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Case Report

Percutaneous transgluteal computed tomography-guided aspiration of obturator internus pyomyositis in adolescent athlete: A case report and literature review

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ABSTRACT

Pyomyositis is an uncommon infection of muscle that is usually managed conservatively, but, can progress to abscess formation requiring open surgical drainage. We present the first reported case of a 14-year-old male with obturator internus pyomyositis requiring computed tomography-guided percutaneous transgluteal drainage for the management of a right obturator internus abscess. We present this case report to provide an alternative to the open surgical management of abscesses from pyomyositis by means of successful computed tomography-guided drainage.

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Introduction

Pyomyositis is an uncommon infection of muscle that presents with nonspecific signs and symptoms that may mimic other, more common diseases [1–4]. Diagnosed early, successful treatment can be achieved with several weeks of appropriate antibiotics, rest, and no residual functional deficits [1–5]. Given a delay of days to weeks, pyomyositis can

progress to abscess formation with resultant challenges in treatment and complications of bacteremia including septic shock [1,2,4] and death [1].

Case

A 14-year-old African-American male initially presented to the emergency department with right thigh pain and painful

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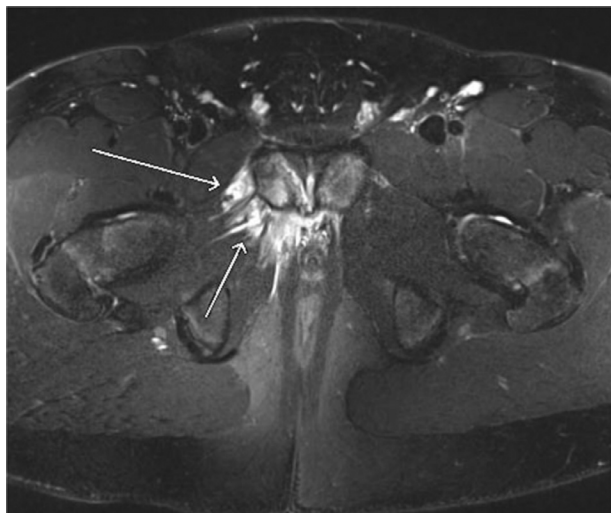


Fig. 1 – Axial T2 fat-saturated postgadolinium MRI demonstrates edema and intramuscular tears involving the right obturator internus and externus muscles and mild widening of the right pubic bone apophysis with edema at the superior ramus. MRI, magnetic resonance imaging.

ambulation but no fever. He was otherwise healthy with no significant past medical history or trauma but had developed pain upon doing butterfly stretches as part of his football conditioning routine the day before presentation. Pain was then described as a pulling sensation on active and passive movement, otherwise full range of motion was present. Initial workup showed mild leukocytosis to $14,500/\mu\text{L}$ with 59% polymorphonuclear cells, erythrocyte sedimentation rate (ESR) of 10 mm/h, and C-reactive protein (CRP) of 5.7 mg/dL. Outside hospital computed tomography (CT) of his pelvis with and without contrast revealed a concerning area of pelvic bone. Magnetic resonance imaging (MRI) of the pelvis with contrast, subsequently performed to rule out osteomyelitis and osteosarcoma, showed intramuscular tears and edema involving the right obturator internus and externus muscles, and mild widening of the right pubic bone apophysis with edema at the superior ramus (Fig. 1). He was initially thought to have osteitis pubis so he was discharged with crutches, 600 mg ibuprofen as needed for pain and instructions to avoid sports and follow-up with sports medicine in 1 week.

He was readmitted to the hospital after 4 days with worsening symptoms of abdominal and thigh pain causing an inability to walk. Since his prior admission, he had additionally developed worsening pain in both shoulders and generalized myalgias, malaise, emesis, and diarrhea. Vitals demonstrated tachycardia and tachypnea, otherwise he was afebrile and normotensive. Physical exam was notable for limited range of motion at the right hip due to pain, diffuse tenderness to palpation in all quadrants of the abdomen without distension or rebound, and no focal neurologic deficits.

