BJMS
Borneo Journal of Medical Sciences

CASE REPORT

Tropical Primary Pyomyositis of The Right Calf Muscle: A Rare and Unexpected Complication of Jump Squat Exercise

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Received: 29 February 2024

Accepted: 23 August 2024

Published: 2 January 2025

DOI: https://doi.org/10.51200/bjms.v19i1.5581

Keywords: *pyomyositis, Overuse muscular injury, Radio imaging*

ABSTRACT

Diagnosing pyomyositis in its initial or invasive stages can pose a challenge due to its vague initial symptoms, which may mimic other conditions such as muscle strain, localized myositis, hematoma, deep vein thrombosis, cellulitis, or thrombophlebitis. A high index of suspicion for possible pyomyositis necessitates confirmation through radiographic imaging. A delayed diagnosis directly correlates with the time taken to commence treatment, thereby increasing the risk of patient morbidity and mortality. We present a case of a diabetic male who experienced bilateral calf muscle pain and right calf swelling after participating in jumping squat exercises, eventually developing right calf myositis and abscesses over a two-week period, which were initially overlooked by several general practitioners. This case underscores the crucial role of radiographic imaging in confirming the diagnosis, whether in the Emergency Department or any primary care setting. Prompt diagnosis and intervention, as demonstrated here, are imperative for minimizing the risks associated with this potentially severe disease. Knowledge of this condition and its diagnostic methods is highly advantageous for emergency physicians, primary care providers, and family physicians.

INTRODUCTION

Pyomyositis is an acute bacterial infection that

occurs within skeletal muscles and usually results in abscess formation. It is neither secondary to a contiguous infection of the soft tissue or bone nor due to penetrating trauma (Bickel J et al., 2002). Pyomyositis is also known as tropical pyomyositis or myositis tropicans since cases are frequently reported from tropical regions (Agarwal V et al., 2011).

Pyomyositis is commonly seen in immunosuppressed individuals, such as people living with human immunodeficiency virus/acquired immunodeficiency syndromes (HIV/AIDS), diabetes mellitus, leukemia, cancer or malignancy, renal failures, liver disease, and autoimmune diseases (Crum NF. 2004). Pyomyositis has been related to insults that affect skeletal muscle, such as rigorous physical exercise, trauma, injecting drug use, intramuscular injection and underlying viral or parasitic myositis (Amoozgar B et al., 2019).

We present a case of a diabetic male who participated in a jumping squat exercise, resulting in bilateral calf muscle pain. Over two weeks, he developed right calf myositis and abscesses, which were initially missed by several general practitioners. This case emphasizes the critical role of early detection in preventing the serious complications of pyomyositis such as severe sepsis necrotizing fasciitis, or the spread of infection to surrounding tissues (Chiu S et al, 2008). Prompt diagnosis and intervention, as exemplified here, are crucial for minimizing the risks associated with this potentially devastating disease.

CASE PRESENTATION

A 50-year-old Malay man presented at the Emergency Department (ED) complaining of persistent bilateral calf pain and unresolved swelling in his right calf muscle over the past two weeks. These symptoms began after he returned home from a team-building program organized by his institution, during which he actively participated in outdoor activities. He reported experiencing bilateral calf muscle pain after performing multiple jumping squats. Subsequently, he noticed a gradual increase in swelling in his right calf muscle, accompanied by tolerable pain and tenderness. He denied any history of physical injuries or insect or animal bites during these activities.

He visited a General Practitioner who diagnosed it as a soft tissue injury (hematoma and sprain/strain) and prescribed pain relief medication. He also sought treatment from a masseur, but despite these efforts, the pain and swelling persisted without improvement. Nonetheless, he managed to carry out his daily tasks with slight difficulty, particularly during movement, due to the persistent pain and swelling. He denied any history of fever, cough, shortness of breath, chest and back pain, muscle weakness, numbness, nausea and vomiting, or urinary symptoms. The patient suffered from diabetes mellitus for the past 15 years, and it was well controlled with medication.

