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Case report

Rapidly growing non-tuberculous mycobacteria infection of prosthetic knee joints: A report of two cases

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ABSTRACT

Non-tuberculous mycobacteria (NTM) cause prosthetic knee joint infections in rare cases. Infections with rapidly growing non-tuberculous mycobacteria (RGNTM) are difficult to treat due to their aggressive clinical behavior and resistance to antibiotics. Infections of a prosthetic knee joint by RGNTM have rarely been reported. A standard of treatment has not yet been established because of the rarity of the condition.

In previous reports, diagnoses of RGNTM infections in prosthetic knee joints took a long time to reach because the condition was not suspected, due to its rarity. In addition, it is difficult to identify RGNTM in the lab because special identification tests are needed. In previous reports, after treatment for RGNTM prosthetic infections, knee prostheses could not be re-implanted in all cases but one, resulting in arthrodesis or resection arthroplasty; this was most likely due to the aggressiveness of these organisms. In the present report, two cases of prosthetic knee joint infection caused by RGNTM (*Mycobacterium abscessus*) are described that were successfully treated, and in which prosthetic joints were finally reimplanted in two-stage revision surgery.

1. Introduction

In rare cases, non-tuberculous mycobacteria (NTM) cause prosthetic knee joint infections. There is a paucity of case reports about NTMs causing prosthetic knee joint infections in the literature. NTMs are present in the environment, including in water and soil. They can cause nosocomial infections [1,2]. NTM infections usually occur in immunocompromised patients. They most commonly take the form of skin and soft tissue infections, pneumonia, endocarditis, or disseminated disease [3]. Rapidly growing non-tuberculous mycobacteria (RGNTM) can be cultured within one week, whereas culture of *Mycobacterium tuberculosis* (*M. tuberculosis*) typically takes at least two to four weeks [4,5]. RGNTM are typically resistant to almost all traditional anti-tuberculous medications and many other antibiotics [6]. *Mycobacterium abscessus* (*M. abscessus*), *Mycobacterium fortuitum*, *Mycobacterium chelonae* and *Mycobacterium smegmatis* are representative RGNTM [7].

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Since knee joint infections caused by NTM are rare, clinical manifestations and treatment strategies for such infections are not well established [8]. Accordingly, clinical manifestations and treatment strategies for rarer presentations, such as prosthetic knee joint infections caused by RGNTM, remain unclear even though the clinical manifestations are typically aggressive.

There are few extant reports of RGNTM infection of prosthetic knee joints [3,9,10]. In those that do exist, diagnosis of RGNTM infection of prosthetic joints took a long time, likely because of the condition's rarity. In addition, treatment was unsuccessful; reimplantation of prostheses could only be performed in a single case, likely due to the aggressiveness of the organism. The present report describes two cases of prosthetic knee joint infection caused by *M. abscessus* that were successfully treated with reimplantation through two-stage revision surgery.

2. Case presentations

2.1. Case 1

An 83-year-old female was transferred to the present institution to treat an uncontrolled postoperative infection four months after a right primary total knee arthroplasty (TKA). Before the TKA surgery she was healthy and did not have a history of any chronic disease that might have affected her immunocompetency. The prosthetic joint infection developed 18 days after the TKA operation. She had undergone two additional surgeries to treat the infection – open debridement with polyethylene insert exchange and open debridement with removal of prostheses and vancomycin-loaded cement spacer insertion – both of which had failed.

At the time of her transfer to the present institution, antibiotic-loaded cement spacers were exposed through a large soft tissue defect on the anterior aspect of the knee and there were signs of infection (Figures 1.A and 2.A). Initial laboratory findings revealed a white blood cell (WBC) count of 14,920 with 82% polymorphonuclear cells (PMNs) in the peripheral blood and a C-reactive protein level of 7.47 mg/dl. Cefazolin had been used, based on isolation of methicillin-susceptible *Staphylococcus aureus* (MSSA) from samples taken from her knee during the surgeries at the previous hospital. After hospitalization at the present institution, open debridement and insertion of vancomycin-loaded (four grams per 40 g batch of cement) articulating cement spacers were performed (Figure 2.B). The soft tissue defect was approximated and carefully closed (Figure 1.B). In addition, swab cultures were collected from the joint fluid and multiple tissues. The culture results revealed *M. abscessus* in four of 11 samples at four days after the surgery. Thus, the antibiotics were changed to amikacin 375 mg intravenously (IV) every 12 h, cefoxitin one gram IV every eight hours, moxifloxacin 400 mg per os (PO) every 24 h, and clarithromycin 500 mg PO every 12 h; this was after consultation with infectious disease specialists and based on a previous case report of RGNTM infection [11,12]. Based on the profile of antibiotic susceptibility, the antibiotic regimen was then changed to amikacin 375 mg IV every 12 h, cefoxitin one gram IV every 24 h, and azithromycin 500 mg PO every 24 h. These antibiotics were maintained until six months after the surgery when the laboratory test results had normalized and there were no signs or symptoms suggesting infection of the knee.

Internal fixation with double plates (Synthes, Paoli, PA, USA) and cement spacer exchange was performed to treat an ipsilateral femur fracture caused by blunt trauma. However, reimplantation was postponed until seven months, as the patient's general

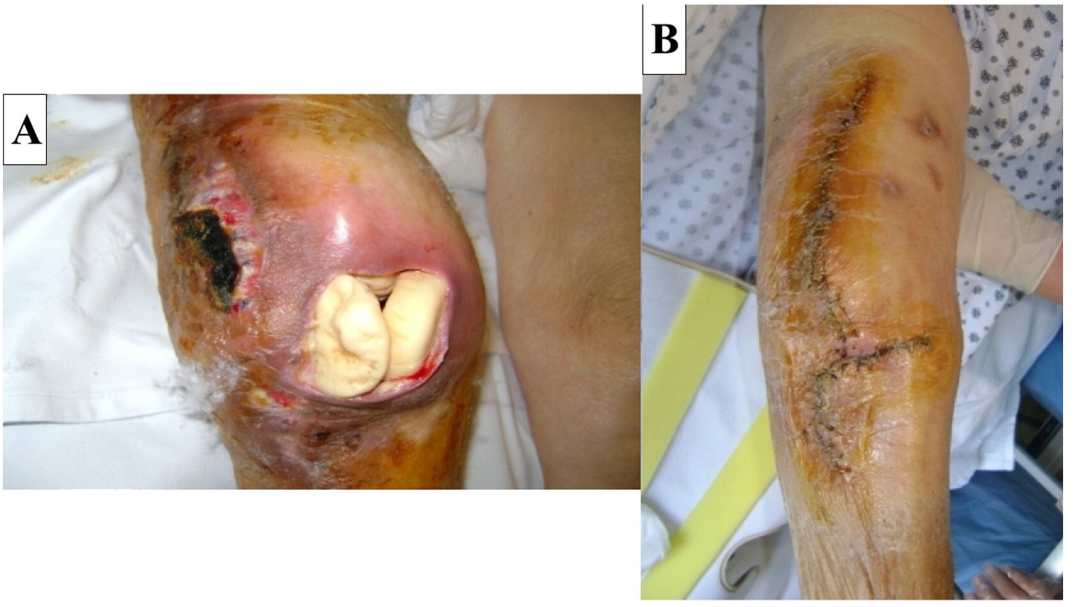

Figure 1. Photograph of the first case. (A) Antibiotic-loaded cement spacers were inserted after removal of TKA prostheses. Signs of infection, such as redness and swelling, accompanied by a huge skin defect on the anterior surface of the right knee were evident. (B) Postoperative photograph obtained at the present institution.

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