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A Rare Case of Escherichia Coli Septic Arthritis in a Patient with Klippel-Trenaunay Syndrome

Keywords: Septic arthritis; Escherichia Coli; Gram-negative bacilli; Orthopedic surgery; Antibiotics selection

Abstract

Background: Septic arthritis, also known as infectious arthritis, results from an acute invasion of the joint space by microorganisms that release endotoxins and trigger cytokine release and neutrophil infiltration. This invasion may happen through the hematogenous spread, contiguous spread from another locus of infection, or direct inoculation to a joint. Other causes include iatrogenic from arthrocentesis or arthroscopy. Bacteria, Mycobacterium, and fungi are the most common culprits. Patients typically present with joint pain, swelling, and fever. The condition is associated with increased morbidity and mortality and thus requires prompt diagnosis and treatment.

Case Report: We reported the case of a 55-year-old female with a past medical history of Klippel-Trenaunay Syndrome (KTS), Escherichia Coli (E. Coli) bacteremia seven years ago, chronic deep venous thrombosis, and type 2 diabetes mellitus who presented with chief complaints of left knee swelling and tenderness. She had Escherichia Coli septic arthritis. She underwent incision and drainage of the infected joint and started on four weeks of antibiotics.

Conclusion: This case is essential as it reports a rare cause of septic arthritis. Gram-negative bacilli account for only 10% to 15% of all cases of septic arthritis and are a growing concern. Moreover, it discusses a practical approach to treating this condition. Patients with KTS are susceptible to recurrent bouts of cellulitis. However, there is no report of increasing the risk of septic arthritis, which could have been the predisposing factor in our patient.

Open Access **Case Report**

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Introduction

Septic arthritis is a severe infection of the joint that is associated with significant morbidity and mortality. Therefore, the clinician needs to recognize and treat this condition early. E. Coli is a rare cause of septic arthritis, but its incidence is rapidly increasing. Prompt orthopedic surgery consultation and a comprehensive antibiotics selection are essential in tackling this condition.

Case Presentation

A 55-year-old female with a past medical history of KTS; osteoarthritis; chronic left leg cellulitis on continuous Cephalexin and Clindamycin for suppression; type 2 diabetes mellitus; chronic deep vein thrombosis and obesity presented to the hospital with left knee pain and swelling ongoing for three weeks. She was previously hospitalizedthree weeks earlier and treated for ten days for left leg and knee cellulitis. At that time, she received intravenous antibiotics with Vancomycin and Ceftriaxone.

She stated that her knee continued to be swollen and painful. She noted that it was excruciating on ambulation, which prompted her to re-present to the hospital again. She was afebrile on admission, and the rest of her vitals were within normal limits. Examination revealed knee effusion and significant joint movement pain but did not display any erythema.

Laboratory work revealed a white blood cell count of 11,300 k/uL (4.8-10.8 K/uL). The erythrocyte sedimentation rate was 119 mm (0-30 mm), and the C-reactive protein was 5.1 mg/dL (0.00-0.60 mg/dL).

X-ray imaging showed severe osteoarthritis with an effusion surrounding the knee (Figure 1). Ultrasound of the left knee showed a small fluid collection of the medical knee, which appears to be consolidated (Figure 2). She underwent ultrasound-guided arthrocentesis with 3 mL of cloudy, bloody fluid obtained. Fluid white cell count was 58,000 mm3 white blood cells, 95% fluid segs; analysis of the fluid was negative for crystals.

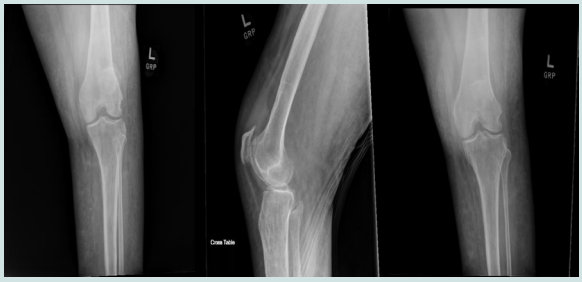

Figure 1: Oblique, lateral, and anteroposterior view of the left knee notable for effusion surrounding the knee.

