CASE REPORT

The Muscle Menace: A Case Report of Cervical Pyomyositis Caused by *Salmonella Sp.*

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ABSTRACT

Cervical pyomyositis is characterized by a collection of pus within the skeletal muscles in the neck region. Patients typically present with neck pain, swelling, and fever. Due to its uncommon occurrence, it can pose diagnostic challenges. We present the case of a 40-year-old man without a significant medical history who developed cervical pyomyositis due to Salmonella enteritidis, an uncommon etiology for this condition. Despite the absence of known exposure to Salmonella, the patient presented with neck swelling, pain, and limited neck movement, accompanied by intermittent fever. An enhanced CT scan of the neck revealed a large abscess involving the left sternocleidomastoid muscle extending into adjacent structures. He was treated with incision and drainage and targeted antibiotic therapy. This case highlights the potential for uncommon pathogens to cause cervical pyomyositis and high index of suspicion with proper investigation is necessary for timely diagnosis and optimal management of such cases.
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INTRODUCTION

Cervical pyomyositis is an uncommon yet potentially severe bacterial infection of the muscles in the neck, marked by the formation of abscess within the skeletal muscles of the neck. Pyomyositis typically affects large muscle groups of the upper and lower limbs. It rarely develops in the neck region, accounting for only a small proportion of cases (3). The illness commonly manifests as localized pain with fever, often resembling other more prevalent neck disorders, which might lead to diagnostic difficulties. *Salmonella* species are recognized as pathogens that mostly cause acute gastroenteritis, but they can also result in extraintestinal manifestations in immunosuppressed individuals. These bacteria rarely cause pyomyositis, particularly in patients who do not have any established risk factors or predisposing circumstances.

CASE REPORT

A 40-year-old man with no known medical illness who works as a technician in the oil and gas industry presented with neck swelling, pain, and limited neck movement, accompanied by intermittent fever for two weeks. His symptoms worsened despite antibiotics prescribed by his general practitioner, leading him to seek care at the emergency department. On examination, he displayed stable vital signs, torticollis, and an 8 x 6 cm left lateral neck swelling which was erythematous, tender and firm with a small fluctuant area. Initial suspicion of a left parotid abscess prompted a referral to the ENT team.

Laboratory investigations revealed leukocytosis, increased C-reactive protein, and a random blood glucose level of 17 mmol/L (Table I). A CT scan of the neck revealed a large left sternocleidomastoid intramuscular abscess extending into the left parotid gland, the left digastric muscle, and the left posterior cervical space (Fig. 1). He was admitted and initiated on intravenous amoxicillin-clavulanate, with insulin therapy started for

hyperglycemia. Incision and drainage done revealed an abscess with 30 cc of pus drained and was sent for culture and sensitivity, tuberculosis workup, and fungal culture. Additionally, tissue from the debridement procedure was sent for histopathological examination, and blood cultures were also sent.

Table I: Summary of Laboratory Investigations

Investigations	Results	Reference range
White blood cell	18.1 (N 76%, L 16%)	(4-10) x 10^9/L
Hemoglobin	11.2	13-17 g/dL
Platelet	265	(150-410) x 10^9/L
Urea	3.1	3.2-8.2 mmol/L
Creatinine	72	62-115 µmol/L
C-reactive protein	11.1	0.0-1.0 mg/dl
Random capillary blood glucose	17	< 7.8 mmol/L
HbA1c	11.1	< 5.7%

N = Neutrophil; L = Lymphocyte; HbA1c = Hemoglobin A1c

Fig. 1: CT scan of the neck showing multilobulated rim enhancing collection within the sternocleidomastoid muscle

The pus culture and sensitivity revealed pure non-lactose fermenter colonies on MacConkey agar (Fig 2), identified as *Salmonella* species by MALDI-TOF. Further testing with Vitek GN ID confirmed the isolate as non-typhoidal *Salmonella* with a 96% probability. Serotyping confirmed the strain as *Salmonella* enteritidis. Antibiotic susceptibility testing exhibited susceptibility to ampicillin, ceftriaxone, ciprofloxacin, and trimethoprim-sulfamethoxazole. Blood cultures were negative, as were TB and fungal workups. Histopathological examination of the tissue showed granulation tissue infiltrated by inflammatory cells with focal tissue necrosis.

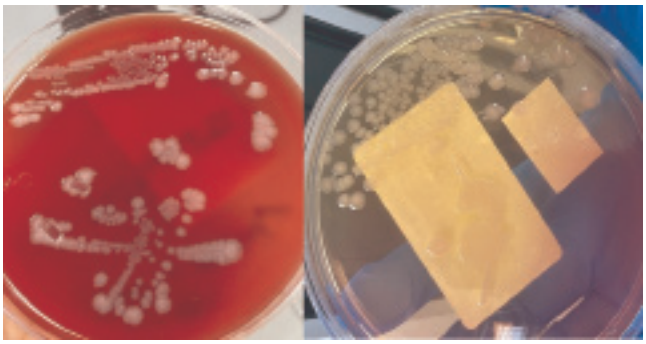

Fig. 2: *Salmonella sp.* growth on blood agar and Mac Conkey agar

Postoperatively, the patient recovered well and was discharged with a two-week course of ciprofloxacin and subcutaneous insulin. He was referred to a government health clinic for further follow-up on his newly diagnosed diabetes mellitus.

