Ochrobactrum anthropi septic arthritis: case report and implications in orthopedic infections

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Abstract

Ochrobactrum anthropi is a rare cause of orthopedic infections. We report the second case of Ochrobactrum anthropi septic arthritis in the literature. Our case highlights the ability of Ochrobactrum anthropi to cause septic arthritis and its relevance in the field of orthopedic infections.

Introduction

Ochrobactrum anthropi (O. anthropi) is a gram negative bacillus widely distributed in the environment and rarely implicated as a human pathogen.1 This opportunistic bacterium has been reported in clinical infections in immunocompetent and immunocompromised hosts2-4 but none has addressed its relevance and treatment challenges in bone and joint infections. We report a case of successfully treated O. anthropi septic arthritis, and its implication in the orthopedic infections field.

Case Report

A 53-year old man with history of gout, alcoholism and right knee anterior and posterior cruciate ligament repair presented to a local hospital with complaints of right knee and right wrist pain. Four days prior to presentation he experienced a fall while intoxicated resulting in skin abrasion of his right knee and trauma of both his right knee and wrist. On exam, his right knee had an abrasion just over the tibial tubercle, moderate effusion, increased warmth and erythema. The right wrist evaluation revealed significant erythema and increased warmth. Laboratory findings revealed a white blood cell count of 12,800/mL, elevated C-reactive protein at 33.8 mg/dL and increased warmth. Synovial fluid culture from his knee grew Group G Beta Hemolytic Streptococci and gram negative rods later identified as O. anthropi. Synovial fluid cultures from his wrist yielded Group G Beta Hemolytic Streptococci. Blood cultures obtained 24 hours after the surgical intervention yielded negative results; however, these were obtained after the administration of antibiotics. Input from the Infectious Disease service was sought, who recommended the addition of trimethoprim-sulfamethoxazole and ceftiraxone to his antibiotic regimen. The patient underwent two more irrigation and debridements of the right wrist and one more of the right knee. The right knee fluid cultures remained negative after the first intervention. In the light of persistent positive cultures of his radiocarpal joint, his care was transferred to the University of Colorado Hospital. On presentation to our institution his temperature was 39.3. His right knee had a longitudinal incision with sutures, a moderate effusion and no evidence of discharge. His right wrist had a surgical incision with sutures and no evidence of discharge. A systolic heart murmur not mentioned on previous evaluations led to the work-up of endocarditis with negative blood cultures and transthoracic echocardiogram. Two additional right knee arthrocentesis revealed calcium pyrophosphate and monosodium urate crystals but negative gram stain and cultures.

At the referring hospital, the knee synovial fluid culture yielded gram negative, motile, oxidase positive and indole negative, Gram negative bacillus of low virulence that occasionally causes human infection. Formerly known as Center for Disease Control and Prevention (CDC) group Vd, the genus Ochrobactrum and its type species O. anthropi were described by Holmes et al. in 1988.5 The Greek word “Ochros” meaning “pale yellow” describes the appearance of its colonies on agar. Ubiquitous in soil and water, O. anthropi has also been recovered from contaminated biologic products,6 hospital environments, graft tissue,7 intravascular catheters, foreign bodies and clinical specimens including: blood, urine, stools, wounds, bile, throat and vagina.8 Since it is closely related to Brucella spp., O. anthropi misidentification can occur with some of the automated systems such as API 20NE.9 As a result, confirmation with negative serum Brucella spp. antibodies is recommended in patients with severe disease manifested primarily as O. anthropi bacteraemia with no obvious cell count of 2,250,000/MM with 90% polymorphonuclear cells and gram positive cocci present on gram stain. He was started empirically on treatment with intravenous vancomycin and levofloxacin. The patient underwent urgent irrigation and debridement of his knee with evidence of frank purulence. An intraoperative right radiocarpal arthrocentesis revealed purulent material with polymorphonuclear white cells and gram positive cocci present on gram stain. An open right radiocarpal irrigation and debridement followed the knee intervention. Synovial fluid culture from his knee grew Group G Beta Hemolytic Streptococci and gram negative rods later identified as O. anthropi. Synovial fluid cultures from his wrist yielded Group G Beta Hemolytic Streptococci. Blood cultures obtained 24 hours after the surgical intervention yielded negative results; however, these were obtained after the administration of antibiotics. Input from the Infectious Disease service was sought, who recommended the addition of trimethoprim-sulfamethoxazole and ceftiraxone to his antibiotic regimen. The patient underwent two more irrigation and debridements of the right wrist and one more of the right knee. The right knee fluid cultures remained negative after the first intervention. In the light of persistent positive cultures of his radiocarpal joint, his care was transferred to the University of Colorado Hospital. On presentation to our institution his temperature was 39.3. His right knee had a longitudinal incision with sutures, a moderate effusion and no evidence of discharge. His right wrist had a surgical incision with sutures and no evidence of discharge. A systolic heart murmur not mentioned on previous evaluations led to the work-up of endocarditis with negative blood cultures and transthoracic echocardiogram. Two additional right knee arthrocentesis revealed calcium pyrophosphate and monosodium urate crystals but negative gram stain and cultures. At the referring hospital, the knee synovial fluid culture yielded gram negative, motile, oxidase positive and indole negative, Gram negative bacillus of low virulence that occasionally causes human infection. Formerly known as Center for Disease Control and Prevention (CDC) group Vd, the genus Ochrobactrum and its type species O. anthropi were described by Holmes et al. in 1988.5 The Greek word “Ochros” meaning “pale yellow” describes the appearance of its colonies on agar. Ubiquitous in soil and water, O. anthropi has also been recovered from contaminated biologic products,6 hospital environments, graft tissue,7 intravascular catheters, foreign bodies and clinical specimens including: blood, urine, stools, wounds, bile, throat and vagina.8 Since it is closely related to Brucella spp., O. anthropi misidentification can occur with some of the automated systems such as API 20NE.9 As a result, confirmation with negative serum Brucella spp. antibodies is recommended in patients with severe disease manifested primarily as O. anthropi bacteraemia with no obvious

