sedimentation rate of 11 mm/h, and C-reactive protein of less than 0.7 mg/dL. Washout and wound flap closure were again required 3 months after removal of the spacer because of another episode of drainage (Figure 3). Aspiration prior to this procedure yielded purulent fluid with 11,800 WBC/mm^3, which was negative for acid-fast bacilli but grew methicillin-resistant *Staphylococcus epidermidis*. Daptomycin was added to her antibiotic regimen for 6 weeks. No inflammatory markers were drawn at that time. At last follow-up, 11 months after the index procedure, the patient had a well-healed surgical incision without evidence of infection. She plans to complete 1 year of treatment of *M. avium*. No further surgery is being considered for the foreseeable future.

**DISCUSSION**

*Mycobacterium avium* complex septic arthritis is rare and offers considerable diagnostic and therapeutic challenges. Atypical mycobacterial infections of the musculoskeletal system have been described for some time.² Beginning in the 1990s, however, these infections were increasingly found in the setting of acquired immunodeficiency syndrome secondary to human immunodeficiency virus.²⁶,⁷ However, with the advent and introduction of highly active antiretroviral therapy, the number of MAC infections in patients with human immunodeficiency virus has sharply decreased.¹ More recently, comorbid conditions leading to immunocompromise have been recognized as a predisposing risk factor for MAC musculoskeletal infections and septic arthritis.² The current patient was suspected to have osteonecrosis of the femoral head, a diagnosis that must be considered with a history of systemic
lupus erythematosus and chronic steroid therapy. However, her cyclic low-grade fevers raised concern for infection for several months prior to her index procedure. The current authors echo other authors’ sentiments in saying that mycobacterial infection, and more specifically atypical mycobacteria, should remain in the differential when evaluating patients with compromised immune systems and atypical joint pain.

Classic methods for diagnosing MAC include staining with the Ziehl-Neelsen technique and culture on Löwenstein-Jensen media. Although most strains grow within 2 to 3 weeks, some may take longer, further delaying diagnosis. More recently developed molecular methods are making more rapid diagnosis possible. Although there are a number of different techniques, including high-performance liquid chromatography and DNA probes, the most accurate and widely available method is polymerase chain reaction. This technique amplifies and analyses DNA sequences from either the hsp65 or rpoB gene. While awaiting culture, polymerase chain reaction may improve the accuracy and speed at which the diagnosis can be made. Current American Thoracic Society/Infectious Diseases Society of America guidelines also recommend drug susceptibility testing for macrolides in cases of MAC infection, which was performed in this case.

Although extremely rare, MAC peri-prosthetic joint infections have been documented. There are few cases in the literature of other atypical mycobacterial peri-prosthetic infections, and implant retention is controversial. Assuming typical bacterial infection, the current authors’ initial plan was antibiotic spacer placement and 2-stage reimplantation. Long-term spacer retention or chronic suppression therapy would be impractical given the current patient’s age and activity level. However, it is uncertain whether MAC infection could be fully eradicated if an antibiotic spacer directed toward typical bacteria is retained. The authors therefore elected to remove all implants and give the patient the best chance of eradication of infection.

The patient underwent 2 additional incision and drainage procedures after removal of the antibiotic spacer despite cultures and joint aspirates being negative for MAC at every interval after the index procedure. The continued drainage was likely due to the development of bacterial superinfection of the wound, and ultimately required coverage with a gluteal flap. On the basis of previously published cases, superinfection and reoperation are not uncommon for MAC septic arthritis. Standard precautions were taken in this case, and it is difficult to discern how the need for repeat surgery could have been prevented. However, this is an important counseling point for the patient and the surgeon, both of whom should be aware that repeat surgery may be necessary despite adequate antibiotic therapy.

**CONCLUSION**

The authors described a case of MAC septic arthritis that presented as osteonecrosis of the femoral head in a young woman with a history of systemic lupus erythematosus who was being treated with chronic steroids and immunosuppressant medication. This case brings up key points regarding high-risk patient populations, the value of molecular diagnostic strategies, and current therapeutic regimens. Most importantly, it highlights the need to maintain a high index of suspicion in the correct clinical scenario so as not to delay diagnosis and proper treatment of the patient’s condition.

**REFERENCES**


