

## Case Report

# Pyomyositis caused by *Salmonella enterica*: a rare case report

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### ABSTRACT

Pyomyositis is characterized as a primary bacterial infection of skeletal muscle, with *Staphylococcus aureus* being the most prevalent causative agent. In contrast, pyomyositis attributed to *Salmonella enterica* is an uncommon occurrence, typically observed in immunocompromised individuals, and often presents diagnostic challenges due to atypical laboratory findings. We report a such rare case involving an 82-year-old male who presented with severe bilateral thigh pain and difficulty in ambulation and a history of diabetes. He was admitted with provisional diagnosis of myositis. Laboratory evaluations indicated marked leukocytosis, elevated inflammatory markers, and hypoalbuminemia. These elevated inflammatory markers and MRI findings collectively suggested the possibility of pyomyositis with myonecrosis. Automated blood culture bactifast confirmed the presence of *Salmonella enterica*. In light of the diagnosis of pyomyositis caused by *Salmonella enterica*, prolonged intravenous antimicrobial therapy and supportive care were commenced. Following the appropriate administration of antibiotic treatment, the patient gradually exhibited symptomatic improvement and achieved hemodynamic stability. Early imaging and prompt initiation of aggressive antimicrobial therapy are essential for achieving favorable outcomes.

**Keywords:** Antibiotics, Inflammatory markers, Pyomyositis, *Salmonella enterica*

### INTRODUCTION

Pyomyositis is a bacterial infection of skeletal muscle, which typically leads to the formation of abscesses. The pathogenesis of this condition is believed to involve hematogenous seeding of the muscle.<sup>1</sup> It is generally characterized as muscle inflammation induced by an infectious agent, with documented cases involving bacterial, fungal, parasitic, and viral pathogens.<sup>2</sup> Pyomyositis is frequently observed in individuals with compromised immune systems, including those living with human immunodeficiency virus/acquired immunodeficiency syndromes (HIV/AIDS), diabetes mellitus, leukemia, cancer or malignancy, renal failures, and autoimmune diseases.<sup>3</sup>

Primary pyomyositis is predominantly caused by staphylococcus aureus, with Gram-negative bacteria being a rare cause. Instances of pyomyositis induced by gram-negative bacteria, such as *Escherichia coli*, *Klebsiella* species, or *Salmonella* species, primarily occur in immunocompromised patients and are associated with a significantly high mortality rates.<sup>4</sup>

The management of *Salmonella* pyomyositis necessitates prompt initiation of antimicrobial therapy, in conjunction with surgical or percutaneous drainage when abscesses are present. Third-generation cephalosporins and fluoroquinolones are commonly utilized, with treatment duration typically ranging from three to six weeks, depending on the severity of the disease and the clinical

response. Early recognition and appropriate intervention are paramount in reducing morbidity and mortality.<sup>5</sup>

In this report, we present a rare case of pyomyositis attributed to *Salmonella enterica*, emphasizing its unusual etiology, diagnostic challenges, and therapeutic considerations.

**CASE REPORT**

An 82-year-old male, had a history of diabetes and presented to us with the complaints of pain in both thighs, difficulty in getting up from sitting position and difficulty in walking due to pain. He was admitted here for further management. On examination, he appeared toxic and dehydrated. A provisional diagnosis of myositis with possible neuropathy was made, and treatment was initiated with intravenous fluids, analgesics, proton pump inhibitors, basal-bolus insulin therapy, and other supportive measures.

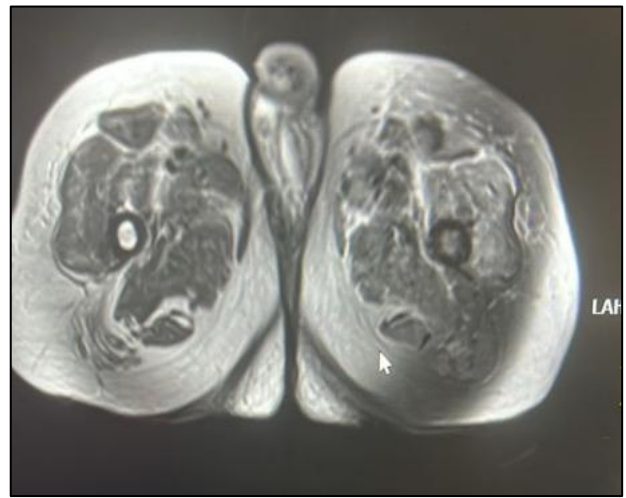
Initial laboratory investigations revealed in Table 1. Blood and urine cultures were sterile, and dengue serology was negative. Two-dimensional echocardiography showed concentric left ventricular hypertrophy with grade I diastolic dysfunction. Neurology consultation was obtained in view of the proximal muscle weakness. During hospitalization, the patient developed high-grade fever (up to 102°F) with worsening leukocytosis, elevated CRP, and deteriorating renal function, prompting initiation of intravenous meropenem in view of sepsis, impending MODS. Nephrology and rheumatology consultations were obtained for acute kidney injury and suspected inflammatory myopathy, and recommendations were followed.

