Septic Arthritis Caused by Sphingomonas Paucimobilis in Immunocompetent Patient: Case Report and Literature Review

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Abstract

Septic arthritis, also known as infectious arthritis, is inflammation of the joints due to a wide range of pathogens, such as bacterial, fungal, mycobacterial, viral, or/and other pathogens; however, some opportunistic pathogens tend to affect immunocompromised patients and rarely infect immunocompetent patients. For example, Sphingomonas paucimobilis is an opportunistic pathogen with a particular tropism toward bones and soft tissues that rarely causes infections in immunocompetent humans. We present a case of Sphingomonas paucimobilis causing septic arthritis in a 34-year-old man who is medically free and with no history of previous surgeries or any other comorbidities. He was treated successfully by both pharmacological treatment and surgical intervention. To our knowledge, there are only four cases published in the literature involving Sphingomonas paucimobilis as a causative organism of septic arthritis affecting immunocompetent patients.

Introduction

Septic arthritis is an inflammation of the joint due to a wide range of pathogens and characteristically results in significant rates of morbidity and mortality [1]. According to an England and Wales study, 68.6% of the cases of septic arthritis were caused by staphylococcal and streptococcal species [2]. Similarly, a study conducted in Riyadh, Saudi Arabia, found staphylococcal and streptococcal species caused more than 75% of septic arthritis cases [3]. However, Sphingomonas paucimobilis, Gram-negative yellow-pigmented non-fermenting bacilli, is an opportunistic pathogen with a particular tropism toward bones and soft tissues that rarely causes infections in immunocompetent humans [4]. To our knowledge, there are only four cases published in the literature involving Sphingomonas paucimobilis as a causative organism of septic arthritis affecting immunocompetent patients. Our aim is to report an uncommon septic arthritis case caused by an opportunistic infection and review the previously published cases.

Case Presentation

We present a case of a 34-year-old man without any comorbidity or previous medical conditions and with no history of previous surgeries. The patient is a smoker, and he denied traveling or other risky behaviors. He had low energy non-penetrating trauma to his right knee, and he was able to ambulate immediately. When he heard a cracking sound and felt pain, he went directly to the emergency department complaining of knee pain, swelling, and effusion. Physical examination revealed effusion with an inability to fully raise his leg with only 15 degrees of leg extension lag. Suspicion of quadriceps or patellar tendon injury was ruled out by knee ultrasound which showed only effusion. Moreover, examination of the knee revealed a stable knee, range of motion 15-100 degrees, with intact medial and lateral collateral ligaments. Due to pain, further ligamentous examination for the anterior cruciate ligament and posterior cruciate ligament was not conducted. The patient was referred to outpatient for valuation after resolution of effusion and possible MRI. After two weeks, he attended the outpatient clinic where he complained of progressing knee effusion and pain. The pain was sudden, continuous, diffuse with no relieving and aggravating factors. The pain was severe to the extent that sometimes he could not bear weight on his right knee. On physical examination, he was afebrile and hemodynamically stable. His right knee was swollen, warm, tender, with no open wounds, limited active and passive range of motion from 15-40 degrees due to pain.

In the emergency department, the right knee X-ray showed no definite fracture or dislocation; however, it showed mild suprapatellar effusion. In the clinic, we decided to aspirate his right knee. The aspiration showed cloudy yellow turbid synovial fluid. The microbiological studies confirmed the presence of gram-negative bacilli, and the result verified pan-sensitive Sphingomonas paucimobilis infection after four days when the patient was immediately admitted from the clinic. Upon the first outpatient clinic visit, which was after two weeks, the blood investigations were as follows: white blood cells, 4.3×10^9/L; hemoglobin, 126 g/L;
platelets, 440×10^9/L; C-reactive protein, 102 mg/L; erythrocyte sedimentation rate, 81 mm/h. However, after 4 days, on admission, they were as follows: white blood cells, 5.7×10^9/L; hemoglobin, 121 g/L; platelets, 448×10^9/L; C-reactive protein, 75 mg/L; erythrocyte sedimentation rate, 57 mm/h.

