CASE REPORT

Klebsiella pyomyositis with complications: a quadriceps quandary in a dialysis patient

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Abstract

The authors report an extremely rare case of Klebsiella pneumoniae pyomyositis of the left thigh in a patient with type II diabetes mellitus on renal replacement therapy (haemodialysis), with untreated hepatitis C. This patient presented via the dialysis unit with fevers, rigors and a swollen left thigh and knee. Initial differential diagnoses included deep vein thrombosis with systemic inflammatory response syndrome, septic arthritis and crystal arthropathy—all of which were subsequently excluded. Although missed on ultrasound duplex scan, lower limb magnetic resonance imaging (MRI) revealed communicating abscesses in the anterior and medial compartments of the left thigh, with associated inflammation of the muscle. Blood cultures on admission and cultures from direct aspiration of the abscesses grew Klebsiella pneumoniae. The abscesses were managed with a computed tomography-guided drain and combination antibiotic therapy.

INTRODUCTION

Recorded cases of pyomyositis in the UK are rare and are frequently associated with immunosuppressive conditions such as HIV, malignancy and diabetes mellitus [1]. Diagnosis can be difficult or delayed, especially if the affected muscle is deep with no superficial evidence of infection [2]. Pyomyositis of the hip or thigh can present as knee pain and may mimic septic arthritis, as it did in the case we report [3]. Pyomyositis should be considered as a differential diagnosis in immunosuppressed patients presenting with the clinical features of septic arthritis.

CASE REPORT

A 50-year-old gentleman on renal replacement therapy, with poorly controlled type II diabetes mellitus presented with fevers, rigors and worsening left knee pain, which diminished his range of movements and created difficulty in weight bearing. Past medical history also included untreated hepatitis C infection (genotype 2) and multiple complications of his diabetes due to non-compliance, including neuropathy and significant maculopathy. He received haemodialysis three times per week by an arteriovenous fistula on his left forearm.

One week prior to this admission, he had presented to the same hospital complaining of lethargy and a swollen left knee. He was found to be anaemic (Hb 80 g/dl) and had raised inflammatory markers (WCC 14.5 × 10⁹/l, CRP 72 mg/l). A left knee effusion was aspirated: no crystals or organisms were seen, and subsequent culture was negative in addition to negative blood cultures. He was discharged with broad-spectrum antibiotics, but no clear source of infection was identified.

On examination, he was apyrexial, with a temperature of 36.8°C. His left thigh and knee were tender, particularly on the lateral aspect. Flexion and extension of the knee was limited. Examination otherwise was normal. Significant findings from his blood tests were a raised white cell count (18.2 × 10⁹/l), neutrophil count (16 × 10⁹/l), C-reactive protein (151 mg/l), creatine kinase...
(193 u/l) and aspartate transaminase (56 u/l). Haemoglobin was 105 g/dl.

With clinical findings of a swollen knee and marked inflammatory response on blood tests, the initial working diagnosis was septic arthritis. Blood cultures grew *Klebsiella pneumoniae*, but the knee aspirate was negative, also ruling out inflammatory arthritis. He was started on intravenous fluoroquinolone, gentamicin and vancomycin (the latter two administered whilst on dialysis). Because of the swollen leg, deep vein thrombosis (DVT) was excluded on duplex ultrasound. He had a computed tomography (CT) of chest, abdomen and pelvis to identify a source of infection as well as to rule out malignancy in the context of untreated hepatitis C and anaemia. Apart from thickening of the oesophageal wall, there was no lymphadenopathy, abscesses or local inflammation. This patient was HIV negative, but upper gastrointestinal endoscopy showed oesophageal candidiasis, an opportunistic infection specific to immunosuppressed patients.

Magnetic resonance imaging (MRI) of the left leg demonstrated (Fig. 1) two communicating abscesses in the medial and anterior compartments of the thigh. Contrast was not administered due to the risk of nephrogenic sclerosis in a haemodialysis patient. Since both abscesses were communicating, he was initially managed with a drain inserted under CT guidance. Purulent, frothy fluid drained, with subsequent culture confirming *Klebsiella pneumoniae*, resistant to ampicillin. He was changed to ertapenem on the advice of the microbiologists and continued to receive this for 5 weeks during dialysis. During this period, his drain remained in situ, with a transition from purulent to serous fluid (~100 ml/day).

