Septic arthritis due to Kingella kingae in an adult patient

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Abstract

Kingella kingae, a Gram negative bacillus normally found in the oropharynx of infants, is a well recognised cause of invasive bone and joint infections in paediatric patients. Osteoarticular infections due to K. kingae in adults are much less common. We report an interesting case of K. kingae septic arthritis of the ankle in a 68 year old woman with rheumatoid arthritis, followed by a brief literature review.

Key words: Kingella kingae, septic arthritis, ankle


Introduction

Kingella kingae, a short Gram negative bacillus, is best known for being a constituent of the HACEK group of organisms; i.e. Aggregatibacter (formerly the aphrophilus group of Haemophilus and Actinobacillus), Cardiobacterium, Eikenella, and Kingella spp (1). It is part of the normal pharyngeal flora in children, and is well recognised as a cause of invasive bone and joint infections in this age group (2). However infections due to K. kingae in adult patients are much less common and the patients usually have a degree of immunocompromise. We report here an unusual case of ankle septic arthritis due to K. kingae in an adult patient.

Case Report

A 68 year old woman, with a 40 year history of rheumatoid arthritis, was admitted with a 2 day history of acute on chronic worsening of pain and swelling in her right ankle. Having undergone left total hip and bilateral knee joint replacements, she was awaiting a right ankle replacement. At presentation she was taking azathioeprine, prednisone and celecoxib for her rheumatoid arthritis.

On examination she was febrile with a warm, swollen, erythematous right ankle, with pain on movement and tenderness over the medial and lateral malleoli. Blood tests showed a normal leucocyte count but raised inflammatory markers (CRP: 161mg/L, ESR: 72 mm/hr). X-rays confirmed arthritic changes in the ankle and foot.

Aspiration of the ankle recovered 1.5ml of turbid fluid. A formal white cell count was not performed. A Gram stain demonstrated large numbers of white cells, which were predominantly neutrophils, but no organisms were visualised. The sample was of insufficient volume for biochemistry analysis. The aspirate was inoculated on to blood and chocolate agar (CO2 incubation at 37°C) of insufficent volume for biochemistry analysis. The aspirate was inoculated on to blood and chocolate agar (CO2 incubation at 37°C) and Fastidious Anaerobe Agar (anaerobic incubation at 37°C). There was insufficient aspirate to inoculate a blood culture bottle. After 48 hours incubation, small colonies were visualised on both the chocolate and blood agar plates. Gram stain of these colonies revealed a short, plump Gram negative bacillus. The colonies were slightly haemolytic with a strong positive oxidase reaction. Catalase testing was negative. Biochemical profile testing (Rapid NH, Remel) confirmed the identification of K. kingae (code 1120, 99.9% probability). The isolate was susceptible to penicillin with an MIC of 0.16mg/L. Peripheral blood cultures yielded no growth after 5 days incubation.

Empirical treatment with fluoxacillin (2g 6-hourly) and benzyl penicillin (1.2g 6-hourly) was rationalised to benzyl penicillin alone 1.2g 4-hourly. The patient improved rapidly on the antimicrobial therapy alone and washout of the joint was not undertaken. She was discharged to the community where she received a benzyl penicillin infusion of 8g over 24 hours via PICC line for 6 weeks. She continued to make an uneventful recovery and has subsequently gone on to have an arthrodesis of her ankle, which was preferred to replacement following the infection.

Discussion

Kingella kingae was originally placed under the Moraxella genus and named Moraxella kingii after Elizabeth O King of the US Centers for Disease Control(CDC) who isolated the bacterium in 1960 (3). It was later transferred to its own genus and renamed Kingella kingae in 1976 (4). K. kingae are facultative anaerobic Gram negative rods which lie together in small clusters and decolourise unevenly on Gram stain. Small colonies are seen after 48 hours and usually have a small zone of beta haemolysis on blood agar. They are oxidase positive.