Upon admission, as a standardized hospital reference, the infectious disease team was consulted and started on 2g intravenous ceftazidime every 8 hours (q8h). On the following day, the patient underwent arthroscopic irrigation and debridement of the right knee, and the pathology result revealed the presence of acute inflammatory cells and fibrin which is consistent with septic arthritis. Thus the vancomycin was replaced with linezolid 600 mg every 12 hours (q12H). The patient improved and was discharged on the eighth postoperative day. He was seen in the clinic doing fine and had a full recovery.

**Discussion**

*Sphingomonas paucimobilis* has been reported as one of the causative organisms of nosocomial and community-acquired infections associated with different comorbidities [5]. Moreover, it has a variable pattern of antibiotic susceptibility. It is reported to be susceptible to third-generation cephalosporins and fluoroquinolones and resistant to penicillin and first-generation cephalosporins [6].

Septic arthritis with *Sphingomonas paucimobilis* is a rare entity. The literature review has revealed only four cases regarding *Sphingomonas paucimobilis* causing septic arthritis in immunocompetent which are listed in Table 1.

| Case            | Age by years | Affected joint | Medical and surgical history                                                                 | Surgical management | Time-delay of surgical intervention | Length of stay | Outcome                  | Follow-up      |
|-----------------|--------------|----------------|-----------------------------------------------------------------------------------------------|---------------------|-------------------------------------|----------------|--------------------------|----------------|
| Kuo et al.      | 47           | Right knee     | The patient suffers from diabetes mellitus, gouty arthritis, and received vacuum cupping over the skin of his right knee just a few days before the presentation. | Yes                 | On the 12th day of admission         | Five weeks     | Complete remission       | six months     |
| Souto et al.    | 41           | Left knee      | He is known to have hyperuricemia.                                                            | Yes                 | After 22 days of treatment           | More than three weeks | Complete remission       | Not mentioned |
| Dischereit et al. | 70         | Right knee     | The patient has hypertension, hyperuricemia, chronic renal failure stage III, aortic valve replacement, and stage II-III COPD | No                  | Not applicable                       | Not mentioned  | Infection was treated successfully with a considerable improvement of the symptoms | Not mentioned |
| Pascale et al.  | 26           | Right knee     | He underwent corrective surgery for limb length inequality two months ago for a tibia fracture. | No                  | Not applicable                       | Treated as an outpatient | Complete remission       | Two months     |
| Present case    | 34           | Right knee     | He is medically and surgically free.                                                          | Yes                 | Next day of admission                | Nine days      | Complete remission       | Two months     |

**Table 1: Published cases of Sphingomonas paucimobilis producing septic arthritis in immunocompetent patients**

Kuo et al. [7]; Souto et al. [8]; Dischereit et al. [9]; Pascale et al. [10]

In comparison to our study, the literature review showed our patient is considered unique since he is young
and medically free, unlike what has been reported in the literature where all of them have musculoskeletal disorders such as gouty arthritis, hyperuricemia, and recent musculoskeletal surgery. Moreover, regarding the time of the surgery, we noticed that the early surgical intervention, which was the next day of admission for our patient, could be the reason for the shorter length of hospitalization.

In regard to medications, there was a wide range of diversity. Each case was susceptible to certain drugs and resistant to others. However, we found that third-generation cephalosporins and fluoroquinolones were frequently used and showed an improvement in patients’ status. However, Pascale et al. used sulfonamides and amoxicillin/clavulanic acid when the susceptibility profile showed resistance to cephalosporins and fluoroquinolones [10]. According to the surgical intervention, the surgery was avoided in two cases, Pascale et al. [10] and Dischereit et al. [9]; the Dischereit et al. case was due to the risk of the surgery since the patient has a critical medical condition who suffer from chronic renal failure stage III, stage II-III chronic obstructive pulmonary disease (COPD), and the need to be on oral anticoagulation [9].

Conclusions

Even though Sphingomonas paucimobilis is an opportunistic and nosocomial infection, it is not clear why and how it can affect immunocompetent patients. However, our patient had a full recovery after surgical and medical treatment. Further studies are needed to explain how it affects immunocompetent patients and the best treatment options.

Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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