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Case Report

Treatment of *Mycobacterium fortuitum* Infection of Total Knee Arthroplasty: A Case Report

偶然分枝桿菌感染的人工全膝關節置換術之治療方案:一病例報告

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ABSTRACT

Mycobacterium fortuitum is a rapidly growing bacterium that can cause infection at different sites in humans. Prosthetic infection caused by this bacterium has historically been a challenge, with reimplantation being unsuccessful in all but one case. *M. fortuitum* is resistant to almost all conventional antituberculous medications. There is no standardised treatment due to its rarity of occurrence. Here, we report a case of successful reimplantation with initial debridement surgery and 6 weeks of antibiotics.

中文摘要

偶然分枝桿菌是迅速生長的生物體，能於人體的不同部位造成感染。該細菌造成的假體感染一直是醫學史上的難題。迄今，感染後的重種手術只有一個成功的個案。幾乎所有常規抗肺結核藥物對該細菌都沒有效用。由於病例罕見，現時還沒有標準的治療方案。本文報告一個病例，最初以清創手術再加上六週的抗生素治療，成功地進行了人工全膝關節的重種手術。

Introduction

Mycobacterium fortuitum is a recognised cause of soft tissue infections at different sites in humans, for example, the cervical region,¹ abdominal wall,² skin³ and breast.⁴ In the literature, only a few cases of *M. fortuitum* prosthetic infections have been reported. The outcome was poor with inevitable failure of reimplantation except in one case.⁵ There is no consensus of treatment.

Case report

A 64-year-old woman had osteoarthritis of both knees. Preoperative X-rays of her left knee (Figure 1) showed no obvious sign of infection. There had been a history of intra-articular injection of unknown drugs of both knees before left total knee arthroplasty (Figure 2) (Legacy posterior stabilized knee, Warsaw, Zimmer) was performed in 2003. Preoperative and intraoperative assessments showed no signs of infection. At 10 weeks after the operation, the patient complained of increased pain in her left knee. Physical examination showed increased temperature in the left knee with

effusion. The blood test showed an elevated C-reactive protein level of 48.9 mg/L. Left knee aspiration was done and joint fluid was sent for investigation. Joint fluid culture was negative but microscopy found an increased number of neutrophils. Acid-fast bacillus smear was negative. Acid-fast bacillus culture yielded *M. fortuitum*, which was sensitive to amikacin, ciprofloxacin and imipenem but resistant to rifampicin, tetracycline and clarithromycin.

Exploration was done 12 weeks after the first operation. Intraoperatively, pus was found inside the joint. Removal of the implant and insertion of a hand-moulded articulating cement spacer made from one pack of antibiotic-loaded cement (500 mg tobramycin in 40 g Simplex cement) were performed (Figure 3). Intraoperative frozen section showed >20 neutrophils per high-power field (40×). Intraoperative fluid culture showed mycobacterial species. After the operation, the patient was placed on intravenous amikacin (500 mg/day) for 6 weeks and oral ciprofloxacin (500 mg twice daily orally) for 6 weeks in total, as suggested by the microbiologist. Two months after insertion of the cement spacer, the pain improved and signs of inflammation subsided. The extension to flexion range of her left knee was 10–80°. The C-reactive protein level went down from 48.9 mg/L to 5.0 mg/L. One month later, revision total knee replacement (Figure 4) was done. Intraoperative frozen section confirmed that the neutrophils count was <5 per

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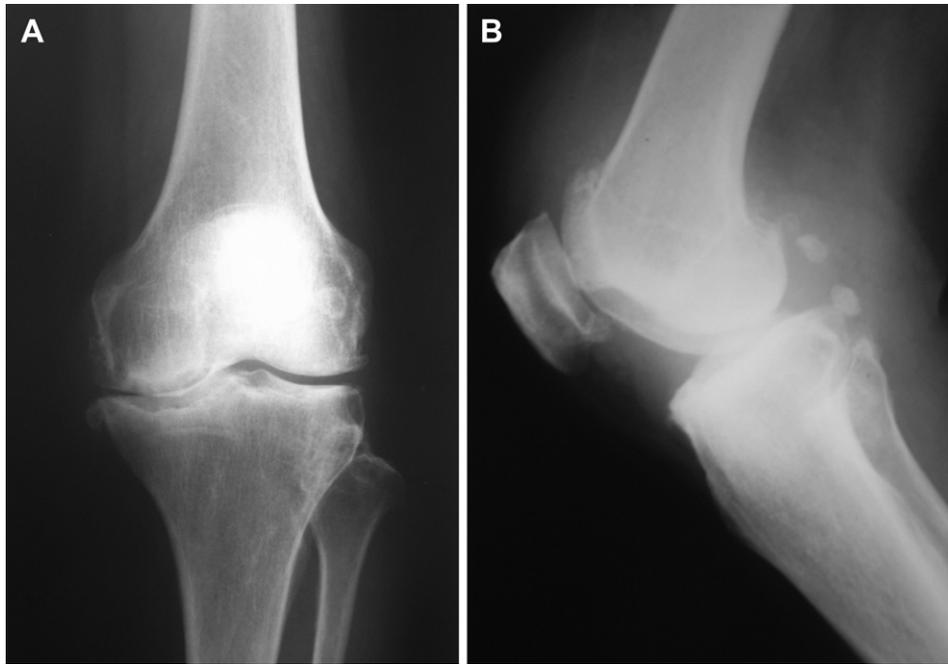


Figure 1. Preoperative X-rays of the left knee.

high-power field. Antibiotic-loaded cement (1 g tobramycin in 40 g Simplex cement) was used. After the operation, 2 weeks of oral ciprofloxacin (500 mg twice daily) was given empirically. Tissue culture was negative.

