Case Report

Septic Monoarthritis and Osteomyelitis in an Elderly Man Following *Klebsiella pneumoniae* Genitourinary Infection: Case Report

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Abstract

Introduction: *Klebsiella pneumoniae* septic arthritis and osteomyelitis, albeit uncommon in adults, are important sites of disseminated infection. Many case reports have shown *K. pneumoniae* as a cause of nosocomial transmitted septic arthritis in neonates and children. We report a rare case of an elderly patient with *K. pneumoniae* genitourinary infection spreading to the liver and other extra hepatic sites like the prostate and peripheral joint. Clinical Picture: The patient presented with a short history of general malaise, fever and urinary symptoms, associated with an acute monoarthritis of the ankle. On admission, he was in septic shock. Investigations suggested an infective cause, as evidenced by raised total white cell count and pyuria. *K. pneumoniae* was cultured from both urine and ankle synovial fluid. Imaging confirmed multiple liver and prostatic abscesses, as well as osteomyelitis of the foot bones adjacent to the ankle. Treatment: Treatment in this case included surgical drainage of the affected joint and surrounding soft tissue structures, in addition to a 6-week course of systemic antibiotics. Outcome: The patient had good clinical response following treatment. In addition, we noted a normalisation of his laboratory parameters and resolution of the intraabdominal and pelvic abscesses. Conclusion: This case emphasises the importance of timely and accurate diagnosis followed by appropriate treatment in disseminated *K. pneumoniae* infection to prevent significant morbidity and mortality.

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Key words: Arthritis, Infectious, *Klebsiella* infections, Liver abscess

Introduction

Despite improved antimicrobial therapy over the past 30 years, there has been little change in the incidence, outcome, or, causative organisms in septic arthritis. *Staphylococcus aureus* is the commonest cause of septic arthritis and various series reported rates of 17% to 80%.[1] European data have consistently shown *S. aureus* as the leading causative organism in septic arthritis.[2,3] The presence of methicillin-resistant *S. aureus* (MRSA) is well described worldwide including Singapore, where up to 40% of isolates of *S. aureus* are MRSA.[4] The other important bacteria are beta-haemolytic streptococci and Gram-negative enterobacteria. *Haemophilus influenzae* is important in children aged 2 months to 4 years.[5,6]

In contrast, Gram-negative bacteria such as *Klebsiella* spp. septic arthritis in adults are uncommon. The majority of cases of reported *Klebsiella* spp. septic arthritis have been in children.[7] In a study of the bacteriology of septic arthritis in an African hospital, it was found that infants formed the bulk of the patients, and Gram-negative bacteria such as those of the *Klebsiella* and *Salmonella* species were the most important cause of septic arthritis in infants and they accounted for 60% of the isolations.[8] In hospital-acquired neonatal septic arthritis, Gram-negative organisms and *S. aureus* have been reported as the most common isolates.[9] In adults, Gram-negative organisms account for only 9% to 20% of septic arthritis cases in teaching hospitals.[10]

Predisposing factors to Gram-negative arthritis include extremes of age, immunosuppressed patients, chronic systemic diseases [e.g., systemic lupus erythematosus (SLE), sickle-cell disease, malignancy], underlying joint damage and extra-articular infections (particularly urinary tract infections and decubitus ulcers).[11] Most infections are secondary to urinary tract or skin infections with subsequent bacteraemic spread to a single joint.[9] In those with no

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apparent risk factors, a history of trauma and recreation should be sought, as reported in a case of *Klebsiella pneumoniae* knee septic arthritis resulting from an injury caused by a marine seashell in a child.[12]

This case report of an elderly gentleman illustrates the important learning points that *K. pneumoniae* septic arthritis and osteomyelitis, albeit uncommon in adults, are important sites of disseminated infection. In addition, it emphasises the importance of determining the primary source of infection and the presence of any remote focus resulting from haematogenous spread, in order for optimal clearance of the pathogen.

Case Report

A 71-year-old Chinese homeless male patient presented with a 10-day history of general malaise, fever, urinary frequency and dysuria. He also gave a 5-day history of a painful and swollen left ankle, unrelated to trauma. There were no chronic comorbidities such as diabetes mellitus, renal disease, recurrent urinary tract infections, chronic alcoholism, or preexisting joint damage such as chronic arthritis and prosthetic joints. In addition, he had not undergone any instrumentation prior to this episode.

At the onset of his symptoms, he took a week's course of traditional Chinese medicine (TCM), which was not known to contain any corticosteroids or immunosuppressives, as recommended by his TCM practitioner. Prior to that he was not on any regular medication.

On admission, he appeared drowsy and was febrile with a temperature of 38.5°C. His blood pressure was 75/40 mm Hg and heart rate 110 regular. There was no lymphadenopathy. No cardiac murmurs were heard and respiratory examination was unremarkable. He had a non-tender hepatomegaly, 2 cm below the right costal margin. Rectal examination revealed an enlarged, non-tender prostate. There was synovitis affecting his left ankle.