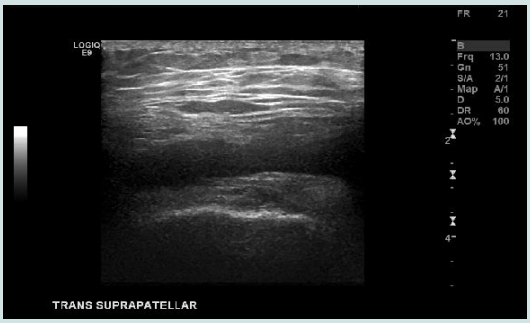

Figure 2: Ultrasound of the left knee showing a small fluid collection of the medical knee, which appears to be consolidated.

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She underwent an incision, drainage, and irrigation of the left knee with findings of cloudy-appearing synovial fluid indicating subacute infection. A culture of the fluid drained from the arthrocentesis grew E. coli. The culture's sensitivity showed that the bacteria produced extended-spectrum beta-lactamase and thus was multi-drug resistant. Infectious disease decided to treat the patient with intravenous (IV) Ertapenem 500 mg and IV Daptomycin 12 mg/kg daily for four weeks. Given that she had a prior history of resistance to E. Coli treatment, there was suspicion of a gram-positive bacterial component absent in the culture. This suspicion justifies the addition of Daptomycin to the antibiotic regimen.

Discussion

In this case report, we have a patient with a complex history of KTS and past E. Coli bacteremia who came to the ED (Emergency Department) due to left knee swelling and tenderness which would later result in E. Coli septic arthritis. Additionally, this patient received chronic antimicrobial suppressive therapy with clindamycin and cefalexin for chronic cellulitis. E Coli septic arthritis is a rarity in the grand scheme of infectious arthropathy. It occurs in patients with recent abdominal surgery, chronic immunosuppression, and rheumatoid arthritis. This patient does not have those noted comorbidities. However, the patient does have KTS. KTS presents with lymphatic abnormalities, which can occur superficially in vascular blebs or lymphangiectasis. These abnormalities can also form deep lymphatic malformations, leading to organ compression and disfigurement. These lesions are at increased risk for chronic lymph, blood leakage, or infectious material translocation. Patients with KTS are susceptible to recurrent bouts of cellulitis. With this information, these patients with KTS can be chronically at risk for septic arthritis with various organisms. [1]

As reported by Horowitz et al., it is essential to treat septic arthritis by initiating antibiotics within the first two days to avoid complications such as subcartilaginous bone loss, destruction of the cartilage, and permanent joint dysfunction. The authors postulate that the most common source of native joint infections is the knee, hip, shoulder, ankle, elbow, and wrist [2]. Per McBride et al., septic arthritis has an incidence of 4 to 29 cases per 100,000 person-years. Patients at higher risk are usually elderly, of lower socioeconomic status, and immunocompromised. [3].

Lieber et al. report that septic arthritis arises via contiguous, direct inoculation and hematogenous spread. Indeed, contiguous spread takes place with a skin infection and cutaneous ulceration. Direct inoculation happens with a previous intra-articular injection when a prosthetic joint is placed within the past two years, recent joint surgery. Hematogenous spread is often seen in Diabetic Mellitus and HIV infection, use of immunosuppressive medications, intravenous drug abuse, osteoarthritis, other causes of sepsis, prosthetic joint more than two years, rheumatoid arthritis, and sexual activity (gonococcal arthritis). Other risk factors include age older than 80 and smoking [4].

