Case report

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A Case of Infantile Fungal Urinary Tract Infection

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Urinary tract infection is common in the pediatric population. The most common causative agents are bacteria, among which *Escherichia coli* is the most frequent uropathogen. Although fungal urinary tract infection is rare in the healthy pediatric population, it is relatively common among hospitalized patients. Fungus may be isolated from the urine of immunocompromised patients or that of patients with indwelling catheters. The most common cause of funguria is *Candida albicans*. Although more than 50% of *Candida* isolates belong to non-*albicans Candida*, the prevalence of non-albicans candiduria is increasing. Herein, we report a case of community-acquired candiduria in a 4-month-old immunocompetent male infant who had bilateral vesicoureteral reflux and was administered antibiotic prophylaxis. He was diagnosed with urinary tract infection caused by *Candida lusitaniae* and was managed with fluconazole.

Key words: Candida, Urinary tract infections, Vesico-ureteral reflux, Antibiotic prophylaxis

Introduction

Urinary tract infection is common in the pediatric population[1]. Urinary tract infection may be caused by bacteria, viruses, fungi, and parasites that colonize the urinary tract, with bacteria being the most common causative agents[1]. The prevalence of funguria is less than 1% in healthy individuals; however, *Candida* species may be isolated from the urine of immunocompromised children or that of children with indwelling catheters[1,2]. Herein, we report a case of community-acquired urinary tract infection caused by *Candida lusitaniae* in a 4-month-old immunocompetent male infant.

Case report

A 4-month-old male infant presenting with a 1-day history of fever was admitted in Gwangmyeong Sungae Hospital. He was born at 39 weeks of gestation via spontaneous vaginal delivery, and his birth weight was 3,170 g. He did not have any perinatal problems.

The patient had two previous events of urinary tract infection as a neonate. At the age of 7 days, he was admitted with urinary tract infection caused by *Enterococcus faecalis*, and Rotaviral enteritis for 6 days. At the age of 22 days, he was readmitted with urinary tract infection caused by *E. faecalis* for 8

days. A sonography revealed bilateral hydronephrosis. A ^{99m}Tc-dimercaptosuccinic acid scan revealed cortical defects in the left kidney. A voiding cystourethrography revealed bilateral vesicoureteral reflux: grade 4 on the right and grade 5 on the left. Subsequently, the infant was administered daily oral amoxicillin-clavulanate for prophylaxis at a dose of 15 mg/kg/day until admission.

On current admission, the patient was febrile and did not have any other symptoms. Vital signs were stable and physical examinations revealed no abnormal findings. Laboratory examination showed a white blood cell (WBC) count of 14,680/μL (46% neutrophils, 46% lymphocytes, 7% monocytes). The C-reactive protein level was 0.585 mg/dL (normal, <0.5 mg/dL). The serum creatinine level was 0.27 mg/dL (normal, 0.03–0.50 mg/dL). Blood culture showed no growth. Urinalysis showed protein ++++, glucose +, occult blood +, and positive nitrite result. Urine microscopy showed red blood cells (RBCs) 1–4 /HPF, WBCs 5–9 /HPF, and some yeast-like cells. The patient was started on intravenous cefotaxime at a dose of 150 mg/kg/day. Urine culture for a specimen collected by urine bag showed approximately 50,000 (CFU/mL) yeast-like organisms; therefore, fluconazole was started at a dose of 3 mg/kg/day. Despite the absence of bacterial growth, cefotaxime was maintained at the same dose.

Urine microscopy showed RBCs 1–4 /HPF and WBCs 1–4 /HPF, and *C. lusitaniae* was isolated in the fungal culture for a specimen collected by catheterization on hospital day 4. The fever of the patient resolved and clinical manifestations improved after 5 days of hospitalization; subsequently, he was discharged and maintained on fluconazole at the same dose.

C. lusitaniae was still isolated in the fungal cultures for specimens collected by catheterization on discharge day 7 and 14, both of which did not show antifungal drug resistance. *C. lusitaniae* was not isolated in the fungal culture for a specimen collected by catheterization on discharge day 28; therefore, antifungal treatment was stopped after 46 days of fluconazole treatment.