K. kingae has been shown to be a commensal of the oropharyngeal tract in early childhood. Previously considered a rare cause of human infection, it is now recognised as an important cause of invasive infection in paediatric patients, predominantly under the age of 2 years (2). Infections have most commonly been reported in the bones and joints of children. K. kingae constitutes one of the HACEK group of organisms which are collectively responsible for 3-5% of cases of bacterial endocarditis (2). They are also known to cause lower-respiratory tract infections, meningitis, oculocutaneous and stomatitis. According to the literature, almost 90% of patients with invasive Kingella kingae infections are under the age of 5 years, with 60% of episodes occurring in the under 2 year age group (5). Based on studies on children in day-care centres it is thought Kingella kingae is transmitted from child to child via saliva particles (6). In contrast to the healthy children acquiring Kingella kingae infections, adults frequently have pre-disposing factors such as rheumatoid arthritis, Felty's syndrome, liver cirrhosis, systemic lupus erythematosus, renal disease, sickle cell anaemia, malignancies and HIV(2,7-9). The fact that relatively few invasive K. kingae infections occur in immunocompetent adults indicates that protection from colonisation and infection requires an acquired immune response (2).

Few previous cases of adult joint sepsis caused by K. kingae have been reported in the literature. Of these few, most involve the knee and one case involved a septic elbow (7, 10-13). As far as we are aware, this is the first reported case of adult septic arthritis caused by K. kingae, occurring in an ankle joint.

The subtle clinical manifestations of K. kingae have been noted previously with patients often presenting only with mild malaise and no or minimal fevers (2,7). K. kingae infections predominantly affect the large weight bearing joints such as hips, knees and ankles (2). Patients with osteo-articular infections due to K. kingae often have blood leucocyte counts, c-reactive proteins and erythrocyte sedimentation rates that are within normal limits or only mildly elevated. The bacterial count in the synovial fluid is often low. As with other HACEK organisms K. kingae is a fastidious bacterium. Recovery of K kingae from body fluids and pus can thus be problematic because these types of specimens seem to be inhibitory to the bacteria. Inoculating synovial fluid into blood culture medium has been shown to increase the likelihood of isolating the organism (2,10).
The technology available for rapid identification of bacteria from clinical samples is now rapidly evolving. Targeted PCR is currently the most sensitive method for detecting *K. kingae* directly from sterile site aspirates (14). However, this is not practical when looking for many potential pathogens in a clinical sample. 16S rRNA gene sequencing offers a more broad based approach, with the ability to look for many different potential pathogens at once, but is less sensitive at detecting *K. kingae* than targeted PCR (15). The recent introduction of MALDI-TOF (Matrix Associated Laser Desorption and Ionisation-Time of Flight) technology into many of the bigger diagnostic laboratories may expedite identification once *K. kingae* colonies are growing on the plate (16). However there has been no research done as yet on the ability of MALDI-TOF technology to detect HACEK organisms directly from patient samples. Other technology which may be of value here is PCR-Electrospray Ionisation/Mass Spectrometry, which combines both PCR and mass spectrometry technology to allow rapid and sensitive identification of a wide spectrum of pathogens directly from patient samples (17). Micro-array may also offer a sensitive and practical approach to the molecular diagnosis of *K. kingae* infections in the future; although at the time of writing there is little available commercially using microarray technology for bacterial identification.

There are no specific guidelines or optimal therapy for *K. kingae*. Patients are treated empirically until cultures reveal the isolate and its susceptibility pattern. The organism is usually susceptible to beta-lactams however beta-lactamase producing *K. kingae* isolates have been described (2). Intravenous penicillin is a standard treatment for those isolates which have tested susceptible (18).

**Conclusion**

This case demonstrates that *K. kingae* can occasionally cause septic arthritis in adults, particularly those with underlying immunocompromise. Inoculation of synovial fluid into blood culture bottles. There are no specific guidelines or optimal therapy for *K. kingae*. Patients are treated empirically until cultures reveal the isolate and its susceptibility pattern. The organism is usually susceptible to beta-lactams however beta-lactamase producing *K. kingae* isolates have been described (2). Intravenous penicillin is a standard treatment for those isolates which have tested susceptible (18). This case demonstrates that *K. kingae* can occasionally cause septic arthritis in adults, particularly those with underlying immunocompromise. Inoculation of synovial fluid into blood culture bottles. There are no specific guidelines or optimal therapy for *K. kingae*. Patients are treated empirically until cultures reveal the isolate and its susceptibility pattern. The organism is usually susceptible to beta-lactams however beta-lactamase producing *K. kingae* isolates have been described (2). Intravenous penicillin is a standard treatment for those isolates which have tested susceptible (18).

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AS: substantive drafting of the main article. MA: revision of article and literature review. KG: clinical care of patient and revision of article. The authors declare no conflicts of interest.

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