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Case Report

Septic Arthritis due to *Propionibacterium* acnes in a Native Knee Joint

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Abstract

Case: A 63-year-old male presented complaining of right knee pain and swelling for 72 hours. Needle aspiration was performed, and *P. acnes* was isolated from anaerobic synovial fluid culture. The patient was treated with arthroscopic irrigation and lavage followed by intravenous Nafcillin for 6 weeks. At 1-week follow-up, a knee aspiration was performed for recurrent symptoms. All cultures obtained at that time were negative. At 6-week follow-up, the patient reported complete resolution of knee pain and knee effusion.

Conclusion: Although rare, *P. acnes* should still be considered as the etiologic agent causing septic arthritis in native knee joints.

Keywords: *Septic Arthritis; Knee; Propionibacterium acnes; P. acnes; Native Joint*

Introduction

The knee is the most common joint involved in septic arthritis [1,2]. *Staphylococcus aureus* is the usual etiologic agent of septic arthritis in developed countries. However, *Streptococcus* species, especially *Streptococcus pyogenes*, are also often isolated in cases of septic arthritis [1-5]. Gram-negative bacilli account for 10% - 20% of cases and are more common in patients with a history of intravenous drug abuse, extremes of age, or immunodeficiency [4].

Propionibacterium acnes has been described as an infrequent cause of periprosthetic joint infections, including those occurring at the knee [6-8], and has been found to be the most common etiologic agent in shoulder septic arthritis following rotator cuff repair [9] and arthroplasty [10]. However, *P. acnes* has only been described as an etiologic agent in native knee infection in a handful of cases [11-13].

The current case report describes the diagnosis and treatment of native knee septic arthritis due to *P. acnes* in a 63-year-old male.

Case Report

A 63-year-old Caucasian male presented to an outpatient orthopedic surgery clinic complaining of right knee pain and swelling for the past 72 hours. He denied symptoms of fever, night sweats, and recent weight loss. He also denied any trauma, surgery, or history of symptoms in that knee. Reported past medical history included a clinical diagnosis of gout more than five years prior to presentation that was not treated with medication. The patient denied symptoms of gout attacks for several years. On examination, the patient was found to have a large right knee effusion. Needle aspiration of the right knee was performed, and the synovial fluid was sent for analysis. Cell count revealed an elevated white blood cell count of 29,800 cells, and 91% were neutrophils. There were no crystals or fungus found in the synovial fluid. The gram stain showed no organisms, and preliminary results from aerobic and anaerobic cultures displayed no growth. Six days after the initial aspirate, the anaerobic culture grew *P. acnes.*

The patient underwent arthroscopic lavage irrigation and debridement. Infectious disease was consulted and placed the patient on 2 grams of intravenous Nafcillin every 4 hours for 6 weeks. At 1-week follow-up, a repeat knee aspiration was performed in the clinic because of recurrent effusion. Gram stain and aerobic, anaerobic, and fungal cultures were negative. At 6-week follow-up, the patient had completed antibiotic therapy, reported complete resolution of right knee pain, and had not had any subsequent knee effusions. Through 5-months post-surgical intervention, no residual or recurring symptoms had been reported.

Discussion

P. acnes is an aerotolerant, anaerobic, gram-positive, pleomorphic rod bacteria that is part of the normal microbiota of human skin, the sebaceous glands of hair follicles, the oral cavity, the gastrointestinal tract, and the genitourinary tract [14]. It has been associated with infections of the skin, soft tissues, cardiovascular system, and deep organ tissues, and is a known biofilm producer [14]. Optimal growth for *P. acnes* is said to occur at a pH of 6.0 - 7.0 [15] and a temperature of 30°C - 37°C [16], and it takes a mean culture time of 6.4 and 6.1 days in aerobic and anaerobic bottles, respectively [17].

The patient's symptoms of acute monoarticular pain and effusion as well as aspirate revealing an elevated white blood cell count with neutrophilia and negative crystal analysis were more suggestive of infectious etiology as compared to inflammatory or other arthropathy. Infectious etiology certainly could not be ruled out and the patient was therefore treated for presumed septic arthritis. Other inflammatory markers such as white blood cell count, erythrocyte sedimentation rate, and C-reactive protein were not obtained as their utility in the diagnosis and treatment of acute septic arthritis has been scrutinized [18]. Synovial fluid cultures yielding isolated colonies of *P. acnes* and on day six as consistent with literature [17] suggest it was the infectious etiology responsible for the patient's symptoms. Additionally, the resolution of symptoms following completion of treatment for septic arthritis implies the patient was treated appropriately for an infectious etiology.

As stated above, *P. acnes* is a known etiology of septic arthritis following rotator cuff repair [9], total shoulder arthroplasty [10], and total knee arthroplasty [6-8]. In such cases, the patient is typically treated with surgical irrigation and debridement and with intravenous and oral antibiotics [6-9]. Shirtliff and Mader [4] reported that gram stain negative septic arthritis is typically treated with broad-spectrum cephalosporin or semisynthetic penicillin, which is adjusted according to culture and sensitivity results. They also noted that arthroscopic lavage of the knee is advantageous in treatment since direct visualization can be obtained and extensive debridement performed through a small incision, allowing for quicker recovery [4]. Hunter., *et al.* [19] found that 62% of septic joints are successfully managed with a single surgical debridement and that independent clinical predictors of failure of a single surgical debridement included involvement of a large joint, synovial fluid nucleated cell count greater than 85.0×10^9 cells/L, infection with *S. aureus*, history of inflammatory arthropathy, and history of diabetes mellitus.

Although the patient in the current case report was aged 63 years and had a history of gout, he did not have any specific risk factors associated with septic arthritis or clinical predictors for failure of a single surgical debridement. There was a reoccurrence of the effusion early in treatment, but the patient did not require multiple debridements. The combined treatment of surgical debridement with intravenous Nafcillin for 6 weeks appears to be a successful method to eradicate *P. acnes* septic arthritis in a native knee.

Conclusion

The current case report discussed the diagnosis and treatment of *P. acnes* in native knee septic arthritis in a 63-year-old male. Although *P. acnes* has been described as a cause of postsurgical shoulder and periprosthetic joint infections, it has only previously been described as an etiologic agent in native knee septic arthritis in a few rare case reports [11-13]. Results of this case suggest that *P. acnes* should still be considered as the potential etiology in septic arthritis of native knee joints, especially in those that are gram stain and culture negative.

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