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Bilateral Prosthetic Knee Joint Infection Caused by *Brucella melitensis*: A Rare Case Report from Iran

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Abstract

Introduction: *Brucella* prosthetic joint infection is a rare condition. We report a case of bilateral prosthetic knee joint infection caused by *Brucella melitensis*, which was cured by prolonged antibiotic therapy without implant removal.
Case Presentation: A 62-year-old woman was admitted to the Labbafinejad Hospital (Tehran, Iran), complaining of pain and swelling in her knee joints from two months ago. She was also suffering from intermittent fever and night sweats. She underwent bilateral total knee arthroplasty five years ago because of a severe degenerative joint disease. Agglutination tests (wright and 2-mercaptoethanol (2-ME)) were positive. Her knee joint fluid and blood cultures yielded *B. melitensis*. The polymerase chain reaction result from her knee joint fluid was positive for *Brucella* spp. The patient was cured after combination therapy with doxycycline, rifampin, and gentamicin. The prosthesis was retained due to the lack of loosening in radiography. Ten months after the treatment, the patient had no symptoms and could walk with no pain.
Conclusions: Clinicians should consider brucellosis in the differential diagnosis of prosthetic joint infection in the endemic regions. They should also be aware that if patients have no sign of implant loosening, they can achieve favorable outcomes only by using antibiotics and with no need for implant removal.

Keywords: *Brucella melitensis*, Brucellosis, Prosthesis-Related Infections, Iran

1. Introduction

Brucellosis is a zoonotic disease caused by *Brucella* species. It is mainly transmitted to humans by consuming unpasteurized dairy products or contact with livestock (1, 2). Brucellosis is endemic in Latin America, Africa, and the Middle East, including Iran (3-6). Brucellosis is a systemic infection mainly presenting with fever, chills, back pain, night sweats, weight loss, fatigue, anorexia, and arthralgia (7). The osteoarticular disease is the most common complication of brucellosis, accounting for 2 - 77% of cases. Spondylitis, sacroiliitis, osteomyelitis, and peripheral arthritis are the most frequently reported forms of osteoarticular involvement (8). Total knee arthroplasty, a common orthopedic procedure, may be followed by infection with gram-positive pathogens such as staphylococci and streptococci (9). Prosthetic joint infection is a serious complication of total joint arthroplasty, rarely caused by *Brucella* spp (10). In this paper, we report a case of bilateral knee prosthesis infection caused by *Brucella* spp.

2. Case Presentation

A 62-year-old woman was admitted to the Labbafinejad Hospital (Tehran, Iran), complaining of pain and swelling in her knee joints from two months ago. The patient's symptoms emerged gradually and progressed over time. She was also suffering from intermittent fever and night sweats. She underwent bilateral total knee arthroplasty five years ago because of a severe degenerative joint disease. The patient received no medication before being referred to us. She had also consumed unpasteurized dairy products. The patient was living in an urban area of Hamedan province, and she was a teacher and had no contact with livestock. Moreover, none of the patient's family members or relatives had a similar medical history.

On admission, her body temperature was 38.5°C, pulse rate was 96 beats/minute, respiratory rate was 16 beats/minute, and blood pressure was 125/75 mmHg. In physical examination, both knees were swollen, and the movements were limited. The other physical examination

was normal. The white blood cell (WBC) count was 5700 cells/mm^3 with 62% neutrophil, the erythrocyte sedimentation rate (ESR) was 90 mm/hour, and the C-reactive protein (CRP) level was 54 mg/L. The following standard tube agglutination tests were positive: the wright test with a dilution of 1/160 and the 2-ME test with a dilution of 1/80. On the fourth day of hospitalization, her knee joint fluid and blood cultures yielded *Brucella melitensis*. The polymerase chain reaction (PCR) results from her knee joint fluid was positive for *Brucella* spp.

Initially, the patient was treated with vancomycin (1 gr every 12 hours) and imipenem (500 mg every 6 hours). However, following the diagnosis of *Brucella* prosthesis joint infection, vancomycin and imipenem were replaced with doxycycline (100 mg every 12 hours), rifampin (300 mg every 8 hours), and gentamicin (240 mg daily). Furthermore, due to the lack of prosthesis loosening in radiography, the prosthesis was retained. All cultures of joint aspirations were negative after the antibiotic treatment. Fever, swelling, and joint effusion were also resolved. Regarding the dramatic clinical response, after four weeks, gentamicin was discontinued, and doxycycline and rifampin were administered for six months. At follow-up with a ten-month interval, the patient had no symptoms and could walk with no pain.

3. Discussion

We reported the first case of bilateral prosthetic knee joint infection caused by *Brucella* spp., cured with an antibiotic regimen without implant removal. Moreover, the pathogen of the described patient was documented by blood culture, synovial fluid culture and PCR, and serology. *Brucella* prosthetic joint infection is an extremely rare condition. Blood culture (or tissue culture) is the gold standard for definitive diagnosis (8, 10). The sensitivity of the conventional culture ranges from 10 to 90% and usually requires a long incubation period (11).

In contrast, automated culture systems have increased the recovery rates of *Brucella* spp. and shortened the incubation period to three days (12). Although *Brucella* prosthetic joint infection is extremely rare, it should consider in endemic areas. Because of the rare occurrence of *Brucella* prosthetic joint infection, its proper management is challenging. Antibiotic treatment in these cases is inevitable; however, there is no consensus on the removal or retention of prosthetic components. Nevertheless, in the absence of evidence indicating implant loosening, the retention of prosthesis and antibiotic therapy may be suitable option (13).

In previous reports, most cases had implant loosening; hence, the prosthesis was removed to be treated successfully (13-15). These case reports were in contrast with the case we reported in this study. Tassinari et al. described a case of *Brucella* prosthetic knee infection with no evidence of implant loosening. The patient was treated only with antibiotic therapy (doxycycline and rifampin) for eight weeks (16). Likewise, Lewis et al. reported a case of prosthetic knee infection with confirmed *B. melitensis*, who returned to the United Kingdom from Thailand. The authors managed the patient with the administration of doxycycline and rifampin (for six months) along with parenteral gentamicin (for the first 14 days), and the implant component was preserved (17). The last two cases were in line with the case reported in this study. The limitation of this case report was that no information was available on the disease relapse.

3.1. Conclusions

We reported the first case of bilateral prosthetic knee joint infection caused by *Brucella* spp., successfully managed with prolonged antibiotic therapy and no implant removal. Clinicians should consider brucellosis in the differential diagnosis of prosthetic joint infection in the endemic regions. They should also be aware that if patients have no sign of implant loosening, they can achieve favorable outcomes only by using antibiotics and with no need for implant removal.

Footnotes

Authors' Contribution: S.T and S.S were the physicians of the patient. P.S., A. Y., and S. T. wrote the first draft. A.K. and S. T., and S. S. revised the manuscript critically.

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