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Case report

Mycobacterium bovis prosthetic joint infection

Infection de prothèse articulaire à Mycobacterium bovis

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1. Introduction

Mycobacterium bovis is part of the *Mycobacterium tuberculosis* complex of animal reservoir. Cattle control and dairy product pasteurization implemented in developed countries led to a decrease in *M. bovis* human infection prevalence, now accounting for less than 1.4% of tuberculosis case patients [1]. Bone and joint infection (BJI) is a rare complication of *M. bovis* systemic infection, with a poorly documented management of patients. This observation of *M. bovis* prosthetic joint infection (PJI) provided the opportunity to summarize current knowledge about this rare condition.

2. Case patient

A 73-year-old woman of Portuguese origin was admitted to hospital for an early PJI two months after a reverse right shoulder arthroplasty for glenohumeral osteoarthritis and rotator cuff tear (Fig. 1, panel A). She had a past medical history of well-controlled asthma and a 6-year history of neutropenia of unknown origin. Physical examination revealed an open surgical scar with purulent discharge. Surgical debridement with

implant retention was performed, followed by the administration of an empirical antimicrobial therapy with vancomycin and cefotaxime. Bacteriological culture yielded *Propionibacterium acnes*. Two weeks later, as the patient presented with a persistent febrile open scar, a second surgical debridement was performed with drainage of suspected infected hematoma. The antibiotic regimen was switched to imipenem, clindamycin, and daptomycin upon suspicion of a superinfection. The postoperative course was marked by severe sepsis with acute respiratory distress. Blood cultures and all preoperative samples remained sterile, prompting the simplification of the antibiotic therapy with imipenem alone. A CT-scan showed a new intra-articular fluid collection next to the shoulder prosthesis, which was sampled using fine-needle aspiration. This unexpected unfavorable postoperative course, despite appropriate broad-spectrum antimicrobial therapy, led to expand the etiological investigation. Polymerase chain reaction (PCR) identified *M. bovis* on joint aspiration and all preoperative samples. Specific antibiotic therapy was then initiated with isoniazid (INH), rifampicin (RMP), ethambutol (EMB), and levofloxacin (LVX). Amikacin was added during the first two weeks. Prosthesis was removed (Fig. 1, panel B), and bone samples were cultured on the mycobacterium selective medium Coletsos (Bio-Rad, Marnes-la-Coquette, France) and MGIT (Becton Dickinson, Le Pont de Claix, France) broth at 37 °C. Both cultures were positive for *M. tuberculosis* complex as identified by sequencing of the hsp65 locus. The spoligotyping profile obtained was

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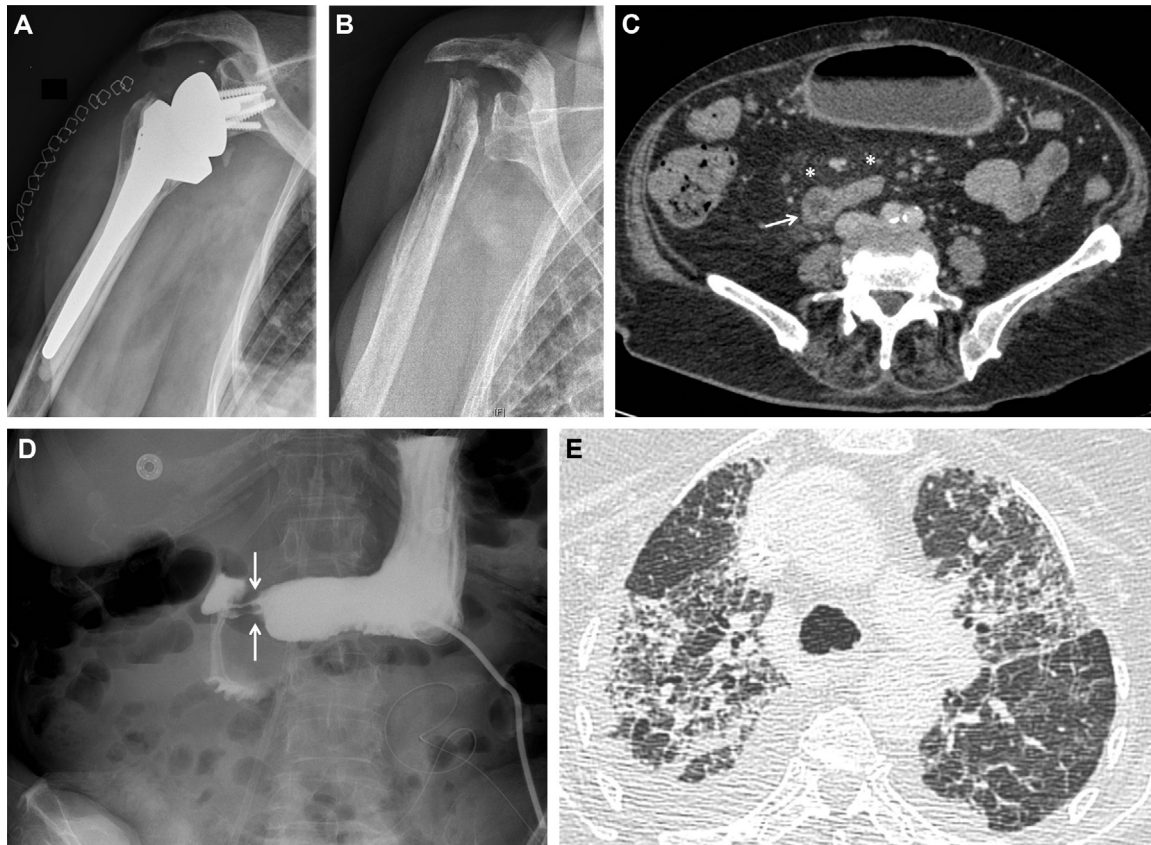