Investigations showed normochromic, normocytic anaemia with a haemoglobin of 10.9 g/dL (13.0-17.0); white cell count of 24.2 x 10^9/L (4.0-10.0), neutrophils 92.3% (40.0-74.0); and platelets of 125 x 10^9/L (160-390). Renal function was normal. His albumin was 22 g/L (40-50), but other liver indices were normal. C-reactive protein was 149.4 mg/L (0.0-5.0). Urine analysis was positive for nitrites and contained more than 225 white cells/μL (0-6). His chest X-ray was normal. His left ankle X-ray showed soft tissue swelling but no osteomyelitis. Serologies for acute and chronic hepatitis B and C were unremarkable; however, his human immunodeficiency virus (HIV) status was not determined. With the clinical scenario of hypotension and pyuria, in addition to acute monoarthritis, a presumptive diagnosis of septic shock secondary to lower urinary tract infection and infectious arthritis was made.

The haemodynamic status of the patient improved with fluid resuscitation and intravenous (IV) dopamine infusion. Empirical IV ceftriaxone 2 g once daily and IV cloxacillin 500 mg 6 hourly were commenced simultaneously. A diagnostic aspirate of the ankle joint yielded minimal turbid synovial fluid, with scanty coliforms on Gram stain. After 48 hours of incubation, *K. pneumoniae* was cultured from both urine and ankle synovial fluid. The organism was sensitive to ceftriaxone, augmentin (amoxicillin/clavulanic acid), gentamicin and ciprofloxacin. Therefore, he was maintained only on IV ceftriaxone. There was no growth of pathogens from the blood cultures. Three days later, he had an arthroscopic drainage with curettage and irrigation of his left ankle as the synovitis did not appear to be improving. A small amount of pus was obtained, with no further growth. Given the presence of chronic anaemia in an elderly patient, upper and lower gastrointestinal endoscopies were performed which excluded underlying malignancy. Tumour markers including alpha fetoprotein (AFP) and carcinoembryonic antigen (CEA) were also unremarkable.

In view of low-grade pyrexia despite 1 week of IV ceftriaxone, a computed tomography (CT) scan of the abdomen was performed to look for disseminated infection. A 4.5 x 7.1 abscess in segment 5/8 of the liver (Fig. 1a) and multiple small prostatic abscesses (Fig. 1b) were seen. There were no features suggestive of neoplastic lesions. Metronidazole 500 mg 8 hourly was added for anaerobic coverage. Percutaneous drainage of the liver abscess was not done as the abscess appeared more solid than liquid on CT scan. In addition, the patient was clinically not septic.

Ten days after the ankle was drained, the pain recurred. A magnetic resonance imaging (MRI) scan showed osteomyelitis of the left distal tibia, talus and calcaneum (Fig. 2). A small abscess collection was seen plantar to the tarsal bones in close relation to the talocalcaneal joint (Fig. 2). A therapeutic ultrasound-guided aspiration of the abscess yielded no growth.

After 10 days of systemic antibiotics, his fever and ankle synovitis had resolved. Laboratory parameters including white cell count, liver function tests and urine had returned to normal. The patient completed 3 weeks of treatment with parenteral ceftriaxone and oral metronidazole, followed by 3 weeks of oral augmentin. A follow-up CT scan of the abdomen and pelvis performed on day 20 showed resolution in the size of the hepatic collection and disappearance of the prostatic abscesses.

The patient was discharged after 25 days in hospital. Follow-up was arranged with the orthopaedic surgeon, urologist and gastroenterologist. However, he defaulted all appointments. Nevertheless, we were able to contact him and confirmed that he had remained well.

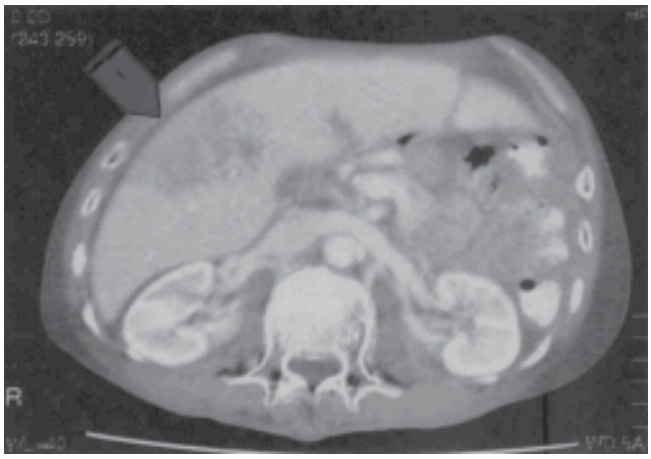

Fig. 1. Computed tomography of the abdomen and pelvis.
Fig. 1a. A heterogeneously enhancing lesion with appearance of multiloculated liver abscess.