At the latest follow-up about 7 years after the reimplantation operation, there was no recurrence of infection. The extension to flexion range of her left knee was 0–70°. The patient could walk painlessly with a stick.

Discussion

M. fortuitum belongs to Runyon group IV, called rapidly growing mycobacterium in the classification of nontuberculous mycobacteria. Extracellular hemolysis is a possible pathogenesis process of the disease owing to haemolysin production by *M. fortuitum*.⁶ This group of mycobacteria has proven *in vitro* susceptibility to amikacin, gatifloxacin, moxifloxacin, ciprofloxacin, and norfloxacin, with amikacin

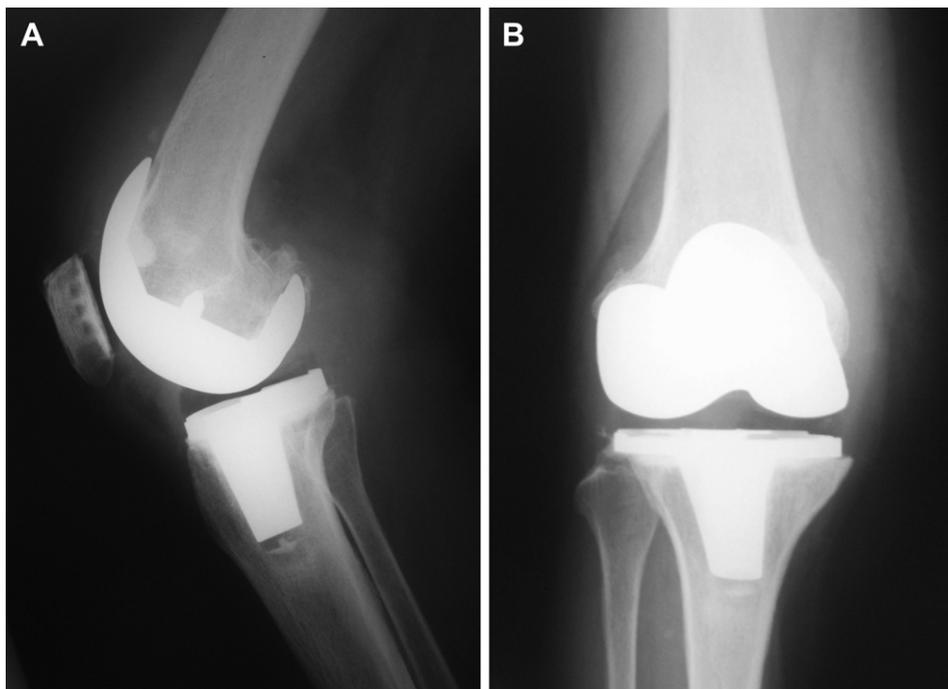


Figure 2. Postoperative X-rays after initial total knee arthroplasty.

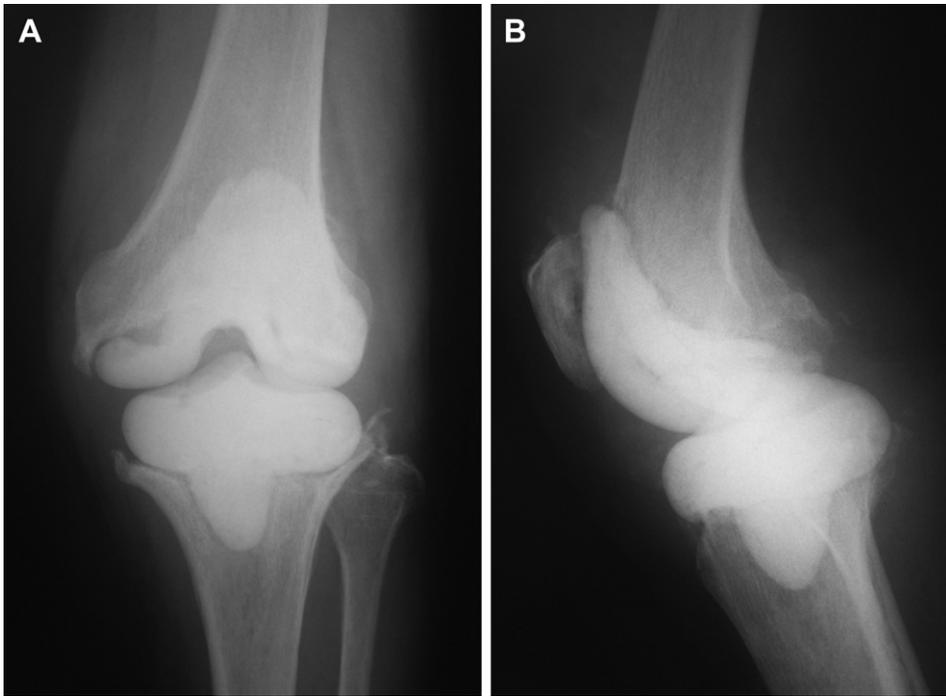


Figure 3. X-rays after radical debridement with insertion of antibiotic cement spacer.

