

**BJMHR**

British Journal of Medical and Health Research

Journal home page: www.bjmhr.com

Unusual Pathogens from Unusual Sites: A Case of Multifocal Sternoclavicular Septic Arthritis Isolating *Salmonella* Paratyphi B

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ABSTRACT

Septic arthritis of the sternoclavicular joint is usually caused by Gram-positive cocci, and accounts for under 1% of orthopedic infections. Gram-negative organisms, especially those by *Salmonella* sp. are particularly rare. This report follows the case of a 42-year-old lady presenting with MRI-confirmed multifocal infective arthritis extending to the pectoralis major. Joint aspirate yielded *Salmonella* Group B, and a prior Widal test suggested *Salmonella* Paratyphi B exposure. Targeted specific antibiotic therapy resolved the patient's symptoms. This case highlights the importance of comprehensive bacteriological workup in atypical cases, and the efficacy of early and culture-guided treatment in rare infections, to prevent complications.

Keywords: Septic Arthritis, Immunocompromised host, *Salmonella* infections

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Received 02 September 2025, Accepted 05 October 2025

INTRODUCTION

A) Background:

Septic arthritis accounts for up to 15% of orthopedic infections, typically affecting large, weight-bearing joints. Septic arthritis of the sternoclavicular joint, however, is extremely rare and comprises less than 1% of the cases. [1] While Gram-positive cocci are the most common cause, infections with Gram-negative organisms have also been reported. [2] Septic arthritis caused by *Salmonella* species is particularly uncommon. This is a rare case of sternoclavicular septic arthritis caused by *Salmonella* Paratyphi B.

B) Case History:

A 42-year-old lady presented with a two-week history of progressive pain and swelling in the right upper chest, and decreased range of motion in her right arm. On examination, tenderness and swelling were noted at the right sternoclavicular joint, extending to the right anterior chest wall. The patient is a known case of diabetes mellitus, on treatment for the last 20 years. Magnetic Resonance Imaging revealed multifocal infective arthritis of the right sternoclavicular joint extending onto the right *Pectoralis major* (Figure 1). Joint exudate was aspirated under ultrasonic guidance; culture and sensitivity was requested.

MATERIALS AND METHOD

Primary Gram's-stained smear of the USG-guided aspirate showed a few pus cells and Gram-negative bacilli. The sample was cultured on 5% Sheep's Blood Agar, and MacConkey's Agar, with overnight aerobic incubation at 37°C. Pure growth was obtained on both media, showing non-hemolytic colonies on 5% Sheep's Blood Agar, and non-lactose-fermenting colonies on MacConkey's Agar (Figure 2). The isolate was oxidase negative, catalase positive, actively motile, and culture smear showed Gram-negative bacilli. Routine biochemical reactions for Gram-negative bacilli were put up (Table). Findings of culture, microscopy, and biochemical reactions enabled the identification of Group B *Salmonella*.

Antibiotic susceptibility testing was performed using Kirby Bauer Disk Diffusion Method, and breakpoints interpreted by CLSI 2025 standards.[3] The isolate was susceptible to Ceftriaxone, Ciprofloxacin, Ampicillin, and Co-trimoxazole. Automated Identification and Antibiotic susceptibility testing with VITEK 2 Compact ID/AST system, and VITEK MS Prime (bioMérieux, France) yielded *Salmonella enterica* subspecies *enterica*; susceptible to the same antibiotics.

Blood, urine, and stool cultures were obtained subsequently, which were negative for *Salmonella*. The isolate showed agglutination with *Salmonella* O4 antisera. The patient had undergone Widal test a month before presenting to this institution; it was positive for

Salmonella Paratyphi B(H) which agglutinated at a dilution of 1:320. There was no record of blood culture or prescription of antibiotics at that time.