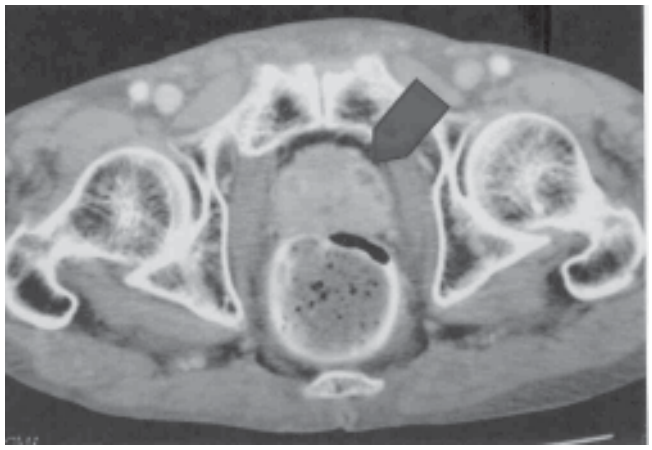

Fig. 1b. Small low attenuation lesions in the prostate with rim enhancement representing multiple small prostatic abscesses.

Fig. 2. Magnetic resonance imaging (sagittal view) of left ankle. (A) Increased signal intensity (T2W) in the distal tibia, talus and calcaneum suggestive of osteomyelitis, with marked soft tissue swelling around the joint. (B) Ovoid lesion with rim enhancement post-gadolinium; representing an abscess collection plantar to the tarsal bones in close relation to the talocalcaneal joint.

Discussion

K. pneumoniae is a Gram-negative, capsulated, gas-producing rod found widely in nature and is associated with urinary and respiratory infections in humans. Although *S. aureus* is the most commonly implicated organism of septic arthritis in adults, certain pathogens are associated with specific at-risk groups; for example, Gram-negative bacteria in the extremes of age (very young or very old) and immunocompromised, anaerobes in diabetics and patients with prosthetic joints, *Salmonella* in systemic lupus erythematosus patients, and *Pseudomonas aeruginosa* in intravenous drug users.[9,10,13] Thus, whilst normal hosts should be treated initially for infection due to Gram-positive organisms, treatment for infection due to Gram-negative organisms and anaerobes is necessary in immunocompromised patients and patients who have probable sources of such organisms.[13] *K. pneumoniae* septic arthritis and associated osteomyelitis occur more commonly in children, with probable nosocomial acquisition of the infecting organisms in the majority of the cases.[8,14,15] This case report illustrates the important point that, although *K. pneumoniae* septic arthritis and/or osteomyelitis are uncommon in adults, they are important sites of disseminated infection. In addition, *K. pneumoniae* is a potentially virulent organism, capable of haematogenous spread from its primary focus; in this case, the genitourinary tract, to cause hepatic and extra hepatic complications. Hence, careful examination of patients for extra-articular infections to identify a portal of entry, or the presence of a remote focus of infection such as cutaneous, genitourinary and respiratory systems should be sought.

Studies on prognostic risk factors have cited advanced age, preexisting joint disease, infected prosthetic joint, raised white cell count at presentation and abnormal renal function as factors associated with adverse outcome for infectious arthritis due to any microorganism.[16,17] This is illustrated by an interesting case of an elderly patient with rheumatoid arthritis developing *K. pneumoniae* emphysematous septic arthritis who became critically ill with septic shock.[18]

Pyogenic liver abscesses are usually complications of biliary tract disease (30% to 35%) or intestinal diseases, and is usually polymicrobial, with *Escherichia coli* being the commonest pathogen.[19] Interestingly, Taiwan reported a changing trend of liver abscesses caused by a single organism, *K. pneumoniae*, with the percentages rising from 30% in the 1980s to over 80% in the 1990s. In contrast, most of these patients are diabetics (75%) and without biliary tract infections. In addition, some patients may develop serious extra hepatic complications such as endophthalmitis, meningitis, lung abscesses, prostatic

abscesses and necrotising fasciitis.[20,21] Hence, the awareness of potential multiorgan involvement of this organism should prompt clinicians to conduct a thorough search for other sites of spread of infection, especially if there is poor response to appropriate antimicrobials. Indeed, based on several recent reports, *Klebsiella* as a cause of liver abscess in Singapore is not uncommon.[22-24]

Treatment of septic arthritis should include prolonged antibacterial treatment (minimum 6 weeks) with effective distribution into joints, plus drainage of the affected joint. *K. pneumoniae* tends to be sensitive to third-generation cephalosporins. However, multidrug-resistant *K. pneumoniae* may be associated with nosocomial transmission, and is resistant to cephalosporins, but sensitive to imipenem and ciprofloxacin, and confirmed to be extended-spectrum beta-lactamase producers.[14] Similarly, the main treatment strategy for intraabdominal or pelvic abscesses is antibiotic therapy with or without drainage. In addition, emphasis needs to be put on infection control procedures and the implementation of programmes that address sites of environmental contamination. A Nigerian tertiary hospital[15] reported the largest outbreak of 12 neonates with *Klebsiella pneumoniae* skeletal infection over a 6-month period. The route of introduction of the organism into the bloodstream is likely to be through contaminated equipment.

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