Upon workup, labs were significant for a white blood cell count of $12,100/\mu\text{L}$ with an ESR of 59 mm/h and CRP of 20.7. CT of the abdomen and pelvis with contrast showed a right obturator internus muscle fluid collection with enhancement

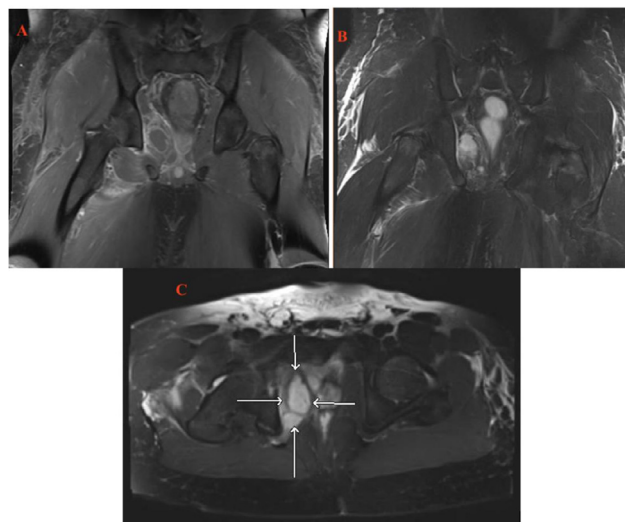


Fig. 2 – Coronal MRI postgadolinium T1 fat-saturated (A) and STIR (B), and axial T2 fat-saturated (C) showing: abscess in right obturator internus muscle, myositis in right external obturator muscle with involvement of abductor magnus and anteromedial right gluteus minimus, abnormal fluid signal intensity along medial aspect of right pubic bone and pubic symphysis concerning for abscess development and extension into pubic symphysis, and right pubic bone osteomyelitis. MRI, magnetic resonance imaging.

at the site of the muscle tear. He was empirically given 1 gram of ceftriaxone and started on intravenous vancomycin for a suspected infectious process in the emergency department. He was admitted to the intensive care unit for further observation.

In the intensive care unit, oxacillin and clindamycin were added to his antibiotic regimen, and blood and urine cultures were ordered. Urine cultures showed no growth, but blood cultures yielded methicillin sensitive *Staphylococcus Aureus* (MSSA) on day 2 in the intensive care unit, at which point vancomycin was discontinued. MRI of the left shoulder and repeat MRI of the pelvis showed myositis in the left shoulder and an enlarging $5.4 \times 2.4 \times 3.8 \text{ cm}^3$ fluid mass in the right obturator internus muscle with osteomyelitis of the right pubic bone (Fig. 2).

He was continued on IV oxacillin and clindamycin, and his daily blood cultures remained positive for three consecutive days after which they stayed negative for 2 days before discontinuation of blood cultures. Patient then underwent abscess drainage by interventional radiology on day 5 of readmission.

In preparation for the drainage procedure, the patient was placed in prone position and localizing images were performed using preprocedural CT that redemonstrated a $5.3 \times 2.2 \text{ cm}^2$ hypodense region in the right obturator internus muscle (Fig. 3). Using CT guidance, a 15-cm One-Step needle was advanced into the hypodense abscess via the transgluteal, infrapiriformis approach, and 5 cc of a cloudy, tan-colored fluid was collected for culture and sensitivity analysis. The sheath was then extended and the needle removed. Next, a



Fig. 3 – Axial (A) and coronal (B) preprocedural CT with arrows pointing to a peripherally enhancing 5.3 x 2.2 cm² fluid collection in the right obturator internus muscle. CT, computed tomography.

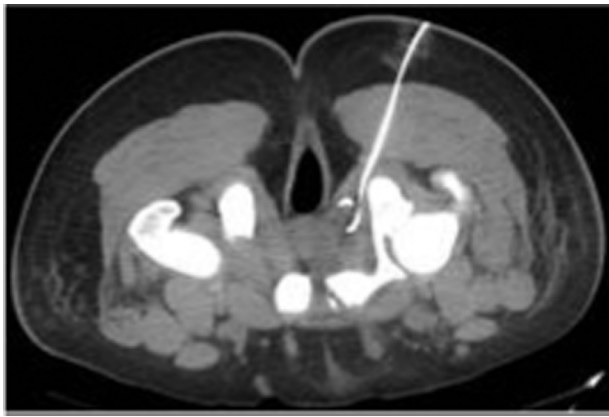


Fig. 4 – Postprocedural axial CT with patient in prone position showing transgluteal drainage catheter in the right obturator internus muscle abscess. CT, computed tomography.

guide wire was guided through the sheath and coiled within the abscess. The sheath was then carefully removed, leaving the guide wire within the abscess. The entrance route gauge was increased using serial dilators as necessary to allow for catheter insertion. An 8 French all-purpose drainage catheter was subsequently guided over the wire and into the abscess, ensuring all catheter holes were securely within the cavity for optimal drainage (Fig. 4). Approximately, 15 cc of fluid was aspirated from the abscess. The procedure proceeded with a total sedation time of 21 minutes and was technically successful without immediate complications. The catheter was maintained to external bulb suction until postprocedure day 4. No follow-up imaging was performed after drainage.