Fig. 1. Morphological investigations. A. Standard X-ray of the right shoulder showing classical reverse shoulder prosthesis just after implantation. B. Standard X-ray of the right shoulder after prosthesis removal for *Mycobacterium bovis* chronic prosthetic joint infection. C. Abdomen CT-scan showing duodenojejunal wall thickening (arrow) with fatty infiltration of the mesentery (asterisk). D. X-ray after barium swallow confirming duodenojejunal stenosis secondary to a non-necrotizing granulomatous duodenojejunitis (arrows). E. Thoracic CT-scan (panel E) revealing diffuse pulmonary fibrosis secondary to diffuse alveolar damage and *M. bovis* infection.

Bilan morphologique.

476 773 677 777 600, thus allowing assignment to *M. bovis* species. The isolate was susceptible to rifampin, isoniazid, and ethambutol, and it was resistant to pyrazinamide. This was consistent with the detection of H57D *M. bovis* specific mutation of the pyrazinamidase (*pncA*) gene. HIV serological test was negative, and CD4+ T-cell count was 250/mm³ (16% of total lymphocytes).

The patient presented with clinical signs compatible with a small bowel obstruction one month after the prosthesis removal. CT-scan revealed a wall thickening of the distal duodenum and proximal jejunum associated with a fatty infiltration of the mesentery (Fig. 1, panel C). The bowel wall inflammation was responsible for duodenojejunal stenosis, as confirmed by barium swallow (Fig. 1, panel D), and managed with venting gastrostomy and feeding jejunostomy. Bowel biopsies revealed non-necrotizing epithelioid and giant cell granuloma, but specific mycobacterial culture and PCR remained negative.

During the ICU stay, and in spite of the antimicrobial therapy, the patient presented with a rapidly progressive pulmonary fibrosis (Fig. 1, panel E). A surgical lung biopsy revealed diffuse alveolar damage with pneumonia and diffuse epithelioid and giant cell granulomas without caseation. Bronchoalveolar fluid culture was positive for *M. bovis*. Corticosteroid therapy

was initiated at 1 mg/kg/day, followed by a gradual decline over several months. Despite a slight improvement of the respiratory condition, chronic respiratory failure requiring long-term oxygen therapy developed.

The patient thus presented with a disseminated *M. bovis* infection with shoulder PJI and pulmonary diffuse infection of duodenojejunal origin as the patient's interview later revealed frequent unpasteurized milk consumption. The treatment consisted of a two-month course of INH (300 mg/d), RMP (900 mg/d), EMB (1000 mg/d), and LVX (500 mg/d) regimen after prosthesis removal, followed by LVX and INH. One year later, physical examination did not reveal any remaining sign of infection. A PET-scan showed no metabolic activity. As the corticosteroid therapy was still ongoing and rifampin could not be used because of drug interactions, it was decided to prolong the treatment for six additional months. Unfortunately, the patient suddenly died a few weeks later from cardiac arrest possibly due to her chronic respiratory failure.

3. Discussion

M. bovis BJI is a rare clinical condition. Out of 7936 tuberculosis cases reported over a 17-year period in Denmark, 282

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