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CASE REPORT

Serratia Myositis in an Intravenous Drug User

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ABSTRACT

Serratia marcescens is a well-known causative agent of hospital-acquired infections, especially in the intensive care unit (ICU), but can also cause community-acquired infections. Infectious myositis due to *Serratia* is an extremely rare infection. We present a rare case of myositis due to *Serratia marcescens* in an intravenous drug user. To the best of our knowledge this is the first case of *Serratia marcescens* infectious myositis in an intravenous drug user. Our report not only reminds us that *Serratia marcescens* could be a pathogen in the community, but also highlights the fact that drug users are a special population with rare and unusual infections and as a result the clinician must have a high clinical suspicion and vigilance in order to diagnose and treat them.

INTRODUCTION

Serratia spp, particularly *Serratia marcescens*, have been recognized as a cause of a wide variety of hospital-acquired infections, especially in the intensive care unit (ICU). However, various studies have shown that a considerable percentage of *Serratia spp* infections are also community-acquired.[1] Respiratory, urinary tract infections and keratitis/endophtalmitis are the most common, with meningitis, bacteremia, endocarditis, peritonitis, osteomyelitis and skin infections being occasionally reported.[1] Myositis due to *Serratia* is an extremely rare infection. To the best of our knowledge, only two documented cases of infectious myositis due to *Serratia marcescens* have been described in the literature.[2,3] We present a case of myositis due to *Serratia marcescens* in an intravenous drug user.

Abbreviations
ICU = intensive care unit
ECDC = European Center for Disease Prevention and Control
HIV = human immunodeficiency virus
qd = quaque die (once daily)
bid = bis in die (twice daily)
tid = ter in die (three times daily)

CASE PRESENTATION

A 38-year-old man presented to the emergency department with a 1-week history of pain in the left flank and thigh and fever with rigor during the preceding three days. There was no history of trauma, intense physical exercise or recent admission to a hospital. Five years earlier, hepatitis C had been diagnosed and the patient was an intravenous drug user of illicit drugs.

On examination, the patient was alert and oriented and appeared distressed. The temperature was 38°C, the blood pressure 110/70 mm Hg and the pulse rate 100 beats

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per minute. He was unable to rise or walk because of the severe pain in his left flank that radiated to his left thigh. There was also pain during the active and passive movements of his left hip joint. There was no swelling, erythema or signs of soft tissue infection. The remainder of the examination was normal.

Laboratory studies revealed a hematocrit of 39%, white blood cell count (WBC) at 17.190/mm^3, including 90% neutrophils, platelet count 217.000/mm^3, normal renal function, aspartate aminotransferase (SGOT) 40 U/L, alanine aminotransferase (SGPT) 49 U/L, creatine phosphokinase (CPK) 340 U/L and C-reactive protein 17 mg/dL. Urine analysis was normal and human immunodeficiency virus (HIV) antibody was negative. Chest and abdomen radiography and abdomen ultrasound were normal.

Blood and urine specimens were taken for culture and he was started empirically on combined intravenous antibiotic regimen with piperacillin-tazobactam 4.5 g tid and daptomycin 500 mg qd, while he was placed on intravenous fluids for hydration and was administered drugs for analgesia.

Eight hours later, computed tomography (CT) of the abdomen and pelvis after the administration of oral and intravenous contrast material showed diffuse swelling and enlargement of the left psoas muscle, without evidence of intramuscular abscess, findings typical of myositis of the left psoas (Fig. 1).

Within 24 hours, both sets of the blood cultures turned positive and *Serratia marcescens* was identified. Urine culture revealed no microorganism. Antimicrobial therapy was switched to intravenous ciprofloxacin 400 mg bid and intravenous ceftriaxone 1 g bid.

The fever subsided within 5 days after initiation of treatment, with a marked clinical improvement. On the 8th hospital day, the patient was able to walk without support only with a mild pain in his left flank. He received intravenous antimicrobial therapy for 5 more days and was discharged on oral ciprofloxacin 500 mg bid for one month, but unfortunately he did not attend his scheduled outpatient visit in order to repeat a CT.

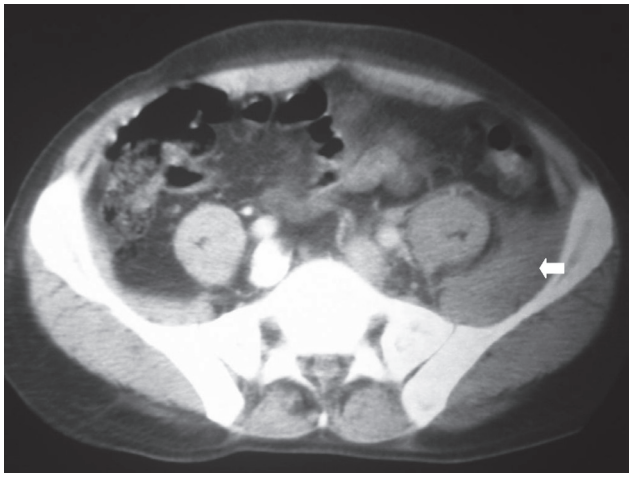

FIGURE 1. Diffuse swelling and enlargement of the left psoas muscle (white arrow), without evidence of intramuscular abscess.

