Large Joint Osteoarticular Infection Caused by *Mycobacterium arupense*

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**abstract**

Nontuberculous mycobacteria tenosynovitis and osteoarticular infections have increased during the past 25 years. At least 15 different species of atypical mycobacteria have been mentioned in the literature as the cause of orthopedic infections. *Mycobacterium arupense* is a recently discovered species that is closely related to the *Mycobacterium terrae* complex. A review of the literature found *M arupense* cited as the cause of a single case of tenosynovitis of the hand. To the authors’ knowledge, this organism has never been cited as the cause of a large joint infection. This article describes a case of knee osteoarticular infection caused by *M arupense* in a 69-year-old woman with no known immunocompromising comorbidities. The patient had more than a decade of knee pain and infection refractory to multiple surgical debridements and broad-spectrum antibiotics. Radical debridement with synovectomy and large-quantity bone resection cleared the infection with more than 2 years of follow-up. Clinically relevant findings in this case include the unusual and challenging nature of diagnosing and treating atypical mycobacterial musculoskeletal infection. The operative principles and techniques that apply to other bacterial osteoarticular infections are appropriate for musculoskeletal infection with *M arupense*. Furthermore, correct identification and speciation of atypical mycobacteria is crucial to guide antibiotic treatment.

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Infection with nontuberculous mycobacteria is rare; however, orthopedic infections involving these species have increased since 1985. At least 15 different species of atypical mycobacteria have been mentioned in the literature as the cause of orthopedic infections. Mycobacterium arupense is a recently discovered slow-growing type of nonchromogenic mycobacteria. Mycobacterium terrae is closely related to the Mycobacterium marui complex. A review of the literature found no report; however, orthopedic infections involving these species are rare. At least 15 species of atypical mycobacteria have been mentioned in the current literature as the cause of large joint infections with nontuberculous mycobacterial osteoarticular infection.

In view of clinical evidence of infection, the patient underwent surgical debridement. Intraoperative findings of extensive soft tissue and bony infection dictated radical surgical debridement, including synovectomy with resection of the distal femur and proximal tibia. A temporary antibiotic cement spacer with tobramycin 5 g and amikacin 500 mg was placed (Figure A). The antibiotic regimen after spacer placement included azithromycin, rifampin, and ethambutol. Microbiologic findings showed acid-fast bacilli, and culture at 4 weeks grew M. arupense.

The antibiotic spacer was left in place and the patient was followed closely, with no clinical signs of infection. At 4 months, the patient underwent joint aspiration and tissue cultures through an open biopsy. All findings were negative. Given the absence of infection, the patient underwent total knee arthroplasty. Because of the previous resection of the infected bone, a tumor prosthesis was necessary (Figure B). The patient continued treatment with the appropriate antibiotic regimen, according to infectious disease recommendations. At 24 months postarthroplasty, the patient had no signs of recurrence of infection and was ambulating without knee pain or the use of an assistive device.

**DISCUSSION**

Most attribute the increase in the incidence of musculoskeletal nontuberculous mycobacterial infections to immunosuppressive diseases. At least 15 species of nontuberculous mycobacteria have been mentioned in the literature as the cause of musculoskeletal infection. The most commonly cited nontuberculous mycobacteria species that cause osteoarticular and tenosynovial infections are Mycobacterium marinum, Mycobacterium kansasi, and the Mycobacterium avium complex. First isolated from clinical samples in 2006, M. arupense is a slow-growing type of nonchromogenic mycobacteria. M. arupense is closely genotypically related to the Mycobacterium terrae complex; however, these species have different antibiotic susceptibility. Orthopedic infection caused by the Mycobacterium terrae complex (M. terrae, Mycobacterium nonchromogenicum, and Mycobacterium triviale) and related species has been infrequently described.

To the authors’ knowledge, only 3 cases of M. terrae infection in large joints have been reported. Furthermore, only 1 report in the current literature describes an orthopedic infection caused by M. arupense; this infection was a tenosynovitis of the hand. Review of the literature found no previous report of a large joint infection caused by M. arupense.

Identification of a novel species of Mycobacterium involves gene sequencing in the microbiology laboratory. At least 30 new species of mycobacteria have been described in the past 5 years. Appropriate
The overall management of nontuberculous mycobacteria infection is still considered controversial. Described treatments include debridement alone, antimicrobial therapy alone with monotherapy or multiple-drug therapy, and a combination of debridement and antimicrobial treatment. The authors’ strategy, involving a combination of debridement and multiple antibiotic agents for a prolonged period, has been supported in the literature. The authors believe that the operative principles and techniques that apply to other bacterial osteoarticular infections are not adequate and should include more aggressive debridement. Additionally, this case shows the importance of correctly characterizing nontuberculous mycobacterial species to guide the selection of antibiotic agents.

**References**