During the general physical examination, he appeared alert, had a healthy complexion, and showed signs of good hydration. His oral temperature was 37.20 Celsius, pulse rate 84 beats per minute, respiratory rate 16 breaths per minute, and blood pressure measured at 170/90 mmHg. Cardiovascular, respiratory, and abdominal examinations showed normal findings. However, examination of the lower limb revealed bilateral calf tenderness without discoloration of the underlying skin. There was an immobile, non-fluctuant swelling over the right calf muscles, measuring 4 x 3 cm. The mass felt firm, moderately tender, slightly warm, with ill-defined margins, and normal overlying skin. There was slight edema in the right lower leg. Calf pain was elicited during both dorsiflexion and plantarflexion of the right foot. No puncture marks, scratches, injuries, or discoloration were observed on the lower extremities. No palpable right inguinal lymph nodes were detected.

The laboratory results revealed elevated

levels in the total white count, erythrocyte sedimentation rate, C-reactive protein (CRP) and random blood sugar, measuring 13.3x106/L, 54 mm/hour, 42 mg/L, and 18.2 mmol/L, respectively. However, hemoglobin, platelet counts, blood urea, creatine kinase, serum electrolytes, and urine leukocyte and nitrite were within normal ranges.

Ultrasound of the right lower limb indicated increased echogenicity in the lateral gastrocnemius muscle with a collection measuring 2.2 x 0.9 cm. Subcutaneous edema was observed at the posterior aspect of the right leg (Figure 1). The MRI revealed diffuse hyperintense signals on T2W and TIRM within the lateral gastrocnemius muscle, along with a focal collection measuring 2.1 x 1.1 x 1.4 cm (Figure 2). This collection displayed a hypointense rim on the HEMO sequence. Based on the MRI findings, myositis with intramuscular abscess formation was suspected.

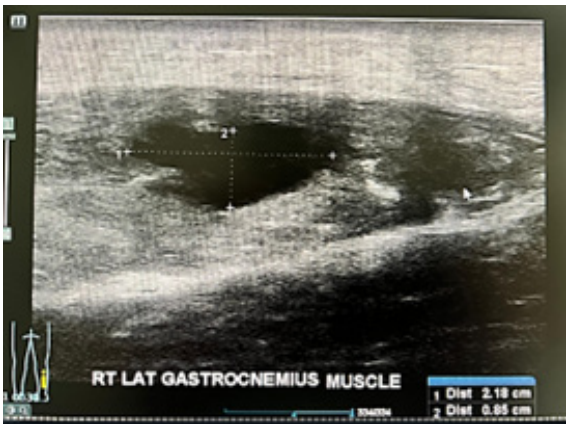

Figure 1: Ultrasound image of right lateral gastrocnemius showing a hypoechoic collection

We referred him to an orthopedic surgeon for incision and drainage under general anesthesia. The diagnosis of pyomyositis in calf muscle was made. However, the source of infection was unknown. Approximately 3-5 mL of pus was drained (Figure 3), and the collected pus was sent for gram stain, culture, and sensitivity tests (C&S). We administered Intravenous antibiotic (cefuroxime 1.5 g stat

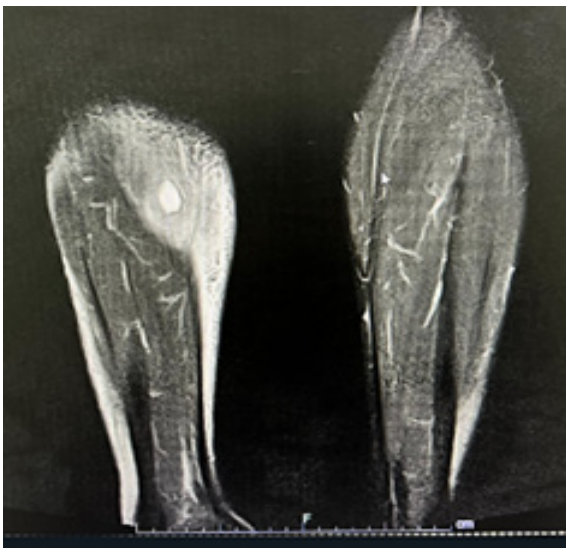

Figure 2: Sagittal view of MRI right lower extremity revealed diffuse hyperintense signal on T2W and TIRM within lateral gastrocnemius muscle. Focal collection of hyperintense signal on T2W and hypointense signal on T1W in lateral gastrocnemius muscle measuring 2.1 x 1.1 x 1.4cm. The collection demonstrated hypointense rim on HEMO sequence. Diffuse enhancement noted within the lateral gastrocnemius muscle. No enhancement of the intramuscular collection in lateral gastrocnemius muscle demonstrated. There was also hyperintense signal on T2W and TIRM in medial gastrocnemius muscle, at lateral proximal aspect. Diffuse subcutaneous thickening and edema at posterior aspect of right leg. No obvious muscle retraction or complete disruption of the muscle. Visualized lower leg vessels are patent.

