CASE REPORT
A confusing case – Weissella confusa prosthetic joint infection: A case report and review of the literature

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The authors describe the first case of Weissella confusa infection of a prosthetic joint. Identification of the pathogen required 16S ribosomal RNA sequencing of isolates obtained in two separate occasions during the assessment of an elderly woman with a painful, swollen knee following total knee arthroplasty. A review of reported human infections due to W confusa are summarized, and risk factors and pitfalls in the application of empirical antimicrobial therapy pending definitive microbiological identification are discussed.

Key Words: Prosthetic joint infection; Vancomycin resistance; Weissella confusa

CASE PRESENTATION
A 94-year-old woman was referred to the general internal medicine service for functional decline secondary to longstanding knee pain. Her medical history included osteoarthritis and her surgical history was significant for a right total knee arthroplasty in 1996. On examination, her vital signs were normal; she was afebrile, but her right knee was red, warm and swollen. A joint effusion was believed to be present. Orthopedic surgery was consulted to help determine whether a prosthetic joint infection was present. Her initial blood work showed an erythrocyte sedimentation rate of 54 mm/h (normal 0 mm/h to 27 mm/h), a C-reactive protein level 52.6 mg/L (normal 0 mg/L to 1 mg/L) and a white blood cell count of 6.2 x 109/L to 10.5 x 109/L. A plain radiograph of the knee demonstrated loosening of the tibial component, with a large joint effusion believed to show metallosis – a deposition of metallic debris in the periprosthetic soft tissues from abrasion of metallic components (1). An aspirate of the knee revealed calcium pyrophosphate crystals, with a total nucleated cell count of 11.3 x 109/L and differential of 97% neutrophils. She was subsequently discharged to a nursing home with tenderness. Orthopedics was once again consulted to evaluate the knee showed a marked increase in swelling with persistent pain and tenderness. Orthopedics was once again consulted to evaluate the knee. Infectious diseases was subsequently consulted to comment on the significance of the Lactobacillus species based on the following results: unidentifiable profile on RapID™ ANA II panel (Oxoid Canada), catalase-negative, PYR-negative, LAP-negative and vancomycin resistance.

She presented six weeks later with Escherichia coli bacteremia arising from an acute urinary tract infection. A reassessment of the right knee showed a marked increase in swelling with persistent pain and tenderness. Orthopedics was once again consulted to evaluate the knee. Infectious diseases was subsequently consulted to comment on the significance of the Lactobacillus species that had grown on culture from the previous admission. A second aspirate was requested and grew the same organism, which was identified as a Lactobacillus species. Of note, there were no calcium pyrophosphate crystals apparent in this aspirate and the total nucleated cell count and differential were 3.1 x 109/L and 96% neutrophils, respectively. The isolate was sent to the Ontario Public Health Laboratory (Toronto, Ontario) for identification using 16S ribosomal RNA sequencing (2).

DIAGNOSIS
16S ribosomal RNA sequencing revealed that the organisms from both knee aspirate cultures were identical and were subsequently identified as Weissella confusa. Susceptibility testing of the organism from both isolates was performed using the agar dilution method and minimum inhibitory concentrations for various antibiotics are summarized in Table 1.

| Antibiotic               | Minimum inhibitory concentration, mg/mL |
|--------------------------|------------------------------------------|
| Amoxicillin              | 0.5                                      |
| Chloramphenicol          | 8                                         |
| Ciprofloxacin            | =1                                        |
| Clindamycin              | =0.5                                     |
| Daptomycin               | =0.5                                     |
| Erythromycin             | =0.25                                    |
| Gentamicin               | =2                                        |
| Levofloxacin             | 2                                         |
| Vancomycin               | Resistant                                |
| Linezolid                | 4                                         |
| Mosfloxacin              | 0.5                                      |
| Penicillin               | 0.5                                      |
| Tetracycline             | 8                                         |
| Trimethoprim/sulfamethoxazole | =4    |

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TABLE 1
Antimicrobial susceptibilities of two Weissella confusa isolates according to the agar dilution method

L’infection d’une prothèse articulaire par le Weissella confusa : rapport de cas et analyse bibliographique

Les auteurs décrivent le premier cas d’infection d’une prothèse articulaire par le Weissella confusa. Il a fallu sequencer l’ARN ribosomalique 16S des isolats à deux moments distincts de l’évaluation d’une femme âgée dont le genou était enflé et douloureux après une arthroplastie totale du genou. Les auteurs résument l’analyse des infections causées par le W confusa chez les humains et traitent des facteurs de risque et des écueils dans l’instauration d’une thérapie antimicrobienne empirique en attendant de confirmer l’agent microbiologique en cause.

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Similarly, gastrointestinal manipulation via endoscopy or surgery for immunocompromised states, which consisted of chronic lymphocytic leukemia, respectively. Other case reports have included risk factors for invasive infection in patients with hepatocellular carcinoma post-liver transplantation by Harlan et al (8) and Salimnia et al (12), who identified infections within three months of infection (8-11).

What was unique to our case was the lack of predisposing factors in our patient. While the patient did have evidence of a concomitant E. coli bacteremia, she was already treated with a one-week course of levofloxacin. She received a one-week course of levofloxacin for her E. coli bacteremia, which unfortunately, provided minimal clinical benefit to her prosthesis. She was discharged from hospital and returned to her home within stable condition. Given her premorbid state and nonambulatory status, it was decided in discussion with the patient and her family to not pursue further medical or surgical therapy for her prosthetic joint infection.

