Case Report
Community-Acquired MRSA Pyomyositis: Case Report and Review of the Literature

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Received 4 September 2010; Revised 11 December 2010; Accepted 12 January 2011

1. Introduction
The differential diagnosis of fever and back pain in an intravenous drug abuser is broad. Pyomyositis is an intramuscular abscess of the large skeletal muscle groups with most initial cases in the tropics but with increasing worldwide distribution in nontropical areas as well. It is often not diagnosed until the later stages of infection [1]. Diagnosis is based on a combination of clinical, laboratory, and radiologic findings [1, 2]. Once treatment is begun, outcome generally correlates with the extent of disease. We present a case of primary pyomyositis with osteomyelitis that, despite appropriate antibiotics and drainage, progressed and extended into the epidural space, compressing the entire spinal column. The objectives of this paper are to: (1) present a case of progressive pyomyositis and (2) review the diagnosis and treatment of an infection that has been increasing in incidence in tropical and temperate climates.

2. Case
A 46-year-old gentleman presented to the hospital complaining of right paraspinal back pain of 2-month duration with increasing intensity. In the days prior to admission, he had also noticed fevers, decreased appetite and overall malaise.

The patient had a medical history of uncomplicated, untreated genotype 1 hepatitis C virus (HCV) and dyspepsia. Surgical history was unremarkable. He was not taking any medications. He lived at home with his mother. His last reported IV drug use was two months prior. He continued to smoke a pack of cigarettes a day and denied alcohol use. He was heterosexual and denied unsafe sexual practices. There was no recent travel and no history of trauma. He reported an allergic reaction to penicillin.

Initial physical examination revealed a temperature of 102.2 degrees Fahrenheit, a heart rate of 137 beats per minute, a blood pressure of 109/71 mmHg, and a respiratory rate of...
Figure 1: Sagittal thoracolumbar spine MRI with STIR (short T1/tau inversion recovery): day 1 (a) and day 11 (b). Serial MRI images of the thoracic and sacral spinal cord from hospitalization day 1 (a) and day 11 (b) using STIR (short T1/tau inversion recovery) sequences. Panel A shows a 12 × 3 cm multiloculated abscess of the right paraspinal musculature in the L2–L5 region, and subtle enhancement of the L3-L4 transverse processes, consistent with osteomyelitis. There is no epidural abscess. The MRI in (b) shows extensive rim enhancement of the epidural column and severe anterior compression of the spinal cord.

On hospital day 2, Blood and abscess cultures grew methicillin-resistant Staphylococcus aureus (MRSA) sensitive to vancomycin with a minimum inhibitory concentration [MIC] of ≤0.5 μg/mL.

The patient improved clinically by hospital day 5. White blood cell count, which initially had increased, trended down to normal. His catheter was not draining any fluid. The peak vancomycin level measured on day three was 32 mcg/mL, with a trough of 12 mcg/mL. A transesophageal echocardiogram ordered on admission for initial concern for endocarditis revealed a small filamentous echodensity in the right anterior mitral valve leaflet consistent with a small ruptured chordae without evidence of vegetations or valvular regurgitation. A human immunodeficiency virus (HIV) antibody test was negative. His HCV viral load was 1.32 × 10^6, with a normal alpha-fetoprotein level and an ultrasound consistent with cirrhosis but without focal masses. Surveillance cultures remained with no growth. The patient inadvertently removed the pigtail catheter 4 days after insertion, on hospital day 6. He remained afebrile.

On hospital day 11, the patient complained of new onset tingling in his fingertips bilaterally with upper extremity weakness and minimal discomfort of his shoulders and chest muscles. Exam at this time showed no meningismus, normal cranial nerve function and reflexes. Strength was decreased bilaterally and symmetrically on shoulder abduction (2/5), elbow flexion and extension (4/5), abductor pollicis brevis function (3/5), finger abduction (4/5) and finger extension (3/5). There was continued, decreased right paraspinal tenderness but an improved psoas sign, with no new findings...
Figure 2: Saggittal T1 cervical spine MRI: day 1 (a) and day 11 (b). Serial MRI images of the cervical spine from hospitalization day 1 (a) and day 11 (b). (a) shows a relatively normal cervical spine with only mild degenerative disc protrusion and mild canal stenosis at C6-C7. (b) shows epidural enhancement and marked anterior compression of the spinal cord beginning at the level of C1 and continuing caudally.

