Primary Pyomyositis in a Young Boy: Clinical and Radiologic Features

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KEY WORDS: primary pyomyositis, purulent myositis, pyogenic abscess, pelvic muscle infection, musculoskeletal computed tomography and magnetic resonance imaging

IMAJ 2010; 12: 511–513

Primary pyomyositis is an uncommon bacterial infection of striated muscle. Pyomyositis is typically a tropical disease and is rarely seen in temperate climates [1]. It is caused by transient bacteremia rather than a local extension of infection and the usual causative organism is *Staphylococcus aureus* [2]. Because of its rarity in childhood and its non-specific signs and symptoms, pyomyositis may cause diagnostic problems for physicians. Various imaging modalities are readily available and will often lead to a diagnosis of soft tissue or muscle abscess. We report here a case of primary pyomyositis of the left obturator muscles (internal and external) associated with septic pulmonary emboli, and discuss the various diagnostic modalities that are helpful for diagnosis and follow-up.

PATIENT DESCRIPTION

A 10 year old boy presented to our emergency room with severe left hip pain causing him to limp, a high fever, vomiting and headache that had begun a day before. Two days earlier he had fallen and mildly injured his left thigh. The child was otherwise healthy. Physical examination at admission showed skin pallor, body temperature of 39.6°C, pulse 105/min, blood pressure 114/76, and respiratory rate 35 breaths/minute. His left hip joint showed a limitation in extension and flexion. The white blood cell count was 8700/mm^3 with 60% neutrophils, and erythrocyte sedimentation rate of 74 mm/hour. C-reactive protein was 101 mg/dl. Left hip joint infection was suspected and parenteral antibiotics with cefuroxime and clindamycin were started (after blood was drawn for cultures). X-ray of the pelvis and left hip, chest X-ray and ultrasound of the abdomen were normal. A technetium bone scan revealed no abnormality.

For further evaluation, contrast-enhanced CT scan of the abdomen and pelvis was performed, which revealed swelling of the left internal and external obturator muscles with central low attenuations consistent with intramuscular abscess. In addition, blurring of fat and facial planes and stranding of the subcutaneous fat were also noted [Figure A]. There was no evidence of bone destruction. A number of pulmonary nodules at the bases of both lungs consistent with septic pulmonary emboli were detected. MRI examination of the pelvis performed a few days later demonstrated loculated fluid signal intensity in the substance of the left internal and external obturator muscles, suggestive of an abscess and associated with edema of the surrounding tissues [Figure B and C]. Left hip joint effusion was observed, probably representing secondary synovitis.

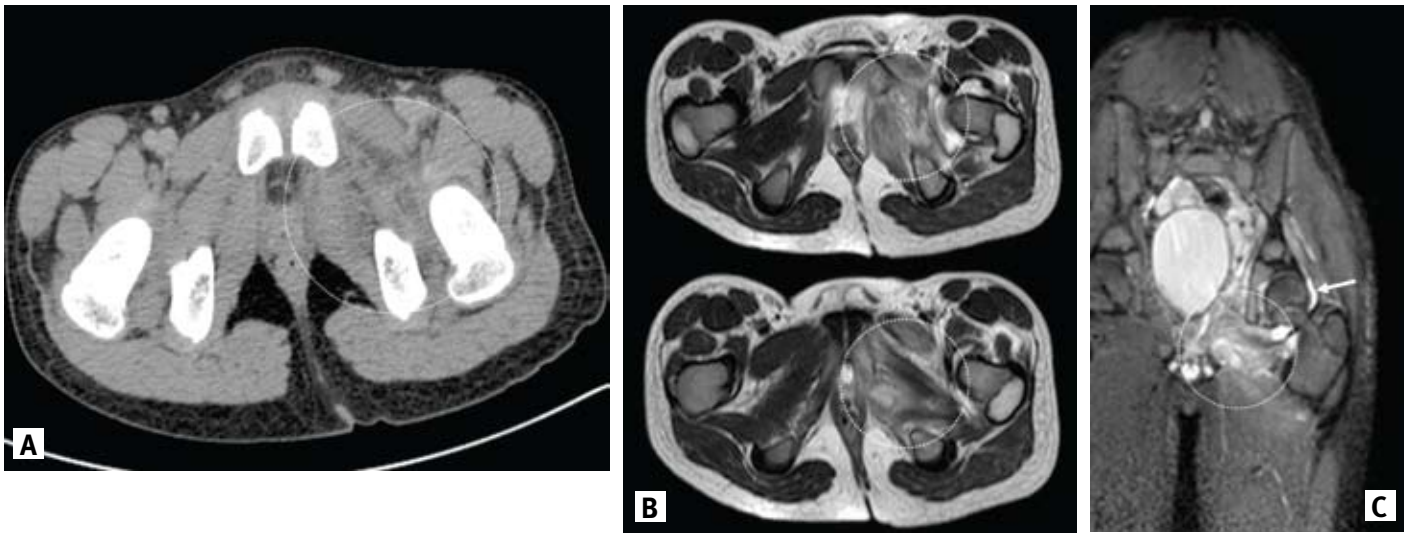
Staphylococcus aureus was identified in three blood samples. The patient was treated with intravenous and oral antibiotics (cloxacilin) for 6 weeks and the symptoms resolved.

