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Kingella kingae Induced Septic Arthritis in the Knee Revealing an Unexpected Diagnosis of Multiple Myeloma, a Case Report

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Learning Point of the Article:

This case highlights the importance of digging deeper when coming across unexpected bacteria as the investigation of the underlying immunodeficiency led to the discovery, and early treatment, of multiple myeloma in this case.

Abstract

Introduction: Kingella kingae has become an increasingly significant cause of osteoarticular infection in children under the age of 4. The bacteria is infrequent in adults. Previous reports have indicated its association with infections, primarily affecting immunocompromised individuals. Only a few cases of isolated septic knee arthritis in immunocompetent patients caused by K. kingae have been reported.

Case Report: We present a case involving a 64-year-old male with an unremarkable medical history diagnosed with septic arthritis in the knee attributed to K. kingae. He was treated with antibiotic therapy and joint irrigation and discharged with outpatient follow-up on the 9th day. The diagnosis led to an unexpected finding of multiple myeloma prompting further treatment.

Conclusion: This case confirms that K. kingae can cause septic arthritis in adults and physicians and microbiologists should be alert to the possibility, especially in adults with an underlying disease.

Keywords: K. kingae, septic arthritis, immunocompromised, multiple myeloma.

Introduction

Kingella kingae is a fastidious, Gram-negative, beta-hemolytic, facultative anaerobic coccobacillus of the Neisseriaceae family. Predominantly colonizing the oropharynx of young children, it is recognized as a significant etiological agent in bone and joint infections among children below 4 years of age [1]. While infrequent in adults, previous reports have indicated its association with infections, primarily affecting immunocompromised individuals or those with underlying chronic medical conditions [2-4]. A systematic literature review led to 10 cases of K. kingae infection in adults and among those were only three cases of isolated septic knee arthritis in immunocompetent patients [2, 3, 5].

We present a case involving a 64-year-old male diagnosed with septic arthritis in the knee attributed to K. kingae, the diagnosis led to an unexpected finding of multiple myeloma prompting further treatment.

Case Report

A 64-year-old male with an unremarkable medical history, presented with a 2-day history of fever, generalized muscle soreness, and 24 h of progressive pain and swelling in his left knee. The patient had played tennis twice in the days leading up to the hospital admission. He had no history of trauma, knee injuries, or surgery. He was not on any regular medication and did not have a history of immunocompromising conditions. He

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Author's Photo Gallery

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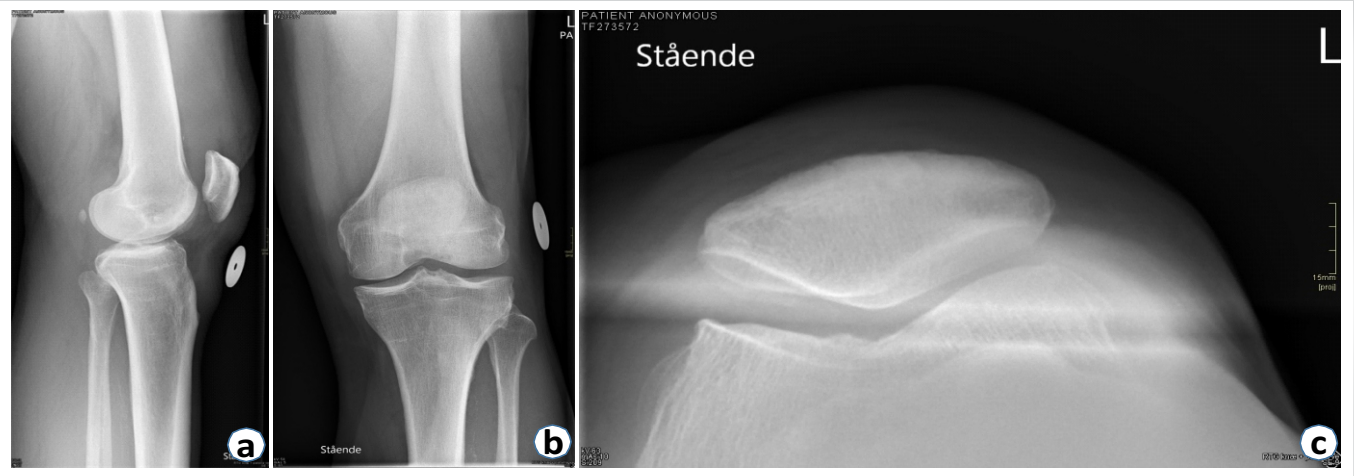