Patient remained febrile until postprocedure day 2 with downward-trending white blood cells, ESR, and CRP. A peripherally inserted central catheter (PICC) was placed on postprocedure day 3 in the patient's left upper extremity for continuation of IV antibiotics at home with Ancef 2 grams every 8 hours for 6 total weeks of antibiotics. At discharge on postprocedure day 7, day 12 of hospital stay, patient denied any pain during ambulation when using crutches, white blood cells and ESR were noted to be 8900/ μ L and 79 mm/h, respectively. Patient was scheduled for close outpatient follow-up with infectious disease and physical therapy (PT).

Initial assessment by PT was done 1 week after hospital discharge and demonstrated limitation in range of motion (ROM) and strength from pain, described as pressure present bilaterally at the anterior hips but predominantly right sided on internal and external hip rotation. Physical therapy proceeded for 6 weeks after the discharge, with gradual but significant improvement in range of motion (ROM) and strength with every visit. ESR and CRP gradually normalized with return to baseline around one month after discharge.

After completion of 6 weeks of antibiotics as planned, the peripherally inserted central catheter was removed. Patient denied any pain with ambulation and climbing stairs, and full range of motion (ROM) and strength were demonstrated on physical exam. At that time, it was determined that no further follow-up was needed with infectious disease and PT.

Discussion

Pyomyositis is more commonly seen in areas with tropical climates, hence the commonly used alternate names *myositis tropicans* or *tropical pyomyositis* [1]. The most common presenting signs and symptoms of pelvic pyomyositis are pain, fever, and limp [2]. As with our patient, detailed history can include recent trauma or possible strain to the pelvic region [1–4,6]. Upon further investigation, leukocytosis with elevated or upward-trending ESR and CRP is likely [1–4].

Pelvic pyomyositis can initially be misdiagnosed due to its nonspecific and often-times inconsistent presenting signs and symptoms [1,7], such as our patient presenting without fever. Differential diagnoses for a clinical presentation similar to that of our patient's should include diseases such as septic arthritis, osteomyelitis, as well as pelvic pyomyositis [1–5,7]. Septic arthritis is typically given the highest priority due to more immediate risk and severity of complications [3–5]. Typically, an arthrocentesis would be performed to evaluate for septic arthritis; an arthrocentesis free of microbial infection indicates the necessity for an MRI of the region [3,4]. Prior MRI of our patient demonstrated concerning pubic bone and obturator internus and/or externus muscle tears during his initial evaluation for appendicitis. These results, in addition to postliminary, more sensitive MRI [8], deemed an arthrocentesis of the hip unnecessary given the substantial evidence for pyomyositis.

Pyomyositis can be divided into 3 discrete stages that correlate with distinct clinical and diagnostic features [1,7]. During the invasive stage, diffuse tissue inflammation occurs, often from an inciting strain or trauma to the muscle [1,2,7]. At this stage, nonspecific signs and symptoms of fever and malaise with more localizing indicators of aches and tension that preclude proper muscle function might obligate the heedful investigator to a more extensive workup [1]. Most patients present during the next, suppurative stage, during which an organized abscess becomes apparent [1,7]. It is postulated that inoculation of the area of initial muscular injury by an organism occurs during a transiently bacteremic state [1,2,8], as commonly occurs after dental procedures [9], IV drug-use [10], or even brushing teeth [9]. This stage can present with more exaggerated localized and systemic signs of infection such as

focal soft-tissue swelling with exquisite tenderness at the site of the abscess and fever [1]. The late stage is characterized by systemic toxicity [1] with its likely sequelae of multisystem organ failure and eventual mortality. MRI imaging is most useful for diagnosing and discerning between stages of pyomyositis development [1,2,6].

