A Nephrostomy-associated Urinary Tract Infection Caused by *Elizabethkingia meningoseptica*

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Abstract

We report a case of nephrostomy-associated urinary tract infection caused by *Elizabethkingia meningoseptica* that occurred in a patient with retroperitoneal fibrosis. Though conventional identification methods failed to detect the causative organism, it was identified on the basis of the complete sequencing of 16S rRNA. Four weeks of levofloxacin and minocycline administration successfully eradicated the infection. *E. meningoseptica* rarely causes urinary tract infections, and we believe that this is the first such case in which the isolate was genetically confirmed. The accurate identification of the organism is necessary for the provision of appropriate treatment and to obtain a better understanding of its epidemiology and pathogenicity.

Key words: *Elizabethkingia meningoseptica*, nephrostomy, nosocomial infection, retroperitoneal fibrosis, 16S rRNA sequence

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Introduction

Elizabethkingia meningoseptica, an aerobic glucose-non-fermentative Gram-negative bacillus, is a hospital saprophyte that has the potential to cause nosocomial infections with high mortality rates (23-52%) (1, 2). *E. meningoseptica* can survive in water supplies by virtue of its chlorine resistance, and the contamination of medical devices with the bacterium has been widely reported (2). The organism is particularly well known as a pathogen responsible for neonatal meningitis (3-5). In adults, the pathogen usually causes respiratory infection, followed by bacteremia and meningitis (6).

The epidemiology and pathogenicity of the emerging pathogen have recently been summarized (1); however, the clinical significance of *E. meningoseptica* in a urinary tract infection (UTI) has yet to be clarified. To our knowledge, although there have been a few cases of *E. meningoseptica*-related UTIs (7-9), there have been no reports of nephrostomy-associated cases. We herein report the first case of post-nephrostomy perinephric abscess caused by an *E. meningoseptica* infection that occurred in a patient with idiopathic retroperitoneal fibrosis.

Case Report

A 65-year-old man complaining of frequent urination was referred to a urologist. His past medical history was unremarkable and he did not take any medication. The patient was prescribed oxybutynin and silodosin for the urinary symptoms, but they did not improve. A few weeks later, bilateral hydronephrosis accompanying renal dysfunction was detected and the patient was admitted to a hospital. He was unable to urinate at all at that time and pyeloureterography showed the complete occlusion of the bilateral ureters. A transurethrally-inserted catheter was completely blocked at the sites of obstruction, and a bilateral nephrostomy was immediately performed. The patient was subsequently transferred to our hospital for further investigation.

On admission, his general condition was stable. The results of a blood examination showed a serum C-reactive protein level of 1.41 mg/dL and a creatinine level of 1.70 mg/dL. The serum levels of IgG and IgG4 were within the normal ranges (1,379.1 mg/dL and 46.4 mg/dL). The blood sample was negative for rheumatic factor, antinuclear antibody and antineutrophilic cytoplasmic antibodies. Tumor

Figure 1. The radiological findings. A: Computed tomography. B: Positron emission tomography-computed tomography. C: Contrast-enhanced T1-weighted image. D: Fat-saturated T2-weighted image. Computed tomography showed dirty fat signs at the pelvic extraperitoneal space (A). The accumulation of fluorodeoxyglucose (B) and well enhanced cord-like structures (C, D) were observed at the perirectal tissues and pelvic side-walls. The bladder was circumferentially hypertrophic. These findings were suggestive of retroperitoneal fibrosis.

factors such as carcinoembryonic antigen (CEA), protein induced by the absence of vitamin K or antagonist-II (PIVKA-2), alpha-fetoprotein (AFP), CA-125 antigen and prostate-specific antigen (PSA) were within normal ranges. In contrast, there was a mild elevation of the levels of soluble interleukin-2 receptor and CA-19-9 antigen (546 U/mL and 653.1 U/mL, respectively). A cytological analysis of his urine was negative for malignant cells. Endoscopic examinations of the upper and lower gastric tracts revealed no evidence of abnormalities. Computed tomography showed inflammatory changes at the pelvic extraperitoneal spaces and magnetic resonance imaging (MRI) of pelvis showed contrast-enhanced tissues spreading diffusely along the corresponding space (Fig. 1). With these findings, although a tissue biopsy was not performed, a diagnosis of idiopathic retroperitoneal fibrosis was made.

Fourteen days after the nephrostomy (five days after hospitalization), a high fever suddenly occurred without any specific symptoms. Antibiotics had not been preliminarily administered. A laboratory examination showed elevated levels of white blood cells (21,600/ μ L) and C-reactive protein

(3.14 mg/dL). Computed tomography showed fluid retention around the left nephrostomy tube, suggesting a perinephric abscess (Fig. 2). The patient's blood cultures were negative, but urine cultures obtained from the drained tubes were positive for *Chryseobacterium* spp. (VITEK2, bioMérieux, Tokyo, Japan), with *Stenotrophomonas maltophilia* and *Burkholderia cepacia*. The results of a matrix-assisted laser desorption/ionization-time of flight mass spectrometry analysis (bioMérieux) showed the *Chryseobacterium* spp. to be *Elizabethkingia miricola*. For further analysis, the complete sequencing of 16S rRNA was performed using the following primers: 341A (5'-CTA CGG GAG GCA GCA GTG GG-3'), 519B (5'-ATT ACC GCG GC(G/T) GCT G-3') and 907A (5'-AAA CT(T/C), AAA (T/G)GA ATT GAC GG-3'). The sequence data were analyzed using the Basic Local Alignment Search Tool (BLAST) sequence homology search program at the DNA Data Bank of Japan (DDBJ), and the pathogen was finally identified as *E. meningoseptica*. The organism was resistant to ceftazidime, carbapenems, aztreonam and aminoglycosides but was susceptible to minocycline and fluoroquinolones (Table).