**Table 1: Laboratory investigations.**

Parameters	Readings
<b>Creatine phosphokinase</b>	191 U/l
<b>Albumin</b>	3 gm/dl
<b>Lactate dehydrogenase</b>	187 U/l
<b>Erythrocyte sedimentation rate</b>	70 mm/hour
<b>C-reactive protein</b>	25.6 mg/l
<b>Serum creatinine</b>	2.3 mg/dl
<b>Potassium</b>	4.4 mEq/l
<b>Sodium</b>	128 mEq/l
<b>Total leukocyte count</b>	23,650/mm <sup>3</sup>
<b>Magnesium</b>	1.2 mg/dl
<b>Calcium</b>	7.9 mg/dl
<b>Urine myoglobin</b>	Negative
<b>ANA</b>	Negative
<b>Mi-2β</b>	Positive

MRI of the thigh was performed and indicated multiple well-defined irregular patchy areas of T2 and STIR hyperintensities within the left gluteus maximus and both anterior and posterior thigh muscles, indicative of

myonecrosis (Figure 1). The raised inflammatory markers alongside MRI findings confirmed the possibility of pyomyositis with myonecrosis. A plastic surgery consultation was obtained, and a muscle tissue culture and biopsy were performed, and no microorganisms were detected in the tissue cultures. Meanwhile, to exclude myositis and paraneoplastic syndromes, a whole-body PET-CT scan was performed, which demonstrated diffuse inflammatory changes. In view of severe hypoalbuminemia (1.7 gm/dl), intravenous albumin was administered, following which the patient showed gradual symptomatic improvement and became hemodynamically stable. Serial monitoring of CRP, renal function tests, and CPK was continued.



**Figure 1: MRI of the thigh showing multiple well-defined irregular patchy areas of T2 and STIR hyperintensities.**

In view of persistent high-grade fever, elevated inflammatory markers, and leukocytosis, an infectious disease consultation was sought, and blood culture processed using the Bactifast system showed positive for *Salmonella enterica* bacteria, we confirmed that the patient was diagnosed with pyomyositis infected by *Salmonella enterica*, immediately intravenous doxycycline and teicoplanin were discontinued. Antibiotic was continued with injection meropenem and levonadifloxacin as per Bactifast report. Antimicrobial therapy was maintained for presumed pyomyositis in the setting of uncontrolled diabetes mellitus. The patient improved clinically and is being discharged in stable condition. On follow up patient had no recurrence to patient is doing fine.

**DISCUSSION**

Pyomyositis is an acute bacterial infection of skeletal muscle that can develop into abscess or myonecrosis and, while it is typically caused by staphylococcus aureus, gram-negative pathogens such as *Salmonella* are rarely recognized in patients with comorbidities, as illustrated by this atypical case with significant muscle involvement and systemic inflammation.

Diabetes mellitus is a commonly noted risk factor for salmonella soft-tissue infections.<sup>6</sup> In the present case, the patient had longstanding diabetes mellitus, which probably aided hematogenous spread of salmonella to skeletal muscle. In contrast to traditional accounts where salmonella pyomyositis typically affects the psoas muscle during the bacteremia, our patient exhibited significant involvement of the gluteal and bilateral thigh musculature, emphasizing an unusual anatomical spread.<sup>7</sup>

The clinical manifestation of pyomyositis frequently appears nonspecific during the initial invasive phase and may involve localized muscle discomfort, weakness, fever, and functional impairment, similar to what was observed in our patient.<sup>8</sup> While hospitalized, our patient experienced a continuous high-grade fever (reaching 102°F), along with an increased total leukocyte count, elevated c-reactive protein levels, and deteriorating renal function, suggesting a systemic inflammatory response and progression of the disease. These clinical markers indicate significant inflammation in the patient.

Imaging played a central role in establishing the diagnosis. Magnetic resonance imaging (MRI) is regarded as the most sensitive method for the early identification of pyomyositis and for defining the scope of muscle involvement, edema, abscess development, and myonecrosis.<sup>9</sup> In our case, MRI of the thigh indicated that the left gluteus maximus and both anterior and posterior thigh muscles were affected, showing signs of myonecrosis, which suggests a progressed stage of the disease.

Blood culture remains the gold standard for the diagnosis of salmonella enterica infections, particularly in regions where typhoid and nontyphoidal salmonellosis are prevalent and other rapid tests lack specificity. Automated blood culture platforms have been shown to detect salmonella spp. effectively from bloodstream infections, underscoring the reliability of the reported positive culture in this case.<sup>10</sup>

Treatment of *Salmonella pyomyositis* involves either medical management or a combination of medical care and surgical intervention. Nonetheless, there are no precise recommendations accessible because of the infrequency of the condition. A lengthy course of antibiotics is required for full recovery. Based on prior research, a minimum of 4 weeks of antibiotic treatment is necessary for *Salmonella* muscle abscess and sacroiliitis. Quinolones are commonly utilized for treating *Salmonella* infections in muscles and bones.<sup>11</sup> In earlier reported cases, meropenem has been successfully utilized in individuals with serious sepsis, extensive muscle involvement, or resistant strains, frequently alongside other medications and supportive treatments.<sup>12</sup>

In our case, broad-spectrum therapy with intravenous meropenem, tigecycline, and emrok was initiated in view of severe systemic infection. Following confirmation of

*Salmonella enterica*, antibiotic therapy was continued with intravenous meropenem, in view of *Salmonella pyomyositis* and uncontrolled sugars, emphasizing the importance of culture-guided treatment in improving outcomes. Patient was discharged in stable condition.

## CONCLUSION

Pyomyositis associated with *Salmonella enterica* is an uncommon yet significant differential diagnosis for febrile patients suffering from muscle pain, particularly in individuals with poorly managed diabetes mellitus. Prompt identification, suitable imaging, and swift start of broad-spectrum antibiotics are essential for positive outcomes. Timely and assertive medical intervention can result in full recovery and avert complications.

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