FIGURE

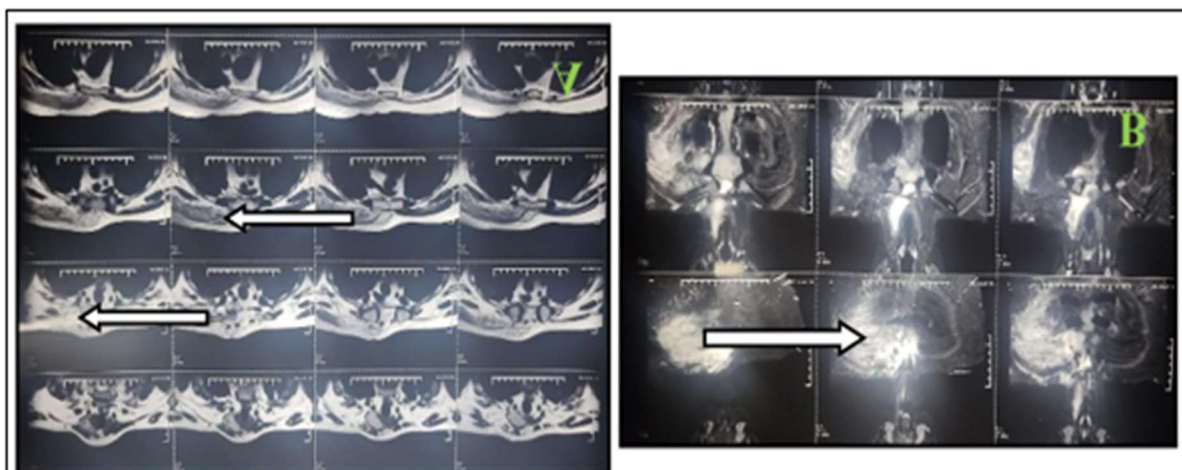


Figure 1: T2-weighted Magnetic Resonance Imaging films showing:

A. Collection at right sternoclavicular joint

B. Involvement of right *Pectoralis major*

Table 1: Showing the biochemical reactions of the isolate

Test	Result
Indole Production	Produced
Methyl Red Test	Negative
Voges Proskauer Test	Positive
Citrate Utilization	Utilized
Urease Production	Not Produced
TSI Agar	K/A with gas and abundant H ₂ S
Lysine Decarboxylase	Decarboxylated
Ornithine Decarboxylase	Not Decarboxylated
Arginine Dihydrolase	Not Di-Hydrolyzed
Agglutination with O4 antiserum	Agglutination seen
Final Identification: <i>Salmonella enterica</i> subspecies <i>enterica</i> serogroup 4 (Group B)	

RESULTS AND DISCUSSION

Patient outcome:

A diabetic lady presenting with MRI-confirmed multifocal infective arthritis extending to the pectoralis major. Joint aspirate yielded *Salmonella* Group B, and a prior Widal test suggested *Salmonella* Paratyphi B exposure. The isolate was susceptible to Ceftriaxone, Ciprofloxacin, Ampicillin, Co-trimoxazole. The patient was administered Ceftriaxone and Ciprofloxacin, to which she responded favorably, with resolution of clinical symptoms.

Typhoidal *Salmonellae* primarily cause enteric fever, although it can invade the intestinal mucosa and enter the bloodstream via lymphatic channels. Joint seeding of *Salmonella* is

relatively rare, but is known to cause septic arthritis, especially affecting large, weight-bearing joints. *Salmonella* infections in the sternoclavicular joint are even rarer, and are typically associated with immunocompromised states, or predisposing factors like diabetes and malignancies. [1], [4], [5]

This patient had multifocal septic arthritis in the right sternoclavicular joint, with soft-tissue invasion. The positive Widal test for *Salmonella* Paratyphi B(H) at the significant dilution of 1:320 indicates the probability of exposure with *Salmonella* Paratyphi B. The lack of evidence of antibiotic therapy upon the positive Widal test could explain the subsequent seeding of the isolate into the sternoclavicular joint, however, the lack of records for blood cultures from that time hampered the definitive diagnosis as such. As the bacteriological workup in the present case yielded *Salmonella* enterica subspecies *enterica* serogroup 4 (Group B), and the kit used for Widal test in this patient utilized Phase I H-antigen 'b' (as mentioned on her past Widal report), a deductive identification of the isolate as *Salmonella* Paratyphi B was made.

This case underscores the importance of culture and sensitivity testing, as empirical therapy often overlooks rare pathogens, which may lead to treatment failures if not detected early. [5] Favorable response to antibiotic therapy emphasizes the importance of early targeted therapy based on culture and sensitivity testing. This is particularly essential, as treatment failure may lead to severe complications like osteomyelitis or joint destruction. The case also highlights the continued importance of conventional tests like Widal, which in this case, enabled a deductive serotype-level identification.

CONCLUSION

This case reiterates that comprehensive bacteriological evaluation should be a cornerstone of management for atypical presentations of septic arthritis, which ensures that unusual pathogens are accurately identified and effectively treated, which in turn, would prevent complications and sequelae.

DECLARATION:

- **The authors declare no conflict of interest in the present study**
- The patient consented for submission of this case report for publication
- The authors have no competing interests to declare
- No funding was received for this article

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