CASE REPORT

**Dokdonella koreensis** bacteremia: A case report and review of the literature

Boeun Lee MD\(^1\), Mitchell R Weinstein MD\(^2\)

**CASE PRESENTATION**

A 75-year-old man with newly diagnosed acute myeloid leukemia with maturation (M2) developed a fever of 38.0°C on the fifth day of his second induction chemotherapy with cytarabine and idarubicin. Chemotherapy had been administered through a peripherally inserted central catheter (PICC) in his right brachial vein. He also reported persistent bilateral pain in his ankles and heels, accompanied by swelling and tenderness. A review of systems revealed a dry cough and a mild headache. The patient did not have any significant medical history before his diagnosis of leukemia. He developed persistent neutropenia, polymyxin-resistant Escherichia coli, and disseminated intravascular coagulation and a diffuse rash after he received the first cycle of cytarabine. The biopsy from the skin lesions was consistent with leukocytoclastic vasculitis attributed to either disseminated intravascular coagulation and a diffuse rash after he received the first cycle of cytarabine or a dermatologist, and his chemotherapy was discontinued. On day 4 of incubation, a blood culture drawn from the PICC line grew a Gram-negative rod in the aerobic bottle. Antibiotics were changed to meropenem (1 g every 8 h) and amikacin (1500 mg every 12 h) and cefepime (2 g every 8 h) for neutropenic fever. He continued to experience daily fevers, with a peak temperature of 38.9°C. He was diagnosed with palmar-plantar erythrodysesthesia due to cytarabine by a dermatologist, and his chemotherapy was discontinued. On day 4 of incubation, a blood culture drawn from the PICC line grew a Gram-negative rod in the aerobic bottle. Antibiotics were changed to meropenem (1 g every 8 h) and amikacin (1500 mg every 24 h). On day 5 of incubation, one blood culture sample drawn peripherally also reported growth of a Gram-negative rod.

A nonmotile, oxidase-positive, non-spoor-forming Gram-negative aerobic bacillus was recovered from both aerobic blood culture bottles, although the organism could not be identified in the microbiology laboratory using routine phenotypic methods. The isolate was identified by Quest Diagnostics as *Dokdonella koreensis* by sequencing the amplified 16S ribosomal RNA gene from genomic DNA (1) using the BLAST program (www.ncbi.nlm.nih.gov/BLAST). Antimicrobial susceptibility testing was performed with the Kirby-Bauer disk diffusion method. The organism was susceptible to most antimicrobials, including amikacin, gentamicin, tobramycin, piperacillin/tazobactam, cefepime and meropenem, but exhibited intermediate susceptibility to ciprofloxacin.

The PICC was exchanged through a guide wire. His fever subsided after the catheter change. Follow-up blood cultures remained sterile. The catheter tip did not grow any organisms. Meropenem was continued for 21 days. He had a prolonged recovery course with extended neutropenia and probable fungal pneumonia. He was treated with voriconazole after a brief course of liposomal amphotericin. He was ultimately discharged home.

**DISCUSSION**

*D. koreensis* is a non-sporo-forming, aerobic, non-lactose fermenting, Gram-negative rod. It was first isolated in 2006 from soil samples and is a non-spore-forming, aerobic, Gram-negative bacillus that was initially isolated from soil. The pathogenicity of this organism in humans remains unclear. The authors report a case of successfully treated *D. koreensis* bacteremia in a patient with a hematologic malignancy who presented with a fever and palmar-plantar erythrodysesthesia.

**Key Words:** Bacteremia; CRBSI; *Dokdonella koreensis*; Neutropenia; Xanthomonadaceae

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He was started empirically on intravenous vancomycin (1500 mg every 12 h) and cefepime (2 g every 8 h) for neutropenic fever. He continued to experience daily fevers, with a peak temperature of 38.9°C. He was diagnosed with palmar-plantar erythrodysesthesia due to cytarabine by a dermatologist, and his chemotherapy was discontinued. On day 4 of incubation, a blood culture drawn from the PICC line grew a Gram-negative rod in the aerobic bottle. Antibiotics were changed to meropenem (1 g every 8 h) and amikacin (1500 mg every 24 h). On day 5 of incubation, one blood culture sample drawn peripherally also reported growth of a Gram-negative rod.

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**DISCUSSION**

*D. koreensis* is a non-sporo-forming, aerobic, non-lactose fermenting, Gram-negative rod. It was first isolated in 2006 from soil samples.
collected in Dokdo, a naturally preserved island in Korea (2). The Dokdonella genus comprises six species: D koreensis (2), D fugitiva (3), D soli (4), D ginsengioli (5), D kunchanensis (6) and D immobilis (7). All strains were found in the environment, especially from soil. It belongs to the Xanthomonadaceae family with other 17 genera including Stenotrophomonas (www.bacterio.cict.fr/classifgenerafamilies.html). Sequencing of the amplified 16s ribosomal RNA gene using universal primers is needed to identify this genus. The differences in phenotypic characteristics, including high DNA G+C content, differentiate Dokdonella from other phylogenetically related genera Dyella, Fratetania, Fultimonas and Rhodanobacter (2).

Little is known about Dokdonella colonization in the hospital environment or pathogenicity in humans. To our knowledge, there has been only one previously published case of D koreensis infection in humans reported in the English-language medical literature (8). Similar to our case, the patient was immunocompromised (bone marrow transplant recipient) and had a bloodstream infection related to a centrally inserted venous catheter. The similarity of the two cases suggests that immunocompromised hosts with indwelling central catheters may be more vulnerable than other hosts to this emerging organism.

The antibiogram of this organism appears to be favourable. However, intermediate susceptibility to ciprofloxacin needs attention in our case. The patient received ciprofloxacin before infection as prophylaxis. This may imply that this organism develops drug resistance from previous antibiotic exposure, similar to other multidrug-resistant Gram-negative organisms.

In our case, it is unclear which symptoms were attributed to D koreensis bacteremia. His skin manifestations were best explained by palmar-plantar erythrodysesthesia, also known as hand-foot syndrome, which has been previously well described in patients who have received cytarabine (9). Fungal pneumonia, which was later suspected, could have complicated his febrile clinical presentation. However, it is still possible that D koreensis bacteremia was related to his skin or pulmonary manifestations. In our case, D koreensis bacteremia was assumed to be a catheter-related bloodstream infection based on clinical presentations (10); however, this was not proven because the catheter tip culture was sterile.

Our case brings to the attention of clinicians and microbiologists a previously uncommonly recognized organism. D koreensis may be a cause of bloodstream infection in severely immunocompromised hosts with central venous catheters. In addition, our case emphasizes that the use of 16S ribosomal RNA gene sequencing needs to be considered early to identify unusual organisms (11). Further studies are warranted to establish the definitive epidemiology, clinical presentation and management of D koreensis infection.

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