DISCUSSION

We presented a case of *Serratia marcescens* myositis in an intravenous drug user patient successfully treated with antimicrobials. Myositis refers to inflammation of the muscles and may be due to infectious and non-infectious etiologies. Infectious myositis which leads to localized collections within the muscles is referred to as pyomyositis or tropical pyomyositis, as it is an endemic disease in tropical regions.[4]

By definition, infectious myositis is a primary bacterial infection which involves the occurrence of transient bacteremia with no obvious local or adjacent source of infection. It is common throughout the tropics and it was thought to be rare in temperate climates, but with the increasing prevalence of immunocompromised patients, it is becoming more widely recognized in temperate countries.[4] Predisposing factors are trauma, immunosuppresion (HIV infection, diabetes mellitus), malignancy and intravenous drug abuse.

Infectious myositis presents in three stages.[4] The invasive stage involves infection of the muscle, which causes the muscle to become edematous and painful, without a focal collection (myositis). At this stage the condition may be cured by appropriate antibiotic therapy alone, as in our case. The suppurative stage is characterized by formation of an abscess (pyomyositis) and the last stage involves the systemic spread of the infection, leading to septicemia and shock. Treatment in the latter stages requires surgical drainage as well as appropriate antibiotics.

CT and magnetic resonance imaging (MRI) are the best imaging techniques for early diagnosis of myositis. The duration of antimicrobial therapy depends on the extent of the muscle involvement, response to therapy and the immune status of the host, but in general, it must last at least three weeks. During the suppurative stage, surgical drainage should be initiated early and serves as the main component of therapy.

Staphylococcus aureus is the main causative pathogen, affecting 90% of the patients in tropical areas and 60% to 70% of cases in temperate regions. Gram negative bacteria are clearly the exception, even in tropical areas.[5] *Serratia marcescens* is an extremely rare cause of myositis. To the best of our knowledge, only two documented cases of infectious myositis due to *Serratia marcescens* have been described in the literature.[2,3]

Serratia marcescens is a well-known causative agent of hospital-acquired infections.[1] More than 200 cases of hospital epidemics due to *Serratia marcescens* bacteremia have been described since 1950, which are caused by contamination of blood products, indwelling catheters, medical devices but also

of materials in the hospital environment such as disinfectants, soaps and taps, since *Serratia marcescens* thrives in moist environments. According to the European Center for Disease Prevention and Control (ECDC), in 2008 *Serratia marcesens* was the causative agent of the 2% of ICU-related bacteremia. Overall, in the international literature, 75%-90% of *Serratia marcescens* bacteremia cases are hospital-acquired.[6,7]

In the past, it was thought that *Serratia marcescens* may be a serious pathogen in intravenous drug users, because of cases of septic arthritis, osteomyelitis and endocarditis caused by *Serratia marcescens* in heroin addicts during the 1970s,[8] but there have not been many reports of *Serratia marcescens* infections in this patient population since then.

Although skin and soft tissue infections are common among intravenous drug users, infectious myositis is rather rare, probably due to relative resistance of the musculature to infection.[4] Muscle trauma is necessary before experimentally induced bacteremia causes myositis in animals.[9] However, intravenous drug abuse is recognized as an important risk factor for myositis, especially in HIV patients.[5,9] The microorganism reaches skeletal muscles during transient bacteremia which is caused by direct intravenous injections of contaminated material or by introduction of commensal flora into the bloodstream through injection.[10,11] The latter pathogenetic mechanism seems to be more important, since *S. aureus*, which is known to colonize drug users,[12] is the leading cause of myositis in this population.

Our case describes the first documented case of infectious myositis due to *Serratia marcesens* in a drug user. The two other cases of *Serratia marcescens* myositis were in immunocompromised patients.[2,3] Why *Serratia marcescens* myositis is so rare among intravenous drug users? *Serratia marcescens* is not a member of commensal skin flora in the community. Skin colonization with *Serratia marcescens* is exclusively hospital-acquired, usually in elderly patients with previous antibiotic exposure. Therefore, the introduction of commensal flora into the bloodstream, which is the main pathogenetic mechanism of bacteremia in drug users, does not occur in the case of *Serratia marcescens*. Moreover, it is known that during the last decades, intravenous drug users can easily obtain sterile paraphernalia by hospitals, pharmacies or community programs, contrary to the 1970s, when sharing of syringes and the use of tap water was the rule.[13] Probably that is the reason why *Serratia marcescens* infections are not so common today among drug users, as it would be expected. It is known -by the hospital outbreaks of *Serratia marcescens* bacteremia- that common use and prolonged exposure of moist devices in the environment are the ideal conditions for *Serratia* growth.[1,8] The intrinsic resistance of skeletal muscle to bacterial infection explains the rarity of myositis cases due to *Serratia marcescens* in drug users.

In conclusion, infectious myositis was thought to be a rare disease in temperate climates, but its occurrence is increasing during the recent years. To the best of our knowledge this is the first case of *Serratia marcescens* infectious myositis in an injection drug user. This case, not only reminds us that *Serratia marcescens* could be a pathogen in the community, but also highlights the fact that drug users is a special population with rare and unusual infections and as a result the clinician must have a high clinical suspicion and vigilance in order to diagnose and treat them.

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