Isolated *Lactobacillus* Chronic Prosthetic Knee Infection

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**abstract**

*Lactobacillus* is a gram-positive rod bacteria found primarily in the gastrointestinal and female genital tracts. Prosthetic infections in implants are being increasingly reported.

The authors present a case of a 58-year-old patient with *Lactobacillus* septic prosthetic knee joint infection. To the authors’ knowledge, this is the first reported case of chronic prosthetic knee infection with isolated *Lactobacillus* species. *Lactobacillus* has been most commonly implicated with bacteremia and endocarditis and rarely with pneumonia, meningitis, and endovascular infection, and a vast majority of the cases are reported in immunocompromised patients. In the current case, diabetes mellitus, hepatitis, malnutrition, anemia, and liver failure were comorbid conditions, placing the patient at increased risk of infection. The findings suggest that further case series are necessary to establish the significance of *Lactobacillus* as an etiologic agent in chronic low-virulence, and potentially vancomycin-resistant, prosthetic joint infection. The need also exists for further research aimed at the risk of prosthetic joint infection with oral intake of certain probiotic foods and supplements. The goal of this case report is to bring to light the potential of this organism to be a cause of subtle chronic prosthetic joint infection.

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The authors have no relevant financial relationships to disclose.

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Received: June 29, 2013; Accepted: August 20, 2013; Posted: January 15, 2014.

**doi:** 10.3928/01477447-20131219-22

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Figure: Lateral radiograph on initial presentation showing a stemmed, nonlinked, constrained total knee arthroplasty with evidence of lucency under the tibial and femoral components and an effusion concerning for chronic infection.
**Case Report**

A 58-year-old African American man with a history significant for diabetes mellitus, hepatitis C, end-stage liver disease, portal hypertension, encephalopathy, chronic renal insufficiency, malnutrition, chronic anemia, atrial fibrillation, and hypertension presented to the authors’ clinic with chronic pain and effusions 2 years after a right total knee arthroplasty (TKA). He had sustained a fracture of his tibial plateau approximately 5 years prior to presentation in 2007, which was treated with open reduction and internal fixation (Figure 1). He had unremitting pain, and after his fracture had healed, he underwent hardware removal and arthroscopic partial meniscectomy. He continued to have pain and worsening of his posttraumatic arthritis and underwent right TKA by an outside orthopedic surgeon. In 2013, while he was undergoing a second round of triple therapy for hepatitis with interferon, ribavirin, and telaprevir, the patient reported a sudden worsening of his right knee pain. He had no open wounds on that leg but experienced occasional chills for a few months prior to diagnosis of *Lactobacillus* prosthetic joint infection.

On presentation to the clinic, he continued to have worsening diffuse pain throughout his right knee and significant instability. He was taking no antibiotics. He was referred for a serum erythrocyte sedimentation rate and C-reactive protein, which he did not obtain. One year later, he returned to clinic with constant pain, worsening of his swelling, and an erythematous swollen knee. He had been wearing a brace, which had not helped. His knee had a boggy fullness consistent with synovitis. Aspiration yielded minimal purulent fluid and a white blood cell count of 226,629 cells per high-power field with 90% segmented polymorphonuclear cells. His erythrocyte sedimentation rate was 113 mm/hr, C-reactive protein was 68.9 mg/L, and white blood cell count was 7.7 mm³. He was afebrile. Serology for human immunodeficiency virus was negative. Right knee radiographs demonstrated a stemmed, nonlinked, constrained, cemented TKA with evidence of loosening but no fracture or excessive polyethylene wear. There were apparent areas of osteolysis under the tibia. He also had a left TKA that showed no signs of loosening or wear (Figure 2).

The decision was made to proceed with staged revision TKA. The first stage was scheduled to take place several days later. After appropriate cardiac, hepatic, and medical workup, optimization, and clearance, he underwent irrigation and debridement with a complete synovectomy and removal of both components of his right TKA and subsequent placement of an articulating antibiotic spacer. Intraoperatively, diffuse hypertrophic synovitis, infectious-type drainage and fluid, and lysis of the proximal tibia and distal femur were found. All hardware was removed. A thorough irrigation and debridement was performed. Cultures were sent from the synovial tissues and the joint fluid. An articulating spacer was placed with reasonable stability. A Vanguard right femoral component (Biomet Orthopedics, Warsaw, Indiana) size 75 with a 16-mm anterior-stabilized polyethylene insert was implanted. Three batches of cobalt blue high-viscosity bone cement were mixed with 3 g of vancomycin, 1.2 g of gentamicin, and 4.5 mg of cefuroxime for local antibiotic delivery.