dose followed by 750 mg 3 times a day) and subcutaneous insulin (Novorapid) 6 unit three times a day. Following wound dressing, the wound was packed with gauze soaked in normal saline. Pus C&S demonstrated heavy growth of Staphylococcus aureus. The organism was sensitive to cefuroxime, augmentin, unasyn, cloxacillin, and other antibiotics.

The subsequent course in the hospital was uneventful. The CRP level decreased from 42 to 18 mg/L. His diabetes medication was optimized. He was discharged with oral

cefuroxime for 2 weeks, etoricoxib, metformin, and empagliflozin. An appointment for a follow-up at the orthopedic clinic was scheduled. During his recent follow-up, two weeks after the incision and drainage procedure, he was completely well, asymptomatic, and the wound had healed satisfactorily.

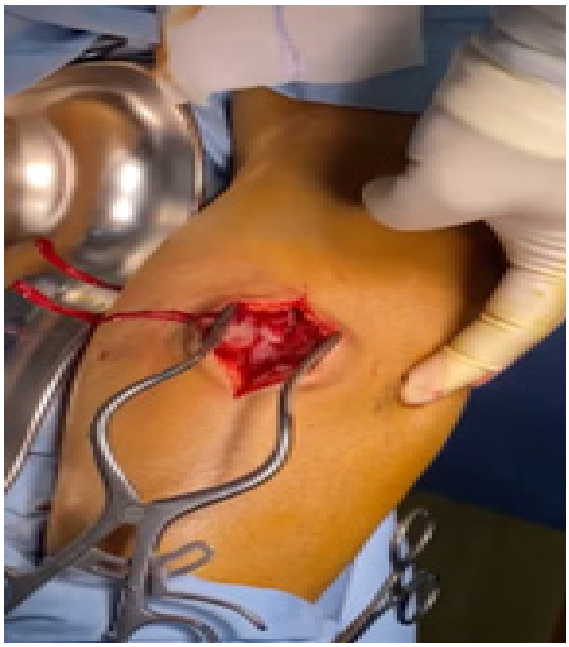

Figure 3: Pus was drained from the gastrocnemius muscle

DISCUSSION

Pyomyositis is an uncommon pyogenic bacterial infection affecting the skeletal muscles, typically caused by Staphylococcus aureus. It is marked by the development of a single or multiple abscesses within the muscle tissue (Chiedozi LC, 1979). Commonly involved muscles are quadriceps, glutei, pectoralis major, serratus anterior, biceps, iliopsoas, gastrocnemius, abdominal and spinal muscles (Chauhan S et al., 2004). The incidence rate of pyomyositis cases is likely attributed to the rising numbers of immunocompromised patients including cancer patients receiving chemotherapy, individuals with rheumatologic conditions taking immunomodulatory agents, as well as those with HIV infection, diabetes mellitus, and liver disease (Maravelas R et al., 2020). In our case, the most probable pathogenesis of pyomyositis involves transient bacteremia occurring alongside muscular injury induced by overexertion during jumping squat exercises and compounded by diabetes mellitus. It is improbable for bacteremia alone, without concurrent muscle damage, to lead to myositis, given the inherent resistance of healthy muscle to infection (Ngor C et al., 2021).

Pyomyositis is categorized as primary or secondary. Primary pyomyositis denotes a purulent skeletal muscle infection arising from presumed or confirmed hematogenous infection (Elzohairy, 2018). It typically results from direct invasion originating from nearby sources of infection like spinal, gastrointestinal, or urinary tract infections. These primary infections often exhibit a subacute onset and predominantly affect extremities or muscles around the hip and pelvis (Hashemi SA, 2012). Therefore, the disease is usually diagnosed late and, for this reason, it is followed by an increased morbidity and sometimes a significant mortality rate (Shittu A, 2020). Conversely, secondary pyomyositis develops from localized penetrating trauma or the spreading of infection to adjacent muscles (Elzohairy, 2018).

