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Mycobacterium fortuitum Infection Following Patellar Tendon Repair

A Case Report

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Investigation performed at the Hospital for Special Surgery, New York, NY

M*ycobacterium fortuitum* is a ubiquitous, rapidly growing mycobacterial species that is infrequently reported in the surgical literature. Clinically important infection with this organism has been described following trauma, injections, augmentation mammoplasty, and ultrasound hydrolipoclasia¹⁻³. In the field of orthopaedic surgery, *Mycobacterium fortuitum* infection has been encountered only following prosthetic arthroplasty or fracture surgery with internal fixation⁴⁻⁹.

We report the case of an otherwise healthy man who underwent patellar tendon repair that was complicated by *Mycobacterium fortuitum* infection. While an accurate diagnosis was delayed by several weeks, aggressive surgical and specific antimicrobial therapy resulted in a favorable outcome. We emphasize the importance of surgeon awareness of this pathogen in order to facilitate accurate diagnosis and appropriate treatment.

The patient was informed that data concerning the case would be submitted for publication, and he consented.

Case Report

A forty-year-old man who worked as an attorney was referred to one of us from another institution two months after surgical repair of the left patellar tendon. Three weeks before the referral, the patient had surgical wound erythema and drainage, accompanied by fever and chills. Oral cephalexin was prescribed but resulted in no improvement. Culture specimens were not obtained at that time. The medical history was otherwise unremarkable. Examination revealed that the patient was 180 cm tall and weighed 95 kg. The systemic temperature, pulse rate, and blood pressure were normal. The patient had an anterior longitudinal left knee incision with diffuse, severe surrounding erythema. The wound was open and draining, with granulation tissue exposed both proximally and in the center. The range of knee motion was from 0° to 70°. The patellar height appeared to be symmetrical on both sides, and the patient could perform an active straight leg raise.

Distal motor and sensory function was normal, with normal pedal pulses. The white blood-cell count was 13,000 cells/ μ L, with a left shift. Magnetic resonance imaging demonstrated joint effusion, bone edema of the patella, extensive edema of the soft tissues surrounding the patella and extending toward the subcutaneous tissues, a draining sinus, and a partial to nearly-full-thickness tear of the patellar tendon (Figs. 1-A and 1-B).

With the patient under anesthesia in the operating room, pus and tissue specimens were obtained from the wound and were sent for Gram staining, bacterial culture, potassium hydroxide preparation, fungal culture, mycobacterial smear and culture, as well as histopathological analysis. At the site of the sutures that had been used for the patellar tendon repair, there was infection tracking into the patella, both at the superior aspect of the patella, where the sutures were tied at the quadriceps tendon insertion, as well as at the inferior pole of the patella, where the sutures had been passed. The wound was irrigated, the sutures were removed, and any nonviable tissue was excised. Manipulation of the knee was performed, and 120° of knee flexion was obtained. The wound was left open, and antibiotic treatment with parenteral vancomycin was initiated. Two days later, a second irrigation and débridement was performed. There was no sign of pus, and the tissue appeared to be viable and clean. As approximately two thirds of the original repair was not intact, the tear in the patellar tendon was repaired with nonabsorbable sutures. At the time of discharge to home, six days after admission, all microbiological studies were negative. A six-week course of ertapenem was prescribed for what was presumed to be a "culture-negative" infection. However, eight days after the first débridement, moderate acid-fast bacilli, which were subsequently identified as *Mycobacterium fortuitum*, were found on mycobacterial culture. The organism's antibiogram became available several weeks later and revealed sensitivity to aminoglycosides, clarithromycin, imipenem, fluoroquinolones, tigecycline, and trimethoprim-sulfamethoxazole. Following the course of ertapenem, the patient received six months

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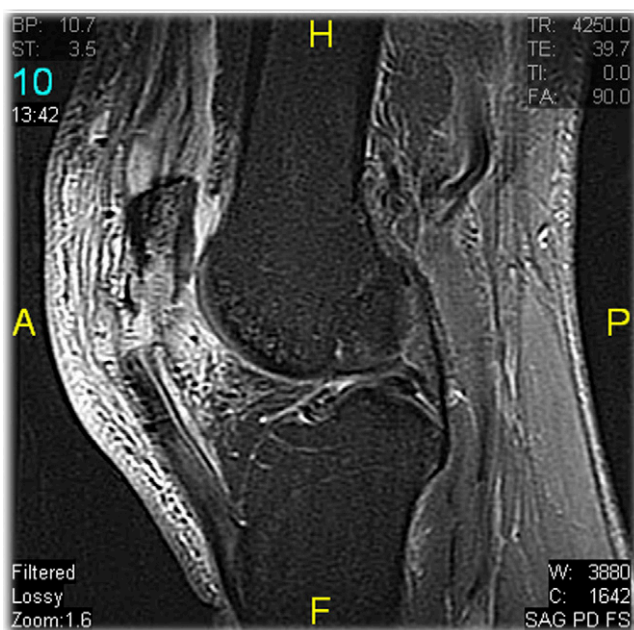


Fig. 1-A

1.5-T magnetic resonance imaging scans demonstrating joint effusion, edema of the patella, edema of the soft tissues surrounding the bone and extending toward the subcutaneous tissues, a sinus, and a partial to nearly-full-thickness tear of the patellar tendon. H = head, F = foot, A = anterior, and P = posterior.

