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CORRESPONDENCE

Nontyphoidal *Salmonella* urinary tract infection among elderly patients

KEYWORDS
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Dear Editor,

Nontyphoidal *Salmonella* (NTS) is a member of the *Salmonella* species, and is responsible for causing various types of human infections including gastroenteritis, primary bacteremia, mycotic aneurysm, infective endocarditis, meningitis, empyema thoracis, and osteomyelitis.[1] In Taiwan, the average annual incidences of bacteremia due to *Salmonella* species were 103 cases/million inhabitants[2]; however, urinary tract infections caused by NTS were rarely reported.[3,4] Urinary tract infection is a common disease in elderly patients. Therefore, we aimed to identify cases of unusual presentation of NTS urinary tract infection among elderly patients and further investigated its associated clinical characteristics and microbiologic features.

This study was conducted at one institution, a 900-bed hospital located in southern Taiwan. From the computerized database of the bacteriology laboratory, patients whose cultures yielded NTS were identified. The medical records of elderly patients with urinary tract infection caused by NTS included in this study were retrospectively reviewed. *Salmonella* isolates were identified by matrix-assisted laser desorption ionization time-of-flight mass spectrometry. Antibiotic susceptibility testing was carried out using VITEK 2, according to the standard procedures recommended by the Clinical and Laboratory Standards Institute standard M100-S24.[6]

From 2008 to 2014, a total of 16 elderly patients aged $\geq$ 65 years were identified to have NTS urinary tract infections. The clinical characteristics of these 16 patients are summarized in Table 1. Hypertension was the most common underlying disease in these patients. In addition, six patients had hepatobiliary stones and four patients had genitourinary stones. Nine (56.3%) patients initially presented with fever and three (18.8%) patients had symptoms or signs of enteritis. All of these 16 patients had elevated C-reactive protein level. Five of the patients had concomitant *Salmonella* bacteremia. Three patients had concomitant NTS and *Escherichia coli* urinary tract infections, and another three had concomitant NTS and *Klebsiella pneumoniae* urinary tract infections. No metastatic complications of NTS urinary tract infections were detected. Most of these patients received third-generation cephalosporins (n = 6) or fluoroquinolones (n = 6), and one patient died due to NTS sepsis.

Most of the infections were caused by Group D *Salmonella* (n = 10), followed by Group B (n = 5) and Group C (n = 1). All of the 16 clinical isolates were susceptible to ceftazidime and ceftriaxone, but three isolates were resistant to ciprofloxacin.

This is the first study to describe the rare presentation of NTS urinary tract infections among elderly patients at a single center. Although more than half of the patients had underlying immunocompromised conditions, such as diabetes mellitus, cancer, chronic kidney diseases, or liver cirrhosis, five patients did not have any immunocompromised conditions in this series. In addition, we found that four patients had urologic anatomical abnormalities—genitourinary tract stones. All of these aforementioned findings may suggest that NTS should be considered as a possible pathogen causing urinary tract infections among elderly patients, especially for those with genitourinary tract stones or immunocompromised host.

The antibiotic susceptibility patterns of the clinical isolates in this study were all susceptible to third-generation cephalosporins. However, the ciprofloxacin-resistant rate was up to 18.8%. Our result is consistent with a previous study report that resistance to fluoroquinolones is emerging.[5] Overall, it indicates that third-generation cephalosporins may be considered the appropriate

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Table 1 Clinical characteristics of elderly patients with nontyphoidal *Salmonella* urinary tract infection.

Variable	No. (%) of patients (n = 16)
Age (mean)	77.8 ± 7.2
Sex, female	10 (62.5)
Underlying diseases	
Hypertension	7 (43.8)
Diabetes mellitus	5 (31.3)
Chronic kidney disease	5 (31.3)
Coronary artery disease	4 (25.0)
Cancer	3 (18.8)
Liver cirrhosis	1 (6.3)
Underlying conditions	
Hepatobiliary stone	6 (37.5)
Genitourinary stone	4 (25.0)
Use of steroid(s)	1 (6.3)
Urinary catheter *in situ*	1 (6.3)
Laboratory finding	
White blood cell (cells/mm^3)	10,848.0 ± 4731.7
Hemoglobin (g/dL)	10.5 ± 2.8
Creatinine (mg/dL)	1.7 ± 0.7
C-reactive protein	94.3 ± 79.0
Serotype of *Salmonella*	
B	5 (31.3)
C	1 (6.3)
D	10 (62.5)
Clinical presentation	
Cystitis	11 (68.8)
Acute pyelonephritis	5 (31.3)
Concomitant *Salmonella* bacteremia	5 (31.3)
Polymicrobial infection	6 (37.5)
Attributed mortality	1 (6.3)

antibiotic treatment of choice for elderly patients with NTS urinary tract infection.

This study had several limitations. First, we did not perform a molecular method to identify the possible cluster infections; however, there is no clinical evidence suggestive of any possible cluster of NTS infections. Second, we cannot define the portal of entry specifically in this retrospective study.

In conclusion, urinary tract infection caused by NTS can develop in elderly patients, especially in immunocompromised patients, or in those with anatomical anomaly.

Conflicts of interest

All authors declare that there is no conflict of interest.

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