One prospective study on 43 children who presented with clinical findings of hematogenous musculoskeletal infection found MRI to be highly diagnostic with a sensitivity of 97% and specificity of 92% [8]. In the invasive stage of pyomyositis, imaging might show muscle enlargement with slight enhancement on T1 images [1,11,7,12]. Initial imaging of our patient did not readily reveal muscle enlargement or enhancement outside of what would be expected with obturator internus and/or externus muscle tears and resultant edema, thus suspicion did not exceed a threshold for further workup. As the disease progresses to the suppurative stage, T1 imaging will show abscess with a peripheral rim of increased intensity [7,12], consistent with findings in our patient upon readmission. CT imaging, although reported to be highly sensitive (100%), has also been shown to be much less specific (43%) for muscle abscess formation as hypointensity findings could also correlate with necrotic neoplasms and chronic hematomas [3].

Interestingly, our patient likely had multifocal pyomyositis in different stages of progression. Upon hospital readmission, an organized abscess localized to the right hip was appreciated on MRI, consistent with the second, suppurative stage of pyomyositis. At the same time, the patient's bilateral shoulder pain with imaging findings consistent with shoulder myositis imply a high likelihood of coinciding invasive stage of pyomyositis development in the shoulders. These findings further add to the discussion [1,2,8] about a metastatic nature to the bacteremic muscular seeding of the disease. Subsequent antibiotic treatment likely rid the developing infection in the shoulders, obviating necessity for future drainage, and abated the local extension of the pelvic infection.

Antibiotics are the mainstay of treatment for any variant of pyomyositis and should immediately be employed upon clinical suspicion [6]. Previous studies have shown *Staphylococcus aureus* and *Streptococcus pyogenes* to be the two most common causative agents [1,3,6]. In the 2014 update to the CDC's *Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections*, IV vancomycin is recommended as initial empirical therapy and should be given in conjunction with an IV agent against enteric gram-negative bacilli in immunocompromised patients or following open trauma to the muscles [6]. Cefazolin or antistaphylococcal penicillins are then recommended to hone antibacterial coverage if MSSA is cultured [6]. In accordance with these guidelines, our patient was initiated on IV vancomycin and dosed with ceftriaxone for broad coverage of methicillin resistant *Staphylococcus aureus*, gram-positive, and gram-negative organisms. Upon growth of MSSA, vancomycin was discontinued, and the patient was continued with 6 weeks of oxacillin and clindamycin with resultant complete resolution.

After sizable abscess maturation becomes apparent on imaging, a drainage procedure will usually be required [6,13]. Traditionally, abscesses had been drained with open surgical procedures such as the Pfannenstiel and ilioinguinal ap-

proaches [13]. The open approaches, while also offering a high likelihood of complete recovery, have been associated with significantly prolonged hospital stays and persistence of infection that were mitigated by usage of percutaneous drainage (PCD) [14]. Contraindications to PCD are peritoneal signs, active hemorrhage, and lack of maturation of the abscess wall [13]. In the absence of contraindications, image-guided PCD is now recommended [13] for abscess drainage if imaging is negative for extensive muscle involvement and significant necrosis that require surgical intervention and debridement.

We successfully performed a CT-guided PCD with a transgluteal, infrapiriformis approach. The transabdominal approach is commonly utilized for simplicity to perform aspirations of pelvic abscesses [15]; however, a transgluteal approach was preferable given the anatomic location of the obturator internus muscle. The obturator internus muscle originates within the lesser pelvis and exits through the lesser sciatic foramen to insert into the medial aspect of the greater trochanter. The transgluteal approach allowed for less interposing pelvic tissue and viscera such as bowel, bladder, and uterus when compared to a transabdominal aspiration. Furthermore, an infrapiriformis approach was chosen for easier circumvention of the sciatic nerve, gluteal vessels, and sacral plexus when compared to the transpiriformis approach, reducing the risk of complications. One of the most commonly reported complications of the transgluteal approach is associated pain or discomfort [15,16]. When compared to the transpiriformis approach, the infrapiriformis approach was found to have a significantly lower risk of postprocedural pain [15,17] and hemorrhage [15]. Our patient did experience some mild local postprocedural pain but no other complications. As postprocedural fluid collections are common and may not be infected [13], it was determined that follow-up imaging to evaluate for disease resolution was not needed unless his clinical presentation indicated a need.

It is important to recognize pyomyositis as a clinically relevant disease. Earlier detection and more immediate antibiotic administration minimize the likelihood of disease sequelae and complications, including abscess formation and death. We present this case report in the pursuit of raising future awareness of this rare disease and to detail an effective means of abscess aspiration. We hope that our reportings help guide future approaches to diagnosis and treatment of pyomyositis and improve standard of care.

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