Discussion

O. anthropi is a non-fermentative, strictly aerobic, motile, oxidase positive and indole negative, Gram negative bacillus of low virulence that occasionally causes human infection. Formerly known as Center for Disease Control and Prevention (CDC) group Vd, the genus Ochrobactrum and its type species O. anthropi were described by Holmes et al. in 1988.5 The Greek word “Ochros” meaning “pale yellow” describes the appearance of its colonies on agar. Ubiquitous in soil and water, O. anthropi has also been recovered from contaminated biologic products,6 hospital environments, graft tissue,7 intravascular catheters, foreign bodies and clinical specimens including: blood, urine, stools, wounds, bile, throat and vagina.8 Since it is closely related to Brucella spp., O. anthropi misidentification can occur with some of the automated systems such as API 20NE.9 As a result, confirmation with negative serum Brucella spp. antibodies is recommended in patients with severe disease manifested primarily as O. anthropi bacteraemia with no obvious
focus of infection and refractory to standard treatment. The first case of human infection with *O. anthropi* was described in 1980 in a debilitated patient with a pancreatic abscess.7 Since then, *O. anthropi* has been infrequently reported as a cause of human infection, mostly associated with nosocomial acquisition, indwelling catheters, retained foreign bodies and hosts with impaired immune function.4 Predisposing conditions for infection by this organism include the presence of indwelling medical devices, previous antibiotic therapy, a prior surgical procedure with allografts, traumatic wounds, coinfection with another bacterium, and impaired host immunity.2 Published reports suggest that *O. anthropi* is an emerging pathogen in immunocompetent patients and orthopedic infections caused by this organism may be increasing in frequency. To date, one case of septic arthritis and 2 cases of osteomyelitis have been reported in the medical literature (Table 1). A Medline search of the terms *Ochrobactrum anthropi*, CDC group Vd, arthritis and osteomyelitis from 1950 to the present yielded 4 citations. A review of these 4 cases plus our own indicates that this pathogen is acquired either through direct inoculation from the environment8,10 or through hematogenous dissemination.11,12

To the best of our knowledge, this is the second reported case of septic arthritis due to *O. anthropi*. In the case presented here, the presumed source of infection is a traumatic wound which served as a port of entry for both *O. anthropi* and Group G Beta Hemolytic *Streptococci*. The presence of associated bacteremia is unknown since blood cultures were obtained after the administration of antimicrobial therapy. It is interesting that only the knee fluid culture grew both Group G Beta Hemolytic *Streptococci* and *O. anthropi*, whereas the wrist fluid culture grew only the former organism. We consider posttraumatic right knee septic arthritis as his primary diagnosis presumably associated with *Streptococci* bacteremia that seeded his right wrist. Since *O. anthropi* is described as a bacterium with low virulence and low pathogenicity,1 it may have caused only localized infection to the right knee joint.

A particular characteristic of this organism is the ability to adhere to foreign bodies. This was first evaluated by Alnor et al.1 who noted that patients with *O. anthropi* bacteremia did not recover until their catheters had been removed. They found *in vitro* that the binding ability of *O. anthropi* to silicone tubes was similar to that of *Staphylococcus aureus* and *Staphylococcus epidermidis*:3 This is relevant for hardware associated orthopedic infections where organisms with the ability to adhere to foreign bodies by the formation of biofilm are much more difficult to cure without radical debridement of the tissue, including hardware removal. Fortunately, the patient in this case had three previous interventions in the affected knee joint with no placement of foreign material. Treatment options for *O. anthropi* are limited. This bacterium is inherently resistant to all beta-lactams (penicillins, cephalosporins and aztreonam) except imipenem which is consistent with the expression of an inducible AmpC β-lactamase.13 A study performed to Teyssier et al.14 performed *in vitro* antibiotic susceptibility testing of 21 strains of *O. anthropi*. They observed general susceptibility of the strains to gentamicin, tobramycin, rifampin, fluoroquinolones, netilmicin, colistin and trimethoprim-sulfamethoxazole.15 Nonetheless, clinical failures with imipenem16 and ciprofloxacin17 therapy despite *in vitro* susceptibility have been reported. In summary, we have presented a case of *O. anthropi* septic arthritis in an adult. To the best of our knowledge, this is the second such report. Our case highlights the ability of *O. anthropi* to cause septic arthritis and its relevance in the field of orthopedic infections. Treatment options are limited and selection of the proper agent is critical.

### References