Postoperatively, intravenous (IV) vancomycin and cefazolin were started prophylactically, pending final culture results, and the infectious disease team was consulted for further recommendations. Type 2 diabetes mellitus remained controlled with metformin, with a hemoglobin A1c of 5.4 mmol/mol. Laboratory values were as follows: white blood cell count, 13.5 mm³; glucose, 170 mg/dL; total bilirubin, 2.8 mg/dL; alkaline phosphatase, 288 mg/µL; aspartate aminotransferase, 111 mg/µL; alanine aminotransferase, 35 mg/µL. By postoperative day 3, the erythrocyte sedimentation rate was...
130 mm/hr and C-reactive protein was 4 mg/L. Blood cultures remained negative, and urine analysis was negative for evidence of infection. Human immunodeficiency virus types 1 and 2 antibody screen was negative. Nasal methicillin-resistant *Staphylococcus aureus* swab was negative.

The patient remained afebrile throughout the hospital stay. A peripherally inserted central catheter was placed in anticipation of an extended postoperative IV antibiotic regimen. Cultures from synovial tissues and joint fluid showed 2+ gram-positive rods and 1+ white blood cell count on gram stain, and cultures grew lactobacilli from multiple samples. The infectious disease team recommended changing the antibiotics to 600 mg of IV clindamycin every 8 hours and 24 U of penicillin G continuous infusion (with recommendations to adjust according to renal function). The recommended duration of therapy was a minimum of 8 weeks for IV antibiotics with transition to oral therapy in the infectious disease clinic. Plans were made to monitor the patient’s complete blood count/comprehensive metabolic panel and C-reactive protein/erythrocyte sedimentation rate at least weekly as an outpatient. *Lactobacillus* was susceptible to clindamycin, erythromycin, gentamicin, penicillin G, and vancomycin. The patient was discharged in good condition to home health care (Figure 3).

**Discussion**

To the authors’ knowledge, this is the first reported case of chronic prosthetic knee infection with isolated *Lactobacillus* species. *Lactobacillus* is a gram-positive rod bacteria. The *Lactobacillus* genus is composed of 2 groups.1 *Lactobacillus rhamnosus* is the most frequent species isolated from humans. *Lactobacillus acidophilus* is less commonly implicated as a human pathogen and is often commercially available as an over-the-counter probiotic supplement.2,4 *Lactobacillus* is considered a healthy part of the normal flora in the female genital tract and the gastrointestinal tract. *Lactobacillus* has been implicated as a cause of bacteremia, endocarditis, pneumonia, meningitis, and endovascular infections.5 Immunocompromised patients constitute a majority of the patients with *Lactobacillus* infections. It has been reported that patients with *Lactobacillus* bacteremia often have signs of septic arthritis, but microbacteriologic studies are almost always initially negative.1,6 *Lactobacillus* bacteremia typically arises from localized suppuration from native flora from the gastrointestinal tract, oral cavity, and genitourinary tract.1,6 *Lactobacillus* is considered a somewhat avirulent pathogen. *Lactobacillus* species are identified by the whole cell-protein pattern obtained by sodium dodecyl sulfate-polyacrylamide gel electrophoresis and molecular techniques.3 Lactobacilli are usually susceptible to penicillin G, ampicillin, imipenem, erythromycin, clindamycin, tetracycline, and chloramphenicol. The third-generation cephalosporins vary in their effectiveness against the isolates. Susceptibility to aminoglycosides depends on the *Lactobacillus* species, and high levels of resistance to gentamicin, kanamycin, tobramycin, and netilmicin have been reported.7

In 2013, Przemyslaw et al3 isolated *Lactobacillus* as part of a polymicrobial total hip arthroplasty infection in 1 of 16 patients, concluding that the lack of clinical signs of infection and negative culture of preoperative joint aspiration and intraoperative specimens do not exclude the presence of bacteria on the implants in cases of aseptic loosening of prostheses. One of 11 patients with an early prosthetic knee infection had *Lactobacillus*, but this was part of polymicrobial infection with *Enterococcus fecalis*. This patient was treated with polyethylene exchange and an ampicillin-ceftriaxone combination and was infection free at 26 months. In 2006, Marculescu et al4 reported only 1 case of *Lactobacillus* prosthetic joint infection among 99 cases (91 patients), but it was unclear whether the patient had received antibiotics prior to the isolation of *Lactobacillus*. That study cited *Lactobacillus* as 1 of 9 cases resistant to long-term suppressive antibiotics necessitating discontinuation.

**Conclusion**

Studies are necessary to establish the significance of *Lactobacillus* as a potentially silent etiologic agent of chronic prosthetic joint infection. Because infections due to *Lactobacillus* are becoming increasingly common in both immunocompetent and immunocompromised patients, prosthetic joint infection should be added to the classically recognized *Lactobacillus*-related infections.
REFERENCES