3. Discussion

Pyomyositis is a supplicative infection of the large skeletal muscles without an apparent spread from contiguous structures. Initially reported largely in the tropics, it has become a disease of worldwide occurrence, with many cases reported in temperate climates [1]. Thought to be due to seeding of a muscle from transient bacteremia, the exact pathophysiology is unknown, as only 5% to 37% of patients with pyomyositis are bacteremic [1]. *Staphylococcus aureus* is responsible for greater than 70% of infections [2], though multiple other organisms have been reported [3]. Cases of MRSA pyomyositis have been increasing reported to date [4]. Comorbid conditions may contribute to the pathogenesis of pyomyositis, with approximately half of infected patients having diabetes mellitus, cirrhosis, aplastic anemia, sickle cell disease, rheumatologic disease, malignancy, or a history of intravenous drug use or being immunosuppressed either by the use of a medication or by HIV [5, 6].

The most commonly involved muscles are those in the thigh and gluteal region, though infection of the deltoid, psoas, biceps, gastrocnemius, and paraspinal region have also been reported [6]. Classically, pyomyositis is described as occurring in three stages [1]. Stage 1 manifests as crampy muscle pain and low grade fever. There is often no sign of underlying muscle or soft tissue swelling or infection. Patients often do not present at this stage due to the vague nature of the complaints. If they are seen by a physician, the condition is often misdiagnosed. Stage 2 begins two to three weeks after the initial onset of symptoms and includes worsening muscle pain, swelling, erythema and fever. A localized purulent collection has developed by this stage, and patients often seek medical attention. If patients are not treated in this stage, they progress to stage 3, which include sepsis and clinical signs of toxicity. Diagnosis involves recognition of the appropriate signs and symptoms as well as a high index of suspicion.

Adjunctive laboratory testing is often not helpful, with variations in the white blood cell count, C-reactive protein and/or erythrocyte sedimentation rate being dependent on underlying diseases, especially, HIV, and often being nonspecific [7]. Despite obvious muscle destruction, serum creatine kinase and aldolase are often normal [8].
cultures are positive only in a minority of patients. MRI with gadolinium contrast is the preferred diagnostic test, if available, showing low signal intensity on T1 weighted images and high signal intensity with diffuse borders and contrast enhancement of T2 weighted images [9]. It is often difficult to diagnose without MRI given the vague and subacute presentation. While other imaging modalities have been used in resource-poor settings, MRI with gadolinium contrast is the gold-standard imaging test especially in cases of infections that affect more than the extremities, as it can provide a more specific diagnosis if there are multiple infections simultaneously (i.e., pyomyositis and osteomyelitis, as in this case) [10].

Treatment of pyomyositis is dependent on the stage of the infection at diagnosis [1]. Stage 1 can be treated with oral antibiotics. More advanced stages require intravenous antibiotics with initial broad coverage for all potential pathogens, keeping in mind that patients with underlying medical comorbidities have a higher risk of gram-negative infections. Often times, interventional radiology or surgical intervention is necessary to drain abscesses and fluid collections. Complications of pyomyositis include muscle scarring, residual weakness, osteomyelitis, septic arthritis, pericarditis and septic shock, among others [1]. With appropriate therapy, patients usually recover well without sequelae.

What is unique to the present case is that the patient’s infection progressed despite appropriate antibiotic therapy and drainage. It also highlights the close anatomical relationship of the involved progressive infection: the initial pyomyositis of the paraspinal muscle, which lies just posterior to the lumbar transverse processes, and psoas muscle, which abuts the lateral portion of the vertebral body, had eroded into the lumbar vertebrae and eventually extended into the spinal canal. Despite the dramatic clinical deterioration of our patient, he made a complete recovery without any permanent neurological deficits.

Funding

No financial support was received for this work by any author. All authors report no conflict of interests.

References

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