Figure 1: (a-c) Radiographic images show the knee in lateral, anteroposterior-plan, and patella view.

presented with a temperature of 36.7°C. Blood analysis revealed a slightly elevated C-reactive protein (CRP) of 87 mg/L and a normal leukocyte count. In addition, laboratory findings indicated hypocalcemia (serum calcium: 2.95 mmoL/L), mildly impaired renal function (creatinine: 113 micromol/L, estimated glomerular filtration rate: 59 mL/min), low albumin levels (24 g/L), and anemia (hemoglobin: 5.4 mmoL/L). Physical examination revealed significant effusion, tenderness over the lateral joint space, and limited range of motion, but there were no wounds, erythema, or joint warmth. Radiographic imaging demonstrated substantial fluid accumulation and mild narrowing of the medial joint space (Fig. 1).

Based on clinical and biochemical findings, septic arthritis was suspected. Synovial fluid aspiration yielded straw-yellow fluid with a leukocyte count of 96.030 × 106/L and an abundance of polymorphonuclear cells. A subsequent aspiration and knee irrigation were carried out on the day of admission. The patient was transferred to the orthopedic surgical ward and commenced on intravenous cefuroxime (1.5 g thrice daily) along with knee immobilization. Further investigations revealed macrocytic anemia, low reticulocyte count, and decreased Vitamin B12 levels. Consequently, additional tests to assess B12 deficiency were initiated, and Betolvex therapy was initiated. Blood tests ruled out rheumatologic disorders by showing normal levels of rheumatoid factor immunoglobulin (Ig)A and IgM, as well as normal cyclic citrullinated peptide IgG. Kidney function normalized following fluid therapy.

By the 2nd day of hospitalization, CRP levels reached 144 mg/L, and the patient reported exacerbating knee pain. Joint aspiration and irrigation were repeated.

By the 3rd day, K. kingae were isolated from the joint fluid culture. Arthroscopic synovectomy was proposed but declined by the patient due to subjective clinical improvement. Blood cultures were negative and bacterial analysis showed sensitivity to benzylpenicillin. Consequently, antibiotic therapy was changed to intravenous benzylpenicillin (2 million units 4 times daily). On the 8th day of hospitalization, joint aspiration and irrigation were repeated due to increased knee swelling. Due to the identification of K. kingae, a transthoracic echocardiogram was performed during the hospitalization and revealed no signs of endocarditis.

The patient was discharged on the 9th day with early outpatient follow-up. The antibiotic regimen was shifted to oral amoxicillin (500 mg thrice daily) for a total duration of 6 weeks. Despite experiencing persistent knee pain and limited range of motion, the patient could ambulate with the aid of crutches. Continued offloading and specific knee exercises were advised. CRP levels were reduced to 86 mg/L upon discharge. Subsequent outpatient monitoring showed decreased knee swelling and improved weight-bearing capacity, along with enhanced range of motion. The last follow-up in the orthopedic surgery department was 1½ months after discharge, and no X-ray control was performed. Through the hematology department, a full-body computed tomography scan was conducted two months after discharge, showing no intra-articular fluid collection or other pathology in the knee.

The rare finding of K. kingae led to additional blood tests. Elevated levels of IgA and IgM were found and a subsequent blood marrow analysis which showed hypercellular bone marrow with infiltration of 80–90% kappa clonal plasma cells confirmed the diagnosis of multiple myeloma. Further, a multiple myeloma FISH showed rearrangement in the CD128-positive selected cells. It prompted the initiation of treatment with velcade–Revlimid–dexamethasone, aciclovir, and levofloxacin. The patient is still being closely monitored in the

hematology outpatient clinic and remains under treatment.