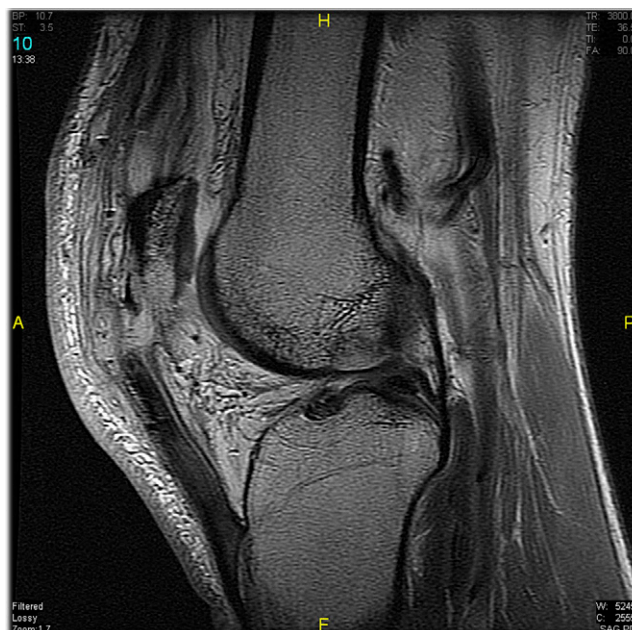


Fig. 1-B

of oral clarithromycin and trimethoprim-sulfamethoxazole. The wound healed well, and the skin sutures were removed twelve days after the second procedure. At the last follow-up visit, seven months following the operations, the patient was doing well and was walking without a limp. The range of knee motion was from 0° to 140°. There were no signs of infection.

Discussion

Mycobacterium fortuitum is an organism that belongs to the group of rapidly growing mycobacteria. It is distributed in natural water, tap water, soil, water-based solutions, and ice and has been described as a contaminant of saline solution, various injectable medications, electromyography needles, and dialysis systems^{1,10,11}.

Infections involving this pathogen often present a therapeutic challenge. The wound infection may present weeks after surgery with dehiscence and sinus tract formation, inconsistently accompanied by fever, chills, or other constitutional symptoms¹². Establishing a microbiological diagnosis will be unlikely if specific mycobacterial media (e.g., Lowenstein-Jensen or Middlebrook 7H11) are not inoculated. Acid-fast stains are often negative. Unrevealing conventional bacterial cultures may be attributed to previous antibiotic therapy if a mycobacterial infection was not considered in the original differential diagnosis. Indeed, previous reports have demonstrated a delay in diagnosis of as much as several months. In a study of a series of rapidly growing mycobacterial skin and soft-tissue infections the median time for microbiological diagnosis after the onset of symptoms was three months², and in another report of a periprosthetic infection the diagnosis was delayed

by fourteen months because a mycobacterial pathogen was not considered¹³.

Although health-care-associated outbreaks have been described, commonly involving exposure to tap water, water-based solutions, and ice machines in hospitals¹⁴, the majority of infections occur sporadically. Infections have been reported in most geographic areas in the world¹⁵, and, in the United States specifically, species of rapidly growing mycobacteria, including *Mycobacterium fortuitum*, have been recovered from 30% to 78% of soil samples throughout the nation¹⁶.

Treatment of *Mycobacterium fortuitum* infections is often difficult as the organism is resistant to standard antitubercular agents and often to other antibiotics as well. Combination therapy with two or more agents is recommended as monotherapy may be associated with acquired resistance¹¹.

In the case of our patient, two months passed from the primary operation until the infection was treated appropriately with aggressive surgery and specific chemotherapy. This scenario of delayed diagnosis and appropriate treatment has been previously reported to result in substantial morbidity or even death^{7,9,17}. Had specimens not been submitted for mycobacterial analysis, our patient may have experienced an adverse outcome. Our decision to manage the patient with combined antimicrobial therapy for six months, according to the culture antibiogram, was based on previous recommendations^{1,8,11} and was successful. The two drugs in this case were selected on the basis of the antibiogram and the desire to administer orally a combination chemotherapeutic regimen that would be well tolerated for an extended period of time (i.e., months). Although fluoroquinolones are often used to treat infections due

to rapidly growing mycobacteria, the well-described risk of tendon inflammation and rupture associated with this drug class proscribed their use in our patient. Nevertheless, as few cases have been reported, no standard protocols are available for the treatment of this pathogen. As such, treatment should be specific for each patient and should rely on early diagnostic studies, culture susceptibility, aggressive surgical débridement, and close clinical monitoring. In cases of periprosthetic infections, removal of the prosthesis should probably be strongly considered^{8,13}.

As to the uniqueness of the case described, it should be noted that, in the orthopaedic literature, *Mycobacterium fortuitum* has only been reported in association with knee and hip arthroplasty, open fractures, and, in one case, a closed tibial fracture that was treated with an intramedullary nail^{14-9,13}. The case described here is exceptional as *Mycobacterium fortuitum* infection was found following a soft-tissue procedure in an otherwise healthy patient. In view of this case and reports in the literature demonstrating serious potential complications related to this undiagnosed infection, we believe that the cost and morbidity of an overlooked diagnosis justify that aerobic

and anaerobic cultures be universally accompanied by mycobacterial cultures at the time of débridement of musculoskeletal infections. ■

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