**Discussion**

Weissella was first described as a new genus in 1993 and was named after Norbert Weiss, a German microbiologist known for his contributions to lactic acid bacteriology. It is identified using 16S ribosomal RNA sequencing to differentiate it from other organisms such as Lactococcus and other members of the family Leuconostocaceae. 

**Table 2**

| Author (reference), year | Clinical infection | Predisposing factors | Outcome |
|-------------------------|-------------------|----------------------|---------|
| Salminia et al (12), 2011 | Bacteremia (2) | ALL/ASCT (1); severe burns (1); central catheter (1) | Survived (2) |
| Harlan et al (8), 2011 | Bacteremia (1) | HCC/liver transplant (1) | Survived (1) |
| Lee et al (10), 2011 | Bacteremia (10) | Malignancy (4); CT (3); chronic steroid use (3); abdominal surgery (4); concomitant polymicrobial infection (5); central catheter (6) | Survived (4); death (6) |
| Kumar et al (9), 2011 | Bacteremia (1) | Gastroesophageal adenocarcinoma (1), CT (1), endoscopy (1) | Survived (1) |
| Kulwichit et al (13) | Osteomyelitis (1) | Unknown | Survived (1) |
| Shin et al (5), 2007 | Endocarditis (1) | None | Survived (1) |
| Flaherty et al (7), 2003 | Endocarditis (1) | Chronic alcoholism (1), previous steroid use (1) | Death (1) |
| Olano et al (11), 2001 | Bacteremia (1) | Abdominal surgery (1), polymicrobial infection (1) | Survived (1) |
| Bantar et al (6), 1991 | Thumb abscess (1) | None | Survived (1) |

**Table 2** Summary of previously documented Weissella confusa infections

ALL Acute lymphocytic leukemia; ASCT Autologous stem cell transplant; CT Chemotherapy; HCC Hepatocellular carcinoma

**References**

1. Romesburg JW, Wasserman PL, Schoppe CH. Metallosis and metal-induced synovitis following total knee arthroplasty: Review of radiographic and CT findings. J Radiol Case Rep 2010;4:7-17.
2. Knox CM, Cevellos V, Dean D. 16S ribosomal DNA typing for identification of pathogens in patients with bacterial keratitis. J Clin Microbiol 1993;35:595-603.
3. Collins MD, Samelis J, Metaxopoulos J, Wallbanks S. Taxonomic studies on some leuconostoc-like organisms from fermented sausages: Description of a new genus Weissella for the Leuconostoc paramesenteroides group of species. J Appl Bacteriol 1993;75:595-603.
4. Fusco V, Quero GM, Stea G, Morea M, Visconti A. Novel PCR-based identification of Weissella confusa using an AFLP-derived marker. Int J Food Microbiol 2011;145:437-43.
5. Shin JH, Kim DI, Kim HR, Kim DS, Kook JK, Lee JN. Severe infective endocarditis of native valves caused by Weissella confusa detected incidentally on echocardiography. J Infect 2007;54:e149-51.
6. Bantar CE, Relloso S, Castell FR, Smayevsky J, Bianchini HM. Abscess caused by vancomycin-resistant Lactobacillus confusus. J Clin Microbiol 1991;29:2063-4.

**Conclusion**

W. confusa is a rare, but well documented, cause of invasive infection in humans. Microbiological identification of W. confusa is best made using 16S ribosomal RNA sequencing. W. confusa infection can be treated with a variety of antimicrobials such as penicillins and fluoroquinolones; however, it exhibits intrinsic resistance to vancomycin.
7. Flaherty JD, Levett PN, Dewhirst FE, Troe TE, Warren JR, Johnson S. Fatal case of endocarditis due to Weissella confusa. J Clin Microbiol 2003;41:2237-9.
8. Harlan NP, Kempler RR, Parekh SM, Burd EM, Kuhar DT. Weissella confusa bacteremia in a liver transplant patient with hepatic artery thrombosis. Transpl Infect Dis 2011;13:290-3.
9. Kumar A, Augustine D, Sudhindran S, et al. Weissella confusa: A rare cause of vancomycin-resistant Gram-positive bacteremia. J Med Microbiol 2011;60(Pt 10):1539-41.
10. Lee MR, Huang YT, Liao CH, Lai CC, Lee PI, Hsueh PR. Bacteraemia caused by Weissella confusa at a university hospital in Taiwan, 1997-2007. Clin Microbiol Infect 2011;17:1226-31.
11. Olano A, Chua J, Schroeder S, Minari A, La Salvia M, Hall G. Weissella confusa (basonym: Lactobacillus confusus) bacteremia: A case report. J Clin Microbiol 2001;39:1604-7.
12. Salimnia H, Alangaden GJ, Bharadwaj R, Painter TM, Chandrasekar PH, Fairfax MR. Weissella confusa: An unexpected cause of vancomycin-resistant Gram-positive bacteremia in immunocompromised hosts. Transpl Infect Dis 2011;13:294-8.
13. Kulwichit W, Nilgate S, Chatsawon T, Krajew S, Unhasuta C, Chongthalelong A. Accuracies of Leuconostoc phenotypic identification: A comparison of API systems and conventional phenotypic assays. BMC Infect Dis 2007;7:69.