Figure 2. Computed tomography showing the perinephric abscess. Computed tomography was performed on day 5. The nephrostomy tubes were bilaterally inserted into the renal calyces. Perinephric fluid retention was seen around the left kidney. There was no apparent periaortic inflammatory change.

Treatment with meropenem was initiated on day 5, but the patient's high fever persisted. After the antibiotic therapy was switched to a combination of levofloxacin and minocycline based on the antimicrobial susceptibility testing, his body temperature normalized. Corticosteroid therapy was started on day 13 with 30 mg per day of prednisolone for the treatment of retroperitoneal fibrosis, and the left ureteral obstruction gradually improved. After four weeks of the antibiotic therapy, the obstruction completely improved.

E. meningoseptica was not detected in other patients during the time of his hospitalization. An environmental screening was not conducted and its latent spread remains unknown.

Discussion

We herein report a rare case of a nephrostomy-associated UTI that was caused by *E. meningoseptica* in a patient with idiopathic retroperitoneal fibrosis. Approximately 30% of retroperitoneal fibrosis cases considered to occur secondary to drug-induced insults, malignancy-related conditions, infectious diseases, or following radiotherapy, surgery, trauma or amyloidosis. The remaining 70% of cases fall into the idiopathic category (10). In our case, systemic investigations did not demonstrate any underlying conditions, and the diagnosis of idiopathic retroperitoneal fibrosis was made.

The case was unique in a few points. First, *E. meningoseptica* infections usually occur in immunocompromised hosts such as patients with malignancies, diabetes, or malnutrition, or patients undergoing corticosteroid treatment or dialysis. However, our patient was healthy and immunocompetent. Second, the organism rarely results in a UTI (6). In previous cases of UTI caused by *E. meningoseptica* (7-9), all of the bacterial identifications were based on the bio-

Table. A Result of Antimicrobial Susceptibility Testing of *Elizabethkingia meningoseptica*.

	MIC (μg/mL)
Piperacillin/Tazobactam	8
Ceftazidime	>16
Cefepime	16
Imipenem	>16
Meropenem	>16
Aztreonam	>16
Gentamicin	8
Amikacin	32
Minocycline	<0.5
Ciprofloxacin	1
Levofloxacin	1

MIC: minimum inhibitory concentration

Susceptibility testing for vancomycin and tigecycline was not performed.

chemical properties of the isolated pathogens. In contrast, the isolate in the present case was confirmed to be *E. meningoseptica* by means of 16S rRNA sequence analysis. As far as we know, this is the first such case in which the isolate was genetically confirmed. Among the *Elizabethkingia* spp., *E. meningoseptica* is known to cause disease outbreaks in various hospital settings (1, 3, 5, 11, 12). Thus, the correct identification of *Elizabethkingia* spp. is essential for appropriate infection control. 16S rRNA sequence analysis would be of great value in this regard. Third, a nephrostomy was associated with the *E. meningoseptica* infection. It has been reported that *E. meningoseptica* bacteriuria is related to urinary tract manipulations such as the placement of an indwelling urinary catheter and the transurethral resection of the prostate (7). Nephrostomy has never been documented to be associated with an *E. meningoseptica*-related UTI. Because of the complete ureteral obstruction, we hypothesize that the patient may have been infected percutaneously through the nephrostomy tube.

E. meningosepticum has a characteristic profile for antibiotic susceptibility. The organism is resistant to antimicrobials to which gram-negative bacteria are susceptible such as aminoglycosides, β -lactams and carbapenems but is surprisingly susceptible to drugs prescribed for treatment of gram-positive bacteria including vancomycin, rifampicin and trimethoprim-sulfamethoxazole (13). This characteristic pattern of antimicrobial susceptibility may make it difficult to select appropriate drugs. Notably, vancomycin was considered to be a choice of treatment for *E. meningoseptica* infection (6, 14), but there have been a few reports suggesting a lower clinical efficacy of the drug for the pathogen (9, 15, 16). *E. meningoseptica* is generally susceptible to fluoroquinolones and minocycline (9), and a combination therapy of levofloxacin and minocycline was clinically effective in treating our patient's UTI. It should be remembered that *E. meningoseptica* is a nosocomial pathogen that is intrinsically resistant to carbapenems.

In summary, we herein reported a rare case of *Elizabethkingia meningoseptica*-related UTI. Although conventional methods for bacterial identification failed, the results of a complete 16S rRNA analysis successfully identified the organism. Physicians may need to be more alert to the presence of this rare pathogen, which shows an atypical susceptibility profile and yields high mortality. Accurate identification is necessary for a better understanding of the epidemiology and pathogenicity of this rare pathogen.

The authors state that they have no Conflict of Interest (COI).

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