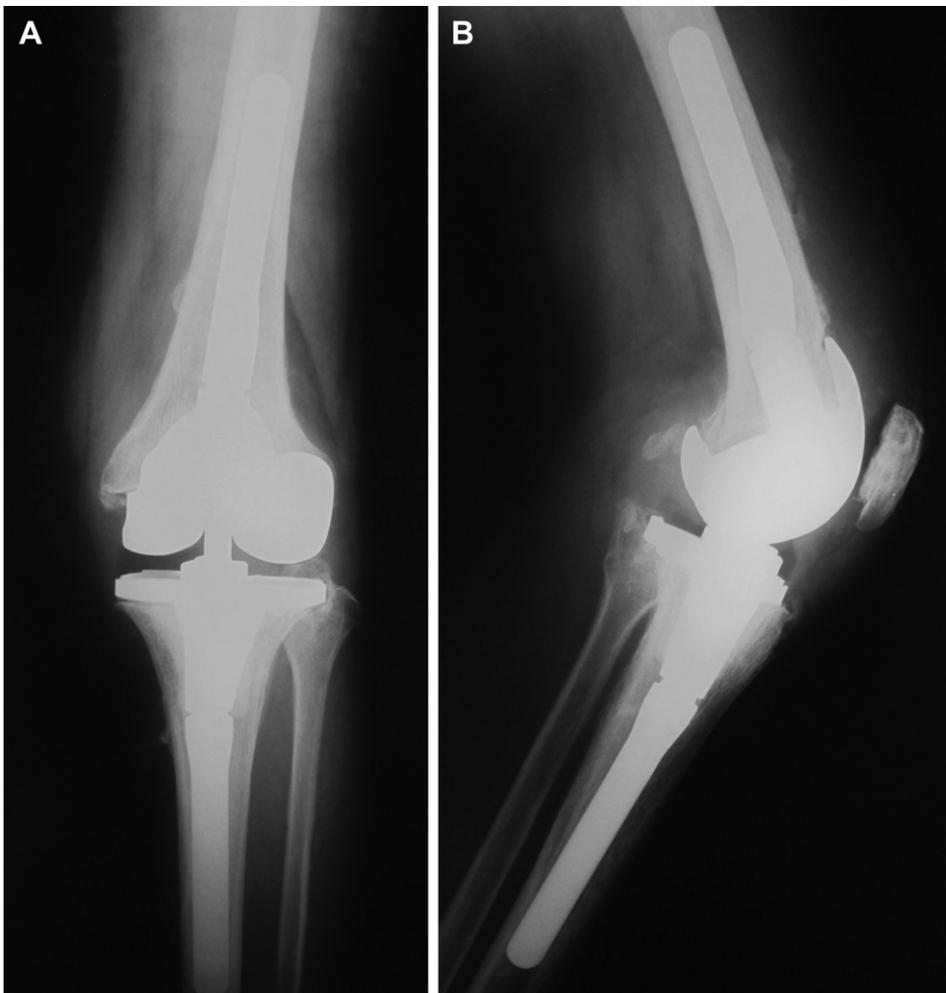


Figure 4. X-rays after reimplantation surgery.

being the drug of first choice followed by the newer generation of fluoroquinolones.⁷

Prosthetic infection by *M. fortuitum* has rarely been reported. The outcome was not satisfactory with failure of reimplantation. It could also happen after hip arthroplasty.⁹ To the best of our knowledge, this is the second case reported in the literature of an infected total knee arthroplasty with subsequent successful reimplantation. Prolonged duration of combination antibiotics for at least 6 months has been recommended.^{5,8}

In our case, however, successful reimplantation was achieved with 6 weeks treatment with systemic antibiotics with antibiotic-loaded cementation in contrast to the suggestion in previous reports. Our case demonstrated that a shorter duration (6 weeks amikacin and ciprofloxacin) would be effective *in vivo* in treating prosthetic infection caused by *M. fortuitum* if there was supplementation with antibiotic-loaded cementation locally during the reimplantation. This could reduce the treatment cost and minimise adverse effects of prolonged systemic antibiotics.

In conclusion, the exact duration of antibiotics and timing of reimplantation surgery remain uncertain for the treatment of *M. fortuitum* infection of total joint arthroplasty. Also, the role and exact regime of antibiotics used in cement spacer is not well

defined. However, radical debridement, tobramycin-loaded articulated cement spacers, and 6 weeks of systemic combination antibiotics, followed by reimplantation after infection is cleared, may lead to successful reimplantation.

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