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Urinary Tract Infection with *Salmonella* spp. Associated with Intestinal Carriage of *Shigella sonnei*

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Abstract

Introduction: Urinary tract infections (UTIs) caused by *Salmonella* spp. are rare, accounting for less than 1% of bacterial UTIs. They usually occur in patients with underlying urological abnormalities or comorbidities. The association with concomitant intestinal carriage of *Shigella sonnei* has been exceptionally reported. **Methods:** We report the case of a 58-year-old male patient followed for benign prostatic hyperplasia complicated by bilateral ureterohydronephrosis and recurrent UTIs. Two urine cultures and a stool culture were performed. Cultures were processed on standard and selective media, with identification and antimicrobial susceptibility testing carried out using biochemical methods and the automated VITEK 2 system. **Results:** Urine cultures yielded a non-typhoidal *Salmonella* spp. isolate, confirmed with a high level of confidence. The strain was susceptible to beta-lactams, fluoroquinolones, and carbapenems, but resistant to aminoglycosides. Stool culture revealed asymptomatic intestinal carriage of *Shigella sonnei*, susceptible to most antibiotics except trimethoprim-sulfamethoxazole. **Conclusion:** This case highlights a rare association between *Salmonella* UTI and intestinal carriage of *Shigella sonnei* and emphasizes the importance of extended microbiological investigations and antimicrobial resistance surveillance.

Keywords

Infection, Urine, Carriage, *Salmonella*, *Shigella*

1. Introduction

Salmonella is an enteroinvasive bacterium primarily responsible for gastroenteritis and commonly isolated from stool specimens. However, it may also be recovered from blood, urine, or deep-seated infections [1]. UTIs caused by *Salmonella* spp. are rare and usually occur in patients with comorbidities or urological abnormalities [2]. UTIs due to non-typhoidal *Salmonella enterica* are uncommon and infrequently reported in the literature [3]. The association with *Shigella sonnei* carriage is exceptionally reported. These infections usually occur in patients with comorbidities or predisposing factors. We reported a case of *Salmonella* spp. UTI associated with intestinal carriage of *Shigella sonnei* in a patient attending the Urology Department of the Peace Hospital in Ziguinchor and referred to the bacteriology laboratory for urine culture. This case highlights the need for comprehensive investigations, including digestive screening, in atypical UTIs.

2. Case Presentation

A 58-year-old male patient with benign prostatic hyperplasia complicated by bilateral ureterohydronephrosis and recurrent UTIs was admitted for management. He also had hypertension and chronic renal failure. Clinical symptoms included nocturia (5 - 6 episodes), dysuria, and burning micturition. A urine sample collected on 18 February 2025 underwent cytobacteriological examination. The cytobacteriological analysis revealed significant leukocyturia (>10^4 leukocytes/mL) associated with significant bacteriuria (>10^5 CFU/mL), supporting the diagnosis of a true urinary tract infection rather than contamination or colonization. Culture on CLED agar yielded Gram-negative bacilli. Identification using API 20E and VITEK 2 confirmed *Salmonella* spp. The isolate was identified as non-typhoidal *Salmonella enterica* based on biochemical profile using VITEK 2 (probability 99%). However, serotyping was not performed due to limited laboratory resources, and the identification remained at the species level. Given the unusual nature of this pathogen in UTIs, a second urine sample and a stool specimen were collected on 21 February 2025 to confirm the urinary isolation and investigate intestinal carriage. Stool samples were cultured on *Salmonella-Shigella* (SS) and Hektoen agars. Identification and antimicrobial susceptibility testing were performed using the VITEK 2 system (GN card).

Blood cultures were not performed as the patient did not present with systemic signs such as fever or sepsis.

3. Results

The first urine culture confirmed a UTI caused by *Salmonella* spp. The second urine culture and stool culture allowed further characterisation. On SS agar, colonies typical of H_2S-producing enterobacteria were observed. API 20E biochemical identification suggested *Salmonella* spp., which was confirmed by VITEK 2 with a 99% probability and excellent reliability, consistent with non-typhoidal *Salmonella enterica*.

Antimicrobial susceptibility testing showed preserved susceptibility to most beta-lactams (ampicillin, amoxicillin/clavulanic acid, third- and fourth-generation cephalosporins), carbapenems (ertapenem, imipenem), and fluoroquinolones (ciprofloxacin, levofloxacin). Resistance to amikacin and gentamicin was observed.

Stool culture revealed non-H_2S-producing colonies on SS agar. Identification by VITEK 2 confirmed asymptomatic intestinal carriage of *Shigella sonnei*. The isolation was susceptible to all tested beta-lactams, carbapenems, fluoroquinolones, and aminoglycosides. Resistance was observed only to trimethoprim-sulfamethoxazole (MIC = 20 mg/L).

Clinical management consisted of targeted antibiotic therapy with a third-generation cephalosporin for 10 days. The patient showed clinical improvement with resolution of urinary symptoms. A follow-up urine culture was negative. No urinary catheter was in place during management.

4. Discussion

UTIs caused by *Salmonella* spp. are rare and were first described in 1946 [4] [5], accounting for less than 1% of bacterial UTIs [6] [7]. Two competing mechanisms may explain the infection: 1) ascending infection via perineal contamination, particularly in the context of intestinal carriage, and 2) hematogenous spread following intestinal translocation [8].

In this case, several recognised predisposing factors were present, including benign prostatic hyperplasia complicated by bilateral ureterohydronephrosis and chronic renal failure, all contributing to urinary stasis and persistent bacterial colonisation [9]. In this patient, the absence of fever and systemic signs, as well as the lack of blood culture positivity, supports the hypothesis of an ascending infection [10] [11]. However, the presence of intestinal carriage suggests that translocation cannot be completely excluded. The concomitant intestinal carriage of *Shigella sonnei* may reflect altered gut barrier integrity, facilitating bacterial translocation [12]-[14]. The association between *Salmonella* UTI and *Shigella* carriage remains poorly documented in sub-Saharan Africa [7].

The antimicrobial susceptibility profile of the *Salmonella* isolate was favourable, consistent with African data where fluoroquinolone resistance remains moderate [15]. *Shigella sonnei* also showed preserved susceptibility, contrasting with global trends of increasing multidrug resistance involving fluoroquinolones, azithromycin, and ESBL-producing strains [16] [17]. This may reflect limited circulation of resistant clones locally.

Stool culture was performed because of the unusual isolation of *Salmonella* in urine. The identification of *Shigella sonnei* did not modify antibiotic treatment but prompted reinforcement of hygiene measures and patient education to prevent fecal-perineal contamination.

5. Conclusion

This case highlights the rarity of *Salmonella* UTIs in patients with predisposing

conditions and the exceptional association with asymptomatic intestinal carriage of *Shigella sonnei*. The favorable antimicrobial susceptibility profile contrasts with global resistance trends. This observation underscores the value of extended microbiological investigations in atypical UTIs and contributes valuable data from sub-Saharan Africa on these uncommon infections.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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