Visser et al. report that Staphylococcus aureus is the most common culprit of septic arthritis. Streptococcus pneumonia is the less prevalent organism but still a leading culprit of adult infection. Salmonella occurs in sickle cell patients and Pseudomonas in trauma and puncture wound patients. Neisseria gonorrhea is often the most common cause of acute mono arthritis in sexually active patients. Fungal and mycobacterial organisms often present subtly but with harmful effects, making their detection challenging. Usually, a synovial fluid acid-fast smear is negative; however, in 95% of cases, a synovial biopsy is positive [5].

Per Chui et al., gram-negative septic arthritis is associated with poorer outcomes. In gram-negative bacillary septic arthritis, the cure rate is lower, poorer therapeutic results, recurrent infection, secondary osteomyelitis, flexion contractures, chronic effusions, and joint ankylosis have been reported. According to the authors, surgical drainage is the best treatment for septic arthritis [6].

Margaretten et al. Explain that septic arthritis can is diagnosed by synovial fluid analysis from the suspected joint. This analysis usually includes culture, crystals analysis, gram stain, and white blood cell count with differential). We likely have a bacterial source when the synovial fluid's white blood cell (WBC) counts are more significant than 50,000 and 90% neutrophil predominance. Laboratory tests may help diagnose septic arthritis, usually including a complete blood count, an erythrocyte sedimentation rate, inflammatory markers such as c- reactive protein, ESR, and blood cultures [7]. Horowitz et al., however, report that in prosthetic joint infections, a White Blood Cell count of 1100 or more in the synovial fluid that contains 64% neutrophile predominance indicates septic arthritis [3].

According to Hassan et al., a plain radiograph can demonstrate widened joint spaces, subchondral bony changes, and bulging of the soft tissues. It should also be noted that a radiograph does not disqualify a septic arthritis diagnosis. Ultrasonography may help identify and quantify the joint effusion and assist in needle aspiration. MRI is sensitive to detect fluid early, and bone scans help evaluate localized infections of the sacroiliac or hip joint [8].

Hassan et al. further discuss the treatment of septic arthritis. According to the authors, antibiotic therapy and joint drainage are the main courses of treatment. It is essential to initiate antibiotics after joint fluid aspiration. Options for anti-staphylococcal coverage include Nafcillin, oxacillin, or vancomycin. Vancomycin may be used for gram-positive organisms if the physician suspects an MRSA infection. For additional gram-negative coverage, a third-generation cephalosporin is optimal. Cultures of the infected material can be used to direct antimicrobial therapy. The orthopedic surgeon should determine the procedure to drain the affected joint. This procedure may include an arthrotomy, arthroscopy, or daily needle aspiration. Therefore, the orthopedic surgeon's early involvement is essential [8].

According to Hassan et al., nongonococcal septic arthritis can be treated for two to four weeks, while extended antibiotic therapy for about six weeks may be crucial in Pseudomonas aeruginosa. Gonococcal arthritis responds well to intravenous ceftriaxone for one to two days. Once clinical improvement occurs, the patient may start oral therapy to complete their regimen. If there is no improvement in about one and a half months, the patient should have another arthrocentesis to rule out Lyme disease, fungal infections, or reactive arthritis. The exclusion of osteomyelitis occurs by imaging [8]. Momodu et al. recommend against immobilizing the joint, and patients should promptly start physical therapy to restore joint

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mobility and prevent muscle loss. Furthermore, patients with infected prosthetic joints may undergo joint debridement, prosthesis removal, and replacement of the new joint with cement-containing antibiotics [9].

Per Margaretten et al. despite antibiotic use, the mortality rate is as high as 7% to 15% for in-hospital septic arthritis. One-third of patients have septic arthritis and morbidity; mortality increases with age and comorbid conditions. While Neisseria infections rarely result in death, infection by staphylococcus can carry a mortality rate of more than 50% [7]. It is, therefore, necessary to promptly recognize and treat septic arthritis.

Conclusion

E Coli septic arthritis, associated with increased morbidity and mortality, is a rare and increasingly frequent cause of severe septic arthritis and other gram-negative bacilli bacteria. KTS may be associated with an increased risk of septic arthritis associated with recurrent bouts of cellulitis.

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