Case Report

Mycobacterium chelonae Infection Following a Total Knee Arthroplasty

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Abstract: Infection following total knee arthroplasty is a major cause of implant failure, with an incidence of infections between 1 and 12%. Although there have been no previously reported cases of infection with Mycobacterium chelonae following total knee arthroplasty, this mycobacterium appears to be a potential pathogen in arthroplasty. When infection following total knee arthroplasty is evident but standard cultures come back negative, atypical mycobacterium infection should be considered. Mycobacterium chelonae does not grow in the normally allotted culture time, so false negative results are common. Once identified, M. chelonae is difficult to treat because of its resistance to standard drug therapies. Details of the first reported successful diagnosis and treatment of an infection with M. chelonae following a total knee arthroplasty are reported. Key words: total knee arthroplasty, infection, Mycobacterium chelonae.

Case Report

A 66-year-old woman was admitted to the hospital with a swollen, erythematous, and painful right knee. She had undergone a total knee arthroplasty 8 weeks previously. Postoperative recovery was uneventful until 6 weeks, when she noticed the pain and swelling. After admission, the right knee was aspirated and a markedly purulent material was obtained (white blood cell count = 62,500, mostly polymorphonuclear leukocytes). The Gram stain and cultures were negative.

An arthrotomy was performed to remove the knee prosthesis and debride the knee. Marked necrotic tissue and destruction of the patella were observed. Tissue and fluid sent to the microbiology and pathology laboratories again cultured negative.

Intravenous antibiotics were started (vancomycin 1 g every 12 hours and gentamicin 80 mg every 8 hours), and the wound was left open for 3 days. The knee was again vigorously debrided and irrigated, and a spacer block of Simplex cement (Howmedica, Rutherford, NJ) and tobramycin (4 g) was inserted. A second cement block was made into a patty and inserted under the extensor mechanism. The wound was closed and a sterile compressive wrap was applied. There were no complications during either surgery.

With a longer incubation period on blood agar (5 days), the organism causing the infection was identified as a strain of Mycobacterium. Further investigation by respiratory immunology experts identified the organism as Mycobacterium chelonae. In accordance with drug susceptibility tests, cefoxitin (1 g intravenously every 8 hours) and amikacin (an 8 mg/kg load followed by 7.5 mg/kg every 8 hours) replaced the previous antibiotics. The rigorous intravenous antibiotic therapy was continued for 6 weeks. At the end of the 6 weeks, the wound remained closed without drainage or tenderness.

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The antibiotic treatment was switched to oral bacitracin. One month later (12 weeks after surgery), the wound was completely healed and antibiotics were discontinued.

Six weeks after discontinuing antibiotics, there was no evidence of persistent infection. The cement spacer was extracted, the joint was debrided, and a revision total knee arthroplasty (Howmedica super-stabilizer implant and cement with 2.4 g tobramycin) was completed without complication. The wound was closed over a drain. All cultures (including the 1-week incubation on blood agar) came back negative. The patient was sent home on oral ciprofloxacin (750 mg twice daily).

Five months after surgery, the patient was full weight bearing with minimal discomfort and no signs of infection. At greater than 2 years after the reimplantation, the patient still experiences no pain and shows no signs of recurring infection.

Discussion

*Mycobacterium chelonae* is a nonpigmented, rapidly growing acid-fast organism that is commonly found in soil. It is an opportunistic pathogen to humans who are immunocompromised or have used corticosteroids. It is resistant to the antibiotic regimens that are normally used to treat prosthetic arthroplasty infections, as well as most antituberculosis drugs.

Typically, cultures grown on blood agar plates are discarded after 48 to 72 hours. *Mycobacterium* does not appear on blood agar plates for 5 to 7 days; therefore, cultures of *M. chelonae* are often reported negative. If there is an obvious infection or failure of a wound to heal, and cultures are negative, an atypical mycobacterium infection should be considered. An extended culture incubation (> 5 days) followed by strain-specific tests allows proper identification.

It is important to differentiate between *M. chelonae* and *M. fortuitum* because of their different drug susceptibilities. The two are often grouped in the "fortuitum complex," although *M. fortuitum* and *M. chelonae* are unrelated species and should be considered separately. The two species can be differentiated using a nitrase test (*M. fortuitum* is positive, *M. chelonae* is negative).

Several articles have reported *M. fortuitum* infections following prosthetic arthroplasty, but only one was found to link *M. chelonae* to joint arthroplasty surgery—a January 1994 letter to the editor from the *Journal of Infection* reporting an infection by *M. chelonae* after a prosthetic hip joint surgery. There have also been reports of *M. chelonae* infections after porcine heart valve implants. It is more commonly known to cause injection abscesses, disseminated disease, skin, and soft tissue infections, and catherter infections; however, it is probable that with respect to arthroplasty, cases of *M. chelonae* currently go undiagnosed.

Once infection with a mycobacterium has been established, as with other prosthesis infections, resection arthroplasty is necessary, along with vigorous debridement. Following implant removal, an aggressive long-term antibiotic treatment should be used to eradicate the infection. In this case, the mycobacteria were susceptible to cefoxitin and amikacin; however, this is not always the case. Atypical strains of mycobacterium are often resistant to standard antituberculosis drugs and can be very difficult to treat. The patient must be completely free of infection without antibiotics before consideration of repeating the arthroplasty. If the *M. chelonae* infection is identified and treated early and aggressively, as this case exemplifies, a successful outcome is possible.

References