A 99mTc-dimercaptosuccinic acid scan at the age of 9 months revealed that the renal scars had persisted in the left kidney. A voiding cystourethrography at the age of 13 months revealed no improvement of bilateral vesicoureteral reflux-grade 4 on the right and grade 5 on the left. Subsequently, the patient underwent a surgery, after which the fungal urinary tract infection did not recur.

Discussion

The prevalence of urinary tract infection varies with age, sex, and race; the overall prevalence of urinary tract infection is 7.0% among infants presenting with fever[3]. The most common causative agents are bacteria, and *Escherichia coli* is the most frequent uropathogen, accounting for 34.7–48.0 % of bacterial urinary tract infections in all age groups[1,4]. One study reported that *Escherichia coli* represented 93.6% of urinary tract infections in the pediatric population[5].

Fungi are not common pathogens of urinary tract infections[6]. *Candida* species are the most prevalent pathogens, accounting for more than 95% cases of funguria, while non-*Candida* funguria is rarely caused by *Aspergillus, Cryptococccus*, or *Blastomyces*[7]. Candiduria is relatively common among hospitalized patients, and it has less than 1% prevalence in healthy individuals[2,7]. However, the prevalence of candiduria is increasing, from accounting for 22% of hospital-acquired urinary tract infections in 1986 to 1989 to 40% in 1992 to 1997[6].

Predisposing factors are present in 90% of patients with candiduria; some of them are diabetes mellitus, indwelling catheters, recent antibiotic usage, urinary tract disease, congenital or structural abnormalities of the urinary tract, prolonged hospitalization, immunocompromised status, malignancy, and renal transplantation[6-9]. *Candida* species may be isolated from the urine of immunocompromised children or that of children with indwelling catheters[1]. One study reported candiduria in 37% of pediatric patients who were administered more than two antibiotics during their hospitalization[10]. *Candida* species were identified in 42% of hospital-acquired urinary tract infections in a neonatal intensive care unit[11]. Extremely-low-birth-weight infants with candiduria are at substantial risk of death or neurodevelopmental impairment[12]. In the present case, bilateral vesicoureteral reflux and recent antibiotic usage were the predisposing factors.

Patients with asymptomatic candiduria who do not have predisposing factors can be monitored without antifungal treatment[9]. However, patients with asymptomatic candi-

duria who have predisposing factors should be appropriately managed. Outpatients are treated by managing predisposing conditions; however, inpatients with evidence of disseminated candidiasis and unstable or neutropenic inpatients are treated with antifungal agents[9]. Patients with symptomatic candiduria should be treated with antifungal agents, among which fluconazole is safe and effective[9].

Despite the lack of studies to guide the optimal length and type of therapy in the pediatric population, systemic antifungal therapy for 21 days from the last positive *Candida* culture is recommended in infants, with oral fluconazole at a dose of 3–12 mg/kg/day or intravenous amphotericin B 1–5 mg/kg/day[13,14]. In our case, fluconazole at a dose of 3 mg/kg/day was maintained for more than 21 days from the last positive *C. lusitaniae* culture.

Antifungal resistance exists in less than 1% of fungal infections, and non-*albicans Candida* are often more resistant than *C. albicans*[7,15]. *C. lusitaniae*, an uncommon *candida* species in infants, is often resistant to amphotericin B[13]; however, the organism did not show any antifungal resistance in our case.

In conclusion, although community-acquired candiduria in an immunocompetent infant without an indwelling catheter is rare, it can present in infants with structural abnormalities of the urinary tract. Symptomatic candiduria requires appropriate evaluations and should be treated with antifungal agents. We report a case of community-acquired urinary tract infection caused by *C. lusitaniae* in a 4-month-old immunocompetent male infant presenting with fever, who had bilateral vesicoureteral reflux and was administered antibiotic prophylaxis, that was resolved with fluconazole treatment without resistance.

Patient consent

This study was approved by the institutional review board (IRB), and the consent was waived due to the nature of the retrospective study [IRB number KIRB-2019-N-009].

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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