Pyomyositis Caused by Coccidioides in a 15-Year-Old Male

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Case in Point

Introduction. Pyomyositis is an infection involving the skeletal muscle, most often leading to abscess formation. The pathophysiology behind this infection is primarily due to the hematogenous seeding of muscle.[1] Pyomyositis is known to commonly occur in tropical regions and affects mostly children between the ages of 2and 5 and adults between 20 and 45.[2] This infection has been seen in immunocompromised individuals, such as those with human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), diabetes mellitus, leukemia, cancer, and renal failure.[3] The most common source of infection in pyomyositis is bacteria, specifically *Staphylococcus aureus*, comprising over half of all cases.[4] Fungal infections have been less commonly associated with pyomyositis. While several large studies have been conducted in tropical climates and environments typically linked to pyomyositis, there is limited to no literature outside of these main regions. Furthermore, there are even fewer reported cases and studies on sources of pyomyositis other than S aureus.[5] We present a 15-year-old male with one of the first-ever reported cases of pyomyositis caused by Coccidioidomycosis.

Myositis and osteomyelitis with fungal causes are very uncommon in patients who are immunocompromised patients and exceedingly rare in those who are immunocompetent. Furthermore, there are very few cases of reported *Coccidioides immitis* myositis; and, to the best of our knowledge, no reported cases of Cocci myositis outside of the gluteal muscle group.[6] This case will describe an adolescent male with concurrent bacterial and fungal myositis and osteomyelitis infections and his treatment course.

Case Description. A 15-year-old male who resides in central California with no past medical history or family history of musculoskeletal or infectious diseases presented to our service with pain and swelling of the left leg. The patient reported a tearing sensation in his left upper thigh muscle 5 months prior while stretching, followed by intermittent leg pain. He had previously visited the emergency department 1 month priorfor left thigh pain with decreased flexion and extension of the left leg. At that time, radiographic imaging demonstrated no evidence of fracture or dislocation, and the patient was discharged the same day. Patient was diagnosed with a muscle strain of the thigh and was discharged home same day.

During the current admission, the patient presented to the emergency department with similar left thigh pain and reported a fluctuant mass at the same site of the injury for the past 5 days. Physical examination revealed a 3 x 3 cm circular erythematous, tender lesion on the lateral aspect of the proximal third of the left femur with fluctuance in this region and tender

loculations 6 cm distal and proximal to the center of the lesion. Bedside ultrasonography raised concerns for a large abscess, and incision and drainage were performed, yielding over 100 cc of purulent material. Wound and blood cultures were collected, and the patient was started on vancomycin and piperacillin/tazobactam. Complete blood count (CBC), C-reactive protein test (CRP), and erythrocyte sedimentation rate (ESR) were ordered, which were remarkable for elevated CRP of 5.86 and potassium of 2.6. Differential diagnoses considered at this time included cellulitis, abscess, pyomyositis, transient synovitis, septic arthritis.

Due to the large purulent abscess with concern for a loculated abscess proximal to the incision and drainage site, a computed tomography scan of the left lower extremity was obtained. The scan showed signs suggestive of pyomyositis with a possible intraosseous abscess versus osteomyelitis. General Surgery recommended an orthopedics consultation for further evaluation of possible intraosseous and osteomyelitis involvement. Orthopedics recommended an magnetic resonance imaging with and without contrast, which revealed an intraosseous abscess within the left anterior-inferior iliac spine measuring 2.0 x 0.7 x 1.4 cm, a multiloculated intramuscular abscess centered within the left rectus femoris muscle with the largest fluid pocket measuring 13 x 3 x 3 cm consistent with pyomyositis, and abnormal interfascial and intramuscular enhancement in the regional left anterior compartment thigh musculature, concerning for deep tissue infection.

Orthopedics performed irrigation and debridement of the left thigh abscess in the operating room (OR). No bone involvement was noted during the procedure. Intraoperative cultures were collected, and a wound vacuum-assisted closure was placed over the left thigh. The wound culture grew rare fungus resembling Coccidioides species, and a gram stain showed rare gram-positive cocci. Following the Coccidioides results, a bedside interview revealed a history of a cough approximately 6 months ago, 1 month before the initial leg injury.

