

Introduction

Septic Arthritis in adults can be a challenging diagnosis. The disease has substantial morbidity as well as mortality and delayed or inadequate treatment can lead to irreversible joint destruction and possible fatality. Septic arthritis is rarely noted in the joints of the foot. Staphylococcus aureus is noted to be the most frequent causative organism of septic arthritis. *Pseudomonas aeruginosa*, the causative agent of our case, is infrequently noted in literature and to our knowledge, septic arthritis in the 1st MTPJ of a healthy adult caused by *Pseudomonas Aeruginosa* has not been previously described in literature.



Radiographs



Figures 1,2,3

Patient Description

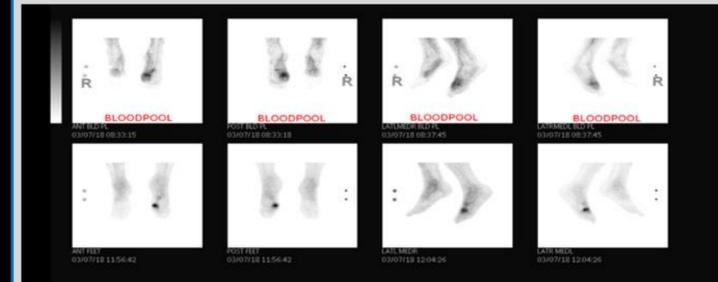
A 47-year-old healthy, Caucasian male presented to Emergency Department with a 1 week history of increasing pain and swelling to his left 1st metatarsophalangeal joint. On physical examination, his left 1st MTPJ was noted to be edematous and mildly erythematous as compared to the contralateral side. He was unable to bear weight and had significant pain to his 1st MTPJ without weight bearing as well as with active and passive range of motion. A small scar was noted to the plantar medial aspect of the joint which patient relates was from a childhood injury. No other skin breaks, lesions, or wounds were noted. The patient denied recent trauma or any personal or family history of gout.

Labs and radiographs were obtained during his Emergency Department visit. Inflammatory markers were noted to be elevated. He had a white blood count of 10.7K/uL with a neutrophil shift, C-reactive protein of 73.6mg/L and erythrocyte sedimentation rate of 8mm/hr. Uric acid level was noted to be within normal limits and urine chemistry was noted to be unremarkable. Plain radiographs of the left foot were obtained (Figures 1, 2 and 3) which demonstrated degenerative changes to 1st MTPJ, overlying soft tissue swelling, and enlargement of 1st metatarsal head with adjacent fragmentation of the sesamoids. A 3D phase bone scan was also obtained (Figure 4) which was positive in all 3 phases, consistent with a differential diagnosis of Osteomyelitis or trauma to the left 1st MTPJ. A joint aspirate and bone biopsy were obtained showing essentially a pure culture of *Pseudomonas aeruginosa*.

Unique History

His past medical history was significant for left femur fracture due to an unsuccessful parachute jump while on active duty many years prior. He denied injury to his feet with that injury. More notably, he recounted a childhood injury to the left 1st MTPJ at the age of ten. He detailed a puncture wound to the plantar aspect of his first metatarsal head from a nail while he was playing on a farm. The patient recounted that his left foot had significant infection with malodorous, purulent drainage and a greenish coloration of the skin at the area of the puncture wound which resulted in a 2-month hospitalization, a diagnosis of osteomyelitis to his left great toe joint, and multiple courses of IV and PO antibiotics. He recalled being told that he would likely need a below the knee amputation which his guardians declined to pursue in lieu of long-term suppressive antibiotic therapy.

3D Bone Scan



Intervention

The patient was subsequently admitted for IV antibiotics, pain control, and surgical intervention. He was initially started on broad spectrum IV Vancomycin/Zosyn which was complicated by an allergic reaction to Zosyn resulting in a full body rash. Infectious disease service was consulted and recommended that the patient be switched to IV Cefapime. Due to continued swelling, erythema, and pain to his 1st MTP joint, the decision was made for surgical incision and drainage. The need for a possible partial ray amputation was discussed with the patient, which he declined in favor of incision and drainage and long term suppressive antibiotic therapy. The patient underwent a left 1st MTP joint incision and drainage with delayed closure. Intraoperative inspection demonstrated that purulent drainage was localized only to the 1st MTP joint with significant degenerative changes to the metatarsal head. There were no other areas of concern. Intraoperative cultures and pathology specimens were obtained and confirmed *pseudomonas* isolated to the joint. The patient's surgical site was packed open to allow for further drainage with final wound closure done 2 days post-op, after improved clinical appearance and a decrease in pain.

The patient declined any further surgical intervention to remove the osteomyelitic bone. He was discharged with a 6-week course of oral Ciprofloxacin. The patient was closely followed for 8 weeks with unremarkable findings. His final follow-up evaluation was 8 weeks status post-initial presentation at which time the patient had completed his antibiotic treatment, denied pain, and had complete resolution of his edema and erythema.

Discussion

Septic arthritis of the 1st MTPJ in a healthy adult secondary to *Pseudomonas aeruginosa* is a rare entity not commonly reported in literature. What makes this case report even more intriguing is the hypothesis that the offending organism is a *pseudomonas* biofilm resulting from his childhood trauma 37 years prior. The infectious disease service concurred with our hypothesis stating that *pseudomonas* biofilm is a "rare occurrence, however cannot be excluded". This hypothesis is further supported by the fact that the patient had no noted trauma or open wound to the area prior to his presentation to the Emergency Department.

Although all ages can be affected, septic arthritis usually affects the geriatric and pediatric populations. Risk factors for development of septic arthritis include but are not limited to: rheumatoid or osteoarthritis, joint prosthesis, IV drug use, alcoholism, diabetes, and cutaneous ulcer. The highest risk factor for septic arthritis, as noted in reviewed literature, is previous joint pathology or abnormal joint architecture. In all age and risk groups, the most frequent causative organism is *Staphylococcus aureus*, followed by *Streptococcus* species. Septic arthritis, due to *Pseudomonas aeruginosa*, is incredibly rare and usually presents in the sacroiliac or sternoclavicular joints primarily of individuals with a history of IV drug abuse. Infection can be introduced into a joint as a result of either hematogenous spread or by direct inoculation (trauma).

In our case, we hypothesize the causative agent was a direct inoculation due to a long term surviving *Pseudomonas* biofilm from a childhood trauma. Biofilm formation has a unique ability to allow infecting organisms to evade both immune defenses and antibiotic treatment. Diagnosing septic arthritis is multifactorial, requiring a detailed work-up and laboratory testing such as: white blood cell count, C-reactive protein, erythrocyte sedimentation rate, and joint aspiration. Additionally, radiographs, bone scan, CT and MRI, as well as investigation of risk factors such as pre-existing or previous joint pathology is important for proper diagnosis.

Essential in the treatment and management of septic arthritis is determination the offending organism and removal of the bacterial and inflammatory debris from the infected joint. Timely joint aspiration is critical as septic arthritis is a medical emergency that requires rapid diagnosis and treatment to prevent serious and long term complications. Underlying joint pathology is the highest risk factor for septic arthritis with *S. aureus* as the most common causative pathogen. To avoid severe outcomes, prompt diagnosis and treatment, including surgical I&D and culture specific antibiotics, is crucial.