The progression of pyomyositis typically unfolds in three stages. Initially, during the first stage, which is typically subacute and spans 1 to 3 weeks, local swelling with a "woody" texture, mild pain, and varying fevers occur. Termed the "invasive phase," this stage involves bacterial infiltration into the muscle, though a definitive purulent collection has yet to form (Chiedozi LC, 1979). Diagnosing pyomyositis during this phase can be challenging due to its vague initial symptoms, which may resemble other conditions such as muscle strain, localized myositis, hematoma, deep vein thrombosis, cellulitis, or thrombophlebitis (Lew KS, 2019). In the second stage, known as the "suppurative" stage, occurring between 10 to 21 days, tenderness and fevers become

more pronounced (Chiedozi LC, 1979). It is during this stage that the diagnosis of pyomyositis is typically confirmed. Notably, common findings in soft tissue infections such as local erythema and regional adenitis are usually absent in pyomyositis. Without prompt diagnosis and treatment, the third stage of pyomyositis ensues, characterized by intense local pain, fluctuance, and systemic manifestations including sepsis (Chiu S et al., 2008).

In our case, the general practitioners missed the diagnosis because our patient presented with localized calf muscle pain and swelling but lacked fever. The diagnosis of pyomyositis relies on imaging. Plain films may show soft tissue swelling, but their utility is limited. Ultrasound, computed tomography (CT), or magnetic resonance imaging (MRI) scans are more sensitive at detecting pyomyositis (Agarwal V et al., 2011 and Ali SZ et al., 2013). Luckily, our Accident and Emergency Unit is equipped with timely ultrasound and MRI capabilities, facilitating diagnosis by detecting myositis and abscess formation.

Determining the causative organism is imperative to optimizing therapy. In our case, analysis of the purulent material extracted during the incision and drainage procedure demonstrated that the strain of bacteria causing the pyomyositis was S. aureus and sensitivity tests revealed that the responsible organism was sensitive to the administered antibiotic, which is intravenous cefuroxime. This finding was expected since S. aureus is the primary culprit in most cases, causing 90% of infections in tropical regions (Narayanappa, 2021) and 60 to 70% in the United States (Christin L, 1992). Notably, few studies indicate community-acquired methicillin-resistant S. aureus (MRSA) is increasingly significant as a cause of pyomyositis (Crum NF, 2004 and Kulkarni GB et al., 2009).

The next most frequent bacteria associated with pyomyositis are streptococci of groups A, B, C, and G, along with S. pneumoniae. Other less prevalent bacterial culprits of pyomyositis encompass gram-negative bacilli, anaerobes like Clostridium spp., Bartonella spp., Mycobacterium spp. like M. tuberculosis and M. avium, and Fusobacterium necrophorum (Crum NF, 2008). The suggested length of antibiotic therapy for pyomyositis usually spans between 2 to 6 weeks, contingent upon various factors like infection severity, the specific causative agent, and the patient's treatment response. In our case, he was completely well and asymptomatic after completing 2 weeks of oral antibiotic. Prolonged treatment may be necessary for multifocal or severe cases, especially when dealing with organisms like Mycobacterium spp (Simopoulou T, 2016). Generally, prognosis is favorable with complete recovery being common; however, recurrence is rare but can happen among immunosuppressed individuals or in cases of atypical infections such as Mycobacterium or Salmonella (Radcliffe C, 2020).

CONCLUSION

This case underscores the nearly missed diagnosis of pyomyositis in the right calf muscle of a poorly controlled diabetic patient with a history of bilateral gastrocnemius injuries due to excessive jumping squat exercise. The condition was almost overlooked due to lack of experience and the absence of fever. A high index of suspicion and confirmation through radiographic imaging are crucial for making the diagnosis. Understanding this rare complication of jump squatting exercises is invaluable for emergency physicians, primary care practitioners, and family doctors.

ACKNOWLEDGEMENTS

The authors would like to thank the Unit A&E and Orthopedic Unit of KPJ Seremban Specialist Hospital for their contributions to this manuscript.

CONFLICT INTEREST

The authors declare that they have no conflict of interest to publish this case report or sponsorship to declare.

CONSENT

Written consent was obtained from the patient prior to the commencement of this case study.

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