Infectious Disease was consulted and recommended a full Coccidioides workup, including a chest X-ray, Coccidioides serology, daily amphotericin B intravenous (IV) infusions at 5 mg/kg, and a nuclear medicine whole-body bone scan to evaluate for other sites of osseous dissemination.

The Coccidioides serology CF titer was 1:128 (normal, 1:1), and the chest X-ray revealed no definite acute cardiopulmonary disease. The bone scan revealed focal increased radiotracer uptake in the anterior-inferior left iliac spine, asymmetrically increased uptake in the distal left femoral metaphysis/epiphysis and proximal left tibial epiphysis/metaphysis, and increased blood flow and blood pool activity in the left thigh.

Given the bone scan results, Infectious Disease recommended X-rays of the left knee and femur, which revealed subtle periarticular osteopenia with small joint effusion. On postoperative day 6, the wound culture returned positive for ampicillin-sensitive

Enterococcus faecalis, and antibiotics were changed to amoxicillin 1000 mg three times a day for 3 weeks. During the hospital stay, the patient experienced hypokalemia, likely secondary to amphotericin B, requiring daily potassium supplementation.

After 3 weeks of daily amphotericin B IV infusions with potassium supplementation, the patient was discharged with a peripherally inserted central catheter (PICC) line in his right arm and instructed to continue infusions on a Monday, Wednesday, Friday schedule until 3 months from the initial infusion date. Upon completion, he will transition to oral fluconazole for at least 3 years. The patient was also discharged with oral amoxicillin for *Enterococcus faecalis,* potassium chloride pills for prophylactic management of hypokalemia, and magnesium tablets for diarrhea management caused by the infusions. Outpatient follow-up visits were scheduled with orthopedics, infectious disease, and pediatrics.

Discussion. Coccidioidomycosis, also known as Valley Fever, is an infection caused by Coccidioides, primarily the *Coccidioides immitis* and *posadasii* species.[7] These are endemic to southern Arizona, central California, southern New Mexico, and Texas.[8] Coccidioidomycosis is typically asymptomatic, but when symptomatic, it presents with respiratory involvement and rarely as a disseminated (extrapulmonary) infection involving the skin, bones, liver, brain, or heart.[9] Coccidioides causing pyomyositis is exceedingly rare, especially in an immunocompetent individual.[3]

This case of Coccidioides-induced pyomyositis in a 15-year-old male is an unusual presentation of the infection. Most cases of pyomyositis are caused by bacteria, with very little literature on fungal myositis, and no reported cases of Coccidioides in the anterior compartment of the thigh. Further highlighting the uniqueness of our case is that the patient had no evidence of a compromised immune system. No immunological testing was performed during the hospitalization; however, patient denied any previous diagnoses of conditions that weaken the immune system including HIV, diabetes, sickle cell, or any other autoimmune conditions. The patient was also not taking any immunosuppressive medications and had never completed any type of chemotherapy or radiation therapy. Most reports of pyomyositis involve immunocompromised individuals such as those with HIV/AIDS or those undergoing immunosuppressive therapy.[3]

The diagnosis of Coccidioides pyomyositis requires a high level of suspicion. Although rare, there is evidence indicating an increase in both Coccidioides infections and pyomyositis cases in the United States, particularly in endemic areas.[10] This case underscores the importance of traditional diagnostic measures; had it not been for the wound cultures performed in the emergency department, the presence of Coccidioides might have gone unrecognized, potentially leading to disease progression and delays in treatment.

This case highlights the rarity of Coccidioides causing pyomyositis in an immunocompetent adolescent. Given typical presentation of Coccidioides and etiology of pyomyositis, this case emphasizes the importance of considering fungal pathology in the differential diagnoses,

particularly in endemic areas. Further research is warranted to enhance our understanding of the pathophysiology, epidemiology, and management strategies for fungal pyomyositis. Increasing awareness of the uncommon manifestations of Coccidioidomycosis can lead to an earlier diagnosis and better patient outcomes in clinical settings.

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