ABSTRACT

We present a case of *Mycobacterium chelonae* infection after total knee arthroplasty in a 70-year-old woman. The patient underwent implant removal, drainage, debridement, and insertion of a gentamycin-load cement spacer. After 4 months, the second-stage surgery was performed. Intravenous amikacin (6 weeks) and oral clarithromycin (12 weeks) were given. At the 12-month follow-up, the patient achieved 90º of flexion and could walk with a stick for up to 15 minutes. She was not taking any analgesics.

**Key words:** arthroplasty, replacement, knee; mycobacterium infections, nontuberculous; reoperation

INTRODUCTION

Atypical mycobacterium infection after total knee arthroplasty (TKA) is rare and devastating. We present one such case in a 70-year-old woman.

CASE REPORT

In October 2009, a 70-year-old woman presented with right knee pain and swelling 4 months after TKA for osteoarthritis of the knee. She could still walk with a stick. The wound had healed well. On palpation, there was an increase in temperature of the knee joint, with some tenderness at the lateral joint line. The active range of motion was 20º to 105º flexion. There was no ligament laxity or obvious leg length discrepancy.

Radiographs showed a well-fixed implant with satisfactory alignment. There was no evidence of loosening (Fig. a). Blood tests revealed a white cell count of 7.9 $10^9$/l, a serum C-reactive protein level of 29.6 mg/l, and an erythrocyte sedimentation rate of 117 mm/hr. Her blood sugar level and routine liver and renal function tests were all within normal ranges.

Ultrasound-guided aspiration of the right knee was performed, and the joint fluid was sent for histology and microbiological examination and culture. Fibroblastic granulation tissue and vague granulomatous inflammation were noted, but the
Ziehl-Neelsen stain showed no acid-fast bacilli. Gram staining showed large number of white cells, but there was no growth in bacterial cultures. The enrichment broth medium (non-radiometric mycobacterium growth indicator tube) turned positive after 8 days of incubation. The contents were subcultured onto agar plates and Lowenstein-Jensen medium and isolates were observed within 7 days. They were confirmed to be rapidly growing mycobacteria. The strain was then sent for restriction enzyme analysis and microbroth dilution for identification and sensitivity testing, respectively.

In view of the abnormal blood parameters and clinical suspicion of an infected prosthesis, the patient underwent a revision excisional arthroplasty 5 months after the primary TKA. According to a microbiologist, intravenous amikacin and oral clarithromycin were given peri-operatively. Intra-operatively, an abscess was found at the lateral side of the knee, which was drained and debrided (together with the surrounding soft tissue). The implants were removed, and a ready-made, articulating, gentamycin-load cement spacer was inserted (Fig. b). The intra-operative specimen was sent for culture. Pre- and intra-operative specimens confirmed the infection to be Mycobacterium chelonae, which was susceptible to the antibiotics. Intraoperative amikacin was continued for 6 weeks, whereas oral clarithromycin was continued for 12 weeks. A hinged knee brace was given. Mobilisation and non-weight bearing were allowed for 4 months between the 2 stages of revision. The second-stage surgery was then performed (Fig. c).

Biochemical markers for infection were monitored. At the 12-month follow-up, the white cell count was $6.5 \times 10^9/l$, the serum C-reactive protein level was $<1 \text{ mg/l}$, and the erythrocyte sedimentation rate was $31 \text{ mm/hr}$. There was no sign of recurrence. The patient achieved $90^\circ$ of flexion and could walk with a stick for up to 15 minutes. She was not taking any analgesics.

**DISCUSSION**

The most common organism responsible for prosthetic joint infection is staphylococcus. Involvement of mycobacterium species is rare. M chelonae is an atypical mycobacterium belonging to the Runyon group IV, which is a non-pigmented, rapidly growing, acid-fast organism. They can be grown in less than 7 days on culture media. The common human atypical mycobacteria are M fortuitum and M chelonae, which have different sensitivities to antibiotics and are commonly found in water and soil. Contaminated water supply for irrigation of surgical instruments is a possible source of infection. There are reports of M chelonae and M farcinogens infections in patients with joint replacement. The antibiotic susceptibility of M farcinogens differs from M chelonae.

Despite a classification system for atypical mycobacteria, there is no consensus on treatment regimens. In a series of 8 cases of prosthetic joint infections caused by rapidly growing mycobacteria, at least 6 months of antimicrobial treatment was recommended. In our patient, the duration of treatment was only 3 months, which was already double the time for usual bacterial infections. The patient’s progress was closely monitored with blood tests. A gentamicin spacer was used between the first and second revision operation. Only antibiotics in powder form can be used as cement spacer. Gentamicin exists in powder form and is thermostable, which is

![Figure](Figure Radiographs taken (a) at presentation (b) after the first-stage revision surgery with the gentamicin-loaded cement spacer in situ, and (c) after the second-stage revision surgery.)
suitable for mixing with cement. Moreover, antibiotic cement spacer can build up the minimal inhibitory concentration (MIC), which has bacteriostatic or even bactericidal effect when the dosage is high.\textsuperscript{10} The MIC for gentamicin and amikacin against \textit{M Chelonei} has been reported to be up to 64 mg/l.\textsuperscript{11} The MIC of gentamycin-loaded cement can be up to 4000 mg/l.\textsuperscript{12} The revision operations were staged 4 months apart rather than the usual 6 to 8 weeks. It is important to remove the implant and fully debride the area, and follow up with a course of intravenous and oral antimicrobials for 3 to 6 months based on the culture sensitivity results, before the second-stage surgery can be performed. High index of clinical suspicion is important, as delayed diagnosis could lead to severe morbidity.

REFERENCES