COMMENT

Pyomyositis is a primary bacterial infection involving the deep skeletal muscles and is not uncommon in a tropical population [1,2]. Various terms have been used to describe this condition: tropical primary myositis, bacterial myositis, suppurative myositis, purulent myositis, and pyogenic abscess. Pyomyositis is caused by transient bacteremia rather than local extension of infection. The causative organism of pyomyositis is *Staphylococcus aureus*, however β-hemolytic Streptococcus group A, *Escherichia coli*, Enterococcus, and *Mycobacterium avium* have also been reported [1,2]. Conditions that have been associated with pyomyositis in temperate climates include human immunodeficiency virus infection, other viral and bacterial infection, parasitic infestation, intravenous drug abuse, diabetes mellitus, leukemia, asplenia, lupus erythematosus, Felty's syndrome, sickle cell anemia, and malnutrition. Pyomyositis caused by intramuscular injections has also been reported [3].

Primary pyomyositis can involve any muscle in the body and in the vast majority of cases only a single muscle is affected. The most common site of infection is the quadriceps muscle, followed by the gluteal and iliopsoas muscles. The shoulder and upper extremity muscles are infrequently involved. Internal and external obturator muscle involvement, such as in our case, is rare. Pyomyositis is characterized by three stages: a) the invasive stage, consistent with an inflammatory process of a skeletal muscle that clinically manifests as cramping pain, with or without fever; b) the suppurative or purulent phase,

A 10 year old boy with primary pyomyositis of the left obturator muscles. **[A]** Axial CT image of the pelvic area shows enlargement and decreased attenuation of the left obturator muscles (internal and external) with effacement of the surrounding fat planes (circle). **[B]** Axial T2-weighted MRI images of the pelvic area show diffuse ill-defined increased signal intensity and swelling of the left obturator muscles on the left side, including a small fluid collection representing intramuscular abscess (circle). **[C]** Coronal MR STIR (short tau inversion recovery) demonstrates swelling and increased signal in the left obturator muscles (circle). Left hip joint effusion is noted, probably representing secondary synovitis (arrow).



usually associated with fever and possibly proceeding to intramuscular abscess formation; and c) the late stage, in which patients present with systemic symptoms and signs of sepsis. This stage of pyomyositis is potentially life threatening and requires urgent treatment.

Most patients with pyomyositis present in the suppurative phase. The patient described here was admitted to the hospital during the suppurative stage of pyomyositis with bacteremia of *Staphylococcus aureus*. The blunt trauma to the muscles in the left thigh and pelvis from the fall – a few days before the admission – may have been the underlying predisposing factor of pyomyositis in our patient. A damaged muscle area from blunt trauma (post-traumatic muscle contusion) may serve as a nidus for skeletal muscle infection in patients with *Staphylococcus aureus* bacteremia [4]. Pyomyositis may also spread from adjacent bone or soft tissue infection, and via lymphatics from infected skin.

Various non-invasive diagnostic modalities such as ultrasound, computed tomography and magnetic resonance imaging have been used to evaluate patients with suspected musculoskeletal infection. Ultrasonographic features in cases with pyomyositis include non-homogeneous echo texture of the muscle fibers with or without hypoechogenic areas representing fluid collection or small intramuscular abscesses [5]. However, in patients with pyomyositis of the pelvic region with involvement of the internal obturator muscle, such as in our case, ultrasound may not be conclusive. Imaging is crucial for the diagnosis of pyomyositis and further evaluation with CT and/or MRI is required. CT shows enlargement and decreased attenuation of the affected muscle with effacement of surrounding fat planes. Contrast-enhanced CT scans may show fluid collections with rim enhancing, corresponding to intramuscular phlegmon or abscess. Osteomyelitis should be considered as a differential diagnosis to pyomyositis. CT plays an important role in the assessment of adjacent bones and provides excellent information on the surrounding anatomic structures. CT can help guide treatment during diagnostic aspiration or drainage of an intramuscular abscess and is useful for surgical planning. MRI provides superior contrast resolution as compared to CT. MRI is considered the imaging modality of choice for the diagnosis of pyomyositis as it most clearly demonstrates the anatomic extent of musculoskeletal soft tissue infections as well as any subsequent abscess formation. The main MRI features are diffuse linear or ill-defined increased signal intensity on the T2-weighted images, as well as contrast enhancement in cases of fluid collections with a rim enhancement on T1-weighted sequences. Having a high sensitivity to reactive inflammatory changes, MRI is an extremely valuable tool for the early diagnosis of pyomyositis [2]; however, it is usually not the first cross-sectional test available in the emergency department and is more time consuming and more costly than CT.

Medical management of uncomplicated pyomyositis is with antibiotics. Most patients can be treated successfully with intravenous administration of a single antibiotic. Cloxacillin is a suitable and common choice. Intramuscular

abscess formation, however, may require imaging-guided drainage along with antibiotic therapy. Such treatment usually results in complete recovery with no long-term sequelae in most cases.

In conclusion, although primary pyomyositis is rare, pediatricians should consider it in any patient with febrile disease and joint complaints. The presenting clinical symptoms are usually nonspecific. Early and accurate diagnosis, established with CT and/or MRI, prevents local and systemic complications, avoids surgical intervention and allows successful treatment with antibiotics.

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