DISCUSSION

A neck abscess, characterized by a collection of pus resulting from an infection within the intricate neck structures, poses significant risks if diagnosis and treatment are delayed, potentially leading to life-threatening complications such as airway obstruction, jugular vein thrombosis, or mediastinitis. Common etiologies for neck infections include pharyngitis, odontogenic sources, peritonsillar abscesses, traumatic injuries, and lymphadenitis (1). However, a less common but noteworthy presentation involves bacterial infections of the neck muscles, known as cervical pyomyositis.

Pyomyositis advances in three stages: an invasive phase, characterized by the seeding of bacteria into the muscle without abscess formation; a suppurative phase, marked by the formation of abscesses and is commonly diagnosed at this stage; and the late stage, which, if untreated, can result in septicemia and substantial mortality. To diagnose pyomyositis, advanced imaging modalities such as ultrasound, CT, or MRI scans are frequently required (2).

Treatment of pyomyositis typically involves antibiotic therapy for the early stages, while advanced stages may require incision and drainage in addition to antibiotics. Staphylococcus aureus is the predominant causative organism, with common muscle locations affected including the psoas, quadriceps, and gluteus muscles. Pyomyositis in the neck is rare, occurring in only 0.4%

of cases (3), and it is thought to arise from bacterial entry into muscle cells via fibronectin binding receptors, particularly in individuals with a history of muscle injury or certain immunocompromised states that predispose to pyomyositis (4).

Pyomyositis secondary to *Salmonella* infection is uncommon, especially in the absence of underlying hematological, immunosuppressive, or endocrine disorders. There have been several published case reports of cervical pyomyositis due to this organism, but in those cases, the patients were either immunocompromised or had obvious exposure to the pathogen. In this case, the patient had no known medical conditions before this presentation and denied any history of exposure that could have led to the infection. Only during the current presentation was this patient diagnosed with diabetes mellitus and discharged with insulin. Diabetes increases the risk of *Salmonella* infection because it reduces stomach acidity and prolongs gastric transit time (2).

Furthermore, the patient's presentation with a large intramuscular abscess involving the sternocleidomastoid muscle and adjacent structures was initially suggestive of a typical bacterial etiology, such as *Staphylococcus aureus* and *Streptococcus pyogenes*. However, the etiological organism in our case was found to be *Salmonella enterica serovar Enteritidis*. Unlike previously reported cases of sternocleidomastoid pyomyositis by *Salmonella* sp., this patient was not a poultry farmer and denied any history of specific exposure to *Salmonella* (1, 2).

The median age of the patients with *Salmonella* sp.-caused pyomyositis was 51 years, and there was a 2.9 to 1 male-to-female ratio. Approximately 50% of the cases were attributed to *Salmonella enteritidis*. 81% of the patients had various pre-existing illnesses, mostly diabetes and human immunodeficiency virus infection (4).

Other than the newly diagnosed diabetes mellitus, this patient had no other known risk factors for acquiring *Salmonella* infection. He denied recent travel, consumption of undercooked meat or eggs, exposure to reptiles, or contact with individuals known to have *Salmonella* infection or chronic carriers of the organism. It is possible that this patient may have unknowingly consumed undercooked food, which could have been a risk factor.

This organism may cause intramuscular abscess via hematogenous dissemination or localized spread through predisposing trauma (2). *S. Typhi* and *S. Paratyphi* have human reservoirs, while non-typhoidal *Salmonella* (NTS) can be acquired from various animals. Extraintestinal infections usually start in the gut, when bacteria enter the bloodstream and spread. *Salmonella* infections normally require ≥100,000 organisms, but some serovars and susceptible populations, such as small children, the elderly, and immunocompromised individuals, may require a lower infectious dosage. This organism's type III secretion system in SPI-1 is needed for bacterial-mediated endocytosis and intestinal epithelial penetration. Their fimbriae help them adhere to the gut wall. They may then infiltrate the gastrointestinal tract's lymphoid tissue, usually in the terminal ileum and distal ileal loop, causing hematologic dissemination and organ translocation. Because they can survive degradation and survive in phagosomes after merging with lysosomes, they can also exist and proliferate in macrophages and the reticuloendothelial system.

The pathogen in this case was identified using MALDI-TOF MS and the VITEK® 2 GN system. While MALDI-TOF MS accurately identifies common *Salmonella* serotypes with 100% sensitivity, additional testing with the VITEK® 2 system is necessary to confirm typhoidal *Salmonella* spp. due to the risk of misidentification (5). The VITEK® 2 Gram-Negative (GN) identification card used in this case is a one-time diagnostic tool for the automated detection of Gram-negative bacilli which utilizes 47 biochemical tests including enzymatic activity and carbon source utilization assays.

Treatment involves incision and drainage of the abscess and appropriate antibiotic therapy, usually requiring a 2 to 4-week course of antibiotics. In this case, the patient responded well to ciprofloxacin and was discharged home with a two-week course.

CONCLUSION

This case emphasizes the need to investigate uncommon pathogens in patients presenting with neck abscesses especially when initial antibiotic treatment does not yield satisfactory results or atypical presentation, such as neck muscle involvement is present. A comprehensive evaluation, which includes imaging modalities such as ultrasound, CT scans, or MRI scans, as well as laboratory procedures such as culture and sensitivity testing and histopathological examination, is required for accurate diagnosis and effective management.

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