He presented 2 months later with further episodes of fevers and rigors as well as left knee pain. A repeat MRI of the femur confirmed the suspicion of osteomyelitis secondary to pyomyositis but was felt that these changes were in keeping with chronic osteomyelitis. Considering this patient’s renal osteodystrophy, a bone biopsy was inappropriate due to significant complications, including fractures. On the recommendations of the microbiologists, he received a 2-week course of intravenous fluoroquinolone, followed up by a 6-week course of oral ciprofloxacin and rifampicin. Repeat MRI scanning 7 months after the start of this episode showed no evidence of osteomyelitis and complete resolution of the intramuscular abscesses with only scarring remaining (Fig. 2).

**DISCUSSION**

The authors report an extremely rare case of *Klebsiella pneumoniae* pyomyositis in an immunosuppressed patient. Our case highlights the necessity that clinicians should have high index of suspicion of pyomyositis in immunosuppressed as it is now recognized that these patients have a higher rate of multifocal disease and mortality [2]. Gram-positive bacteria, such as *Staphylococcus aureus* and *Streptococcus pyogenes*, are hypothesized to be the predominant microorganism in pyomyositis because they possess adhesins that enable bacteria to adhere to extracellular matrix proteins of skeletal muscle, a characteristic that gram-negative bacteria lack [4]. Although *Klebsiella pneumoniae* is associated with diabetic patients in the form of liver abscesses, the specific association with pyomyositis is still unclear [5].

Presenting symptoms of pyomyositis can be subtle and misleading among immunosuppressed patients due to poor host inflammatory response [2]. Three stages of the disease process have been described to correlate with symptoms: invasive (bacterial seeding), suppurrative (abscess formation) and final stages (septicaemia and multi-organ dysfunction) [6]. The presentation of localized, muscular pain, oedema and low-grade fevers in the first stage frequently leads to the misdiagnosis of muscle strain or contusion [6]. Pain and swelling in the second stage lead to differentials of DVT, septic arthritis or osteomyelitis [6].

Blood tests (including inflammatory markers) can also be misleading in pyomyositis particularly in immunocompromised patients [2]. Even though there is extensive muscle involvement and evidence of muscle necrosis, serum creatine kinase and aspartate aminotransferase are typically normal [2]. Blood cultures are positive in ~30% of the cases, and the rate is believed to be higher in gram-negative infections [7]. A high index of suspicion is required, particularly in immunocompromised patients, with confirmation by MRI with gadolinium contrast for diagnosis [2].

If identified in the first stage, antibiotic therapy covering *Staphylococcus aureus* infection is usually sufficient, as well as antimicrobials with gram-negative actions in immunocompromised individuals. The later stages require parenteral broad-spectrum

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**Figure 1:** Coronal view of abscess, demonstrating communication between the medial and anterior compartments of the left thigh.

**Figure 2:** Transverse plane demonstrating the extension of the abscess in the anterior compartment of the left thigh, with mild fluid levels.
antibiotic treatment, usually accompanied by a drainage procedure. Patients with underlying comorbidities are more likely to have a complicated disease course and therefore require close follow-up. Although frequency of complications of the infection is not well established, recurrence of the disease has been reported to be 18.9% ($n=74$) and 2.1% ($n=95$) in immunosuppressed and immunocompetent patients, respectively [2]. Although gram-negative organisms or mycobacteria have been reported to be associated with recurrence, no other factors have been identified [1]. Damage to striated muscle through trauma has been suggested to be a risk factor based on animal models, but this has not been recognized in literature reviews [8].

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CONFLICT OF INTEREST STATEMENT

None declared.

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ETHICAL APPROVAL

No ethical approval is required. All identifiable patient information has been removed from this manuscript.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the editor of this journal.

GUARANTOR

D.J. was the consultant physician caring for this patient and is the guarantor of the paper.

AUTHOR CONTRIBUTIONS

All authors were directly involved with the care and management of this patient. A.M.D.N. conducted the literature review and created the manuscript with M.H. All authors edited the manuscript and reviewed the manuscript prior to submission.

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