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Case Report

Salmonella Paratyphi B wound infection in a diabetic foot a rare case presentation

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ABSTRACT

This case study presents a rare instance of a diabetic foot wound infection caused by *Salmonella* Paratyphi B in a 44-year-old male with type 1 diabetes mellitus. Though *Salmonella* species are typically associated with enteric fever and gastrointestinal manifestations, some species like *S. Paratyphi B* can rarely cause wound infection as presented in this case. The patient underwent antibiotic treatment and eventually required surgical amputation of the affected toe due to the infection's chronic nature. This case underscores the importance of unusual pathogens in diabetic wound infections and highlights *Salmonella* Paratyphi B's potential as an agent in such cases.

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1. Introduction

Salmonella spp. typically cause enteric fever but can also, though rarely, lead to skin and soft tissue infections and osteomyelitis.¹ The development of these complications depends on factors such as bacterial load, strain virulence, host immunity, effectiveness of treatment, and prior exposure. Risk factors for focal *salmonella* infections include extremes of age, immunosuppression, underlying malignancy, intravenous drug use, and previous trauma.² Wound infections caused by pathogens like *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Enterococcus faecalis*, and *Acinetobacter baumannii* have been extensively documented in diabetic patients.³ Here, we present a remarkably rare case involving a diabetic foot wound infection affecting the second toe of the left foot, attributable to *Salmonella* Paratyphi B.

2. Case Presentation

A 44-year-old male patient presented to the surgical outpatient department of our hospital with complaints of swelling and discoloration on his left foot persisting for the last 3-4 months. He reported a history of trauma to the affected site approximately 10 months ago. Additionally, the patient has been experiencing high-grade intermittent fever for the past 10-15 days. The patient has a significant medical history of type 1 diabetes mellitus, which has been managed with medication for the past 40 years. Previous surgical interventions include cholecystectomy, lobectomy of the left lung, and amputation of the great toe of the left foot.

A diffuse, smooth, ill-defined swelling was noted upon clinical examination, extending from the base of the 2nd metatarsal to the tip of the 2nd toe. The overlying skin exhibited redness, without any signs of discharge, sinus, fistula, or dilated veins. Hematological investigation revealed a normocytic normochromic blood picture with neutrophilic leukocytosis. Additionally, liver function tests indicated a slightly elevated direct bilirubin, with all other parameters falling within normal limits. A bilateral lower

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limb ultrasound venous Doppler showed no evidence of deep venous thrombosis.



Figure 1: Left second toe wound infection

A swab from the infected site of the left second toe was sent to the microbiology laboratory for culture and sensitivity testing. (Figure 1) Following standard laboratory procedures, the specimen was immediately inoculated onto blood agar, MacConkey agar, and nutrient agar. All plates were then incubated at 37°C for 18–24 hours. Direct Gram staining of the specimen revealed the presence of polymorphonuclear leukocytes (>25 cells/low power field) along with Gram-negative bacilli.

Following the incubation period, grey/white, non-hemolytic colonies were observed on blood agar, while non-lactose fermenting colonies were observed on MacConkey agar. These colonies were identified as *Salmonella* Paratyphi B using both conventional biochemical methods and the Vitek 2 compact system (GN ID Card). Confirmation of *Salmonella* Paratyphi B was also achieved through agglutination with specific Antisera *Salmonella* O Poly A, confirming it as *Samonella* species, with O antigen factor 4 and H antigen phase 1 b (Difco-BD India Pvt Ltd) confirming its species. Antimicrobial susceptibility testing was done by using the Vitek 2 compact system (AST N406) and Kirby-Bauer disk diffusion method, which revealed susceptibility to all tested drugs. Given the uncommon occurrence of the pathogen, a follow-up sample was collected three days after the initial one, confirming the continued presence of the same organism. Due to chronic non-healing nature of the ulcer, ultimately, surgical amputation of the left second toe was performed and the patient was treated with Amoxicillin/clavulanic acid (625 mg, TDS) for 10 days.

3. Discussion

According to a global study on the Bacteriological Profile of Diabetic Foot Infections, Gram-negative organisms were found to be more prevalent than Gram-positive organisms.

Table 1: The zone diameters and MICs of *Salmonella* Paratyphi B were determined for antibiotics using the Kirby-Bauer disk diffusion method and the Vitek 2 system

| Antibiotic | MIC(μ g/ml) | Interpretation |
|-------------------------------|---------------------------------|----------------|
| Ampicillin | 25mm (by disk diffusion method) | S |
| Trimethoprim/sulfamethoxazole | $\leq 20 \mu$ g/ml | S |
| Ciprofloxacin | $\leq 0.06 \mu$ g/ml | S |
| Ceftriaxone | 29mm (by disk diffusion method) | S |
| Cefepime | $\leq 0.12 \mu$ g/ml | S |
| Meropenem | $\leq 0.25 \mu$ g/ml | S |
| Azithromycin | 25mm (by disk diffusion method) | S |

Pseudomonas aeruginosa was the most frequently isolated, followed by *Klebsiella pneumoniae*, *Escherichia coli*, and *Acinetobacter baumannii*, among others. Among Gram-positive bacteria, *Staphylococcus aureus* was the most commonly isolated organism.³

Salmonella species are typically associated with enteric fever but have also been sporadically reported to be linked with skin, soft tissue infections,^{1,4} and osteomyelitis.⁵ There have been reported cases where *Salmonella* Typhi was found in wound infections.^{6,7} There are even reported cases of hard-to-heal diabetic ulcers due to *Salmonella* Paratyphi A.¹

We came across a rare case of diabetic foot wound infection affecting the second toe of a 44-year-old male due to *Salmonella* Paratyphi B. This occurrence mirrors findings from case studies published by Sergiu-Ciprian Matei, where *Salmonella* Paratyphi B was isolated from infections in venous leg ulcers,⁸ and by Pramod S. Manthalkar, who encountered a case of postoperative wound infection in a 21-year-old female, also with *Salmonella* Paratyphi B.⁹ These incidences underscore the emerging recognition of *Salmonella* Paratyphi B as a potential agent in various types of wound infections, shedding light on its diverse clinical manifestations beyond its classical presentation in gastrointestinal illnesses.

4. Conclusion

Diabetes increases the risk of *Salmonella* infections in the skin, soft tissue, and osteomyelitis. Diabetic patients are immune-compromised, making them vulnerable. It's crucial to consider uncommon pathogens like *Salmonella* Paratyphi B in diabetic wound infections. This case in India is the first reported instance of isolating *Salmonella* Paratyphi B from a diabetic wound. It expands our understanding of the rare causes of diabetic wound infections and their complications.

5. Limitation of Study

We requested urine, stool, and blood cultures from the patients, but couldn't obtain them. This limitation in our study made it difficult to determine whether the infection source is endogenous or exogenous.

6. Consent of Patient

Taken.

7. Source of Funding

Nil.

8. Conflict of Interest


Nil.

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