Discussion

Until recently, K. kingae was thought to be rare [6]. Previously it was classified under the Moraxella genus, but in 1976 it was renamed and was the first species in the genus Kingella [7]. It has become increasingly significant as a cause of osteoarticular infections in children under the age of 4, predominantly colonizing the oropharynx [1, 6]. It is assumed that its dissemination occurs through hematogenous spread to the joints [7]. More rarely, it causes lower respiratory tract infections and meningitis. It is further known for being a member of the HACEK group, a group of rare Gram-negative organisms which can cause endocarditis [1].

Infections in adults with K. kingae are much less common and often affect individuals with some form of immunocompromise. K. kingae infections affecting the ankle, the pubis, the sternoclavicular joint, and intervertebral discs in immunodeficient patients have been reported [8, 9, 10, 11, 12]. A thorough literary review found cases of septic arthritis in immunocompromised adults with significant predisposing factors including Felty's syndrome [7], rheumatoid arthritis [8], breast carcinoma, end-stage renal disease [9], and leukemia [13].

Osteoarticular Kingella infections in immunocompetent patients are rare. The first case (to the author's knowledge) of K. kingae septic arthritis in a healthy adult was described by Esteve et al. in 2001 [3]. Ricketts et al. (2015) and Chen et al. (2021) described two similar cases both affecting the knee [2, 5].

It is well-known that patients with multiple myeloma are at increased risk for infections in general, including bacterial infections, due to their weakened immune systems [14]. Septic arthritis is not rare in this patient group. Common agents are among more Streptococcus pneumoniae, Staphylococcus aureus, and Escherichia coli [15]. To the author's knowledge, no cases of primary septic arthritis in the knee in a patient with multiple myeloma have been reported.

The real incidence of K. kingae infection is debatable and probably underestimated. Patients with osteoarticular infections due to K. kingae often have blood leukocyte counts, CRP, and erythrocyte sedimentation rates that are within normal limits or mildly elevated. The bacterial count in the synovial fluid is often low [8]. Advancements in culture techniques and a better understanding of the bacteria have led to an increased rate of detection [2]. K. kingae is facultative anaerobic, Gram-negative, lies in coccal clusters, and resists decolorization in Gram stain. Small colonies are seen after 48 h and often have a small beta hemolysis on blood agar [8, 5]. It has been suggested that K. kingae can be mistaken for a beta-hemolytic Streptococcus [7]. As a result, the bacteria is uniquely difficult to identify. Inoculating synovial fluid into a blood culture medium has been shown to increase the likelihood of isolating the organism [8]. It requires days of incubation to grow [9]. In this case, it took 3 days. Targeted PCR is currently the most sensitive method for detecting K. kingae directly from sterile site aspirates. However, this is not practical when looking for many potential pathogens in a clinical sample [8]. Alternative methods for detection are 16s rRNA gene sequencing, PCR electrospray/mass spectrometry, and microarray [8].

K. kingae is sensitive to a number of agents. Patients are treated empirically until cultures reveal the organism. It is usually susceptible to beta-lactams including penicillin, gentamicin, and cephalosporins. Intravenous penicillin is the standard treatment when the bacteria has been isolated [8]. There have been reported some cases of beta-lactamase production [5] and resistance has been shown for vancomycin, erythromycin, clindamycin, trimethoprim, and ciprofloxacin [2].

Conclusion

This case confirms that K. kingae can cause septic arthritis in adults and physicians and microbiologists should be alert to the possibility, especially in adults with an underlying disease.

Clinical Message

It highlights the importance of digging deeper when coming across unexpected bacteria as the investigation of the underlying immunodeficiency led to the discovery, and early treatment, of multiple myeloma in this patient.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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