® Postepy Hig Med Dosw (online), 2013; 67: 719-721
e-ISSN 1732-2693

www.phmd.pl
Case report

Received: 2012.04.27
Accepted: 2013.02.18
Published: 2013.08.02

Fungal urinary tract infection complicated by acute kidney injury in an infant with intestino-vesical fistula

Grzybicze zakażenie układu moczowego powikłane ostrym uszkodzeniem nerek u dziecka z przetoką pęcherzowo-jelitową

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Summary

We report one infant, who in the course of therapy of bacterial urinary tract infection developed fungal UTI and acute kidney injury. It was caused by coexistence of well-known risk factors and additionally intestino-vesical fistula. Appropriate and timely introduced treatment with intravenous fluconazole proved to be therapeutic in the patient. Our report shows that in every case detailed analysis of predisposing factors should be performed and appropriate diagnostic studies ordered, including the possible presence of other – less common – factors, e.g. defects in the gastrointestinal tract.

Keywords: **Fungal urinary tract infection • acute kidney injury • child**

Full-text PDF: http://www.phmd.pl/fulltxt.php?ICID=1061348

Word count: 821
Tables: –
Figures: 2
References: 6

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Abbreviations: **AKI** – acute kidney injury, **US** – ultrasound scan, **UTI** – urinary tract infection.

Introduction

Fungal infections of the urinary tract are relatively seldom recognised in very young children. Their risk factors include prematurity, low birth weight, long-term antibiotic therapy, immunosuppressive treatment and immunocompromised status. Anatomical abnormalities of the urinary tract, urinary tract instrumentation and finally contamination of intravascular peripheral or central catheters are other predisposing factors for fungal UTI [6,3].

The clinical course of such infection is varied. It may be completely asymptomatic, may affect only the lower urinary tract or lead to pyelonephritis, formation of fungal bezoars or eventually to papillary or cortex necrosis. The course of UTI depends on the pathogens, the patient's immunological status and presence of risk factors [2].

We report one child with acute fungal urinary tract infection (UTI) complicated by acute kidney injury (AKI).

Case

A 5-month-old boy, born at term, was admitted to our hospital due to acute UTI. In the neonatal period he had a double-barrel colostomy formed because of high anorectal atresia with recto-bladder fistula. Imaging studies, including abdominal ultrasound scan and renal scintigraphy, revealed significant hypoplasia and malposition of the right kidney. The boy had developed several episodes of acute bacterial UTI and respiratory tract infection prior to hospitalization. On admission he was found apathetic and feverish. Initial C-reactive protein (CRP) was 56 mg/l. Urinalysis showed pyuria and urine culture revealed *Citrobacter freundii* 106 CFU/ml. On abdominal ultrasound scan (US) a slightly dilated pyelocalyceal system of the left kidney was noted. Intravenous antibiotic therapy with ceftazidime was commenced and the state of the child improved. Despite the use of antibiotic according to sensitivities and antifungal prophylaxis with nystatin, on the 7th day of hospitalization the child's condition suddenly deteriorated. The boy spiked a temperature again and was noted to be apathetic and irritable with severe abdominal tenderness on palpation. Further observations revealed a fall in urine output and hypertension. Laboratory tests revealed: CRP 180 mg/l, white blood cell count (WBC) 21 000/ul, serum urea 54 mg/dl and creatinine 1.88 mg/dl. The estimated glomerular filtration rate (eGFR) by Schwartz formula was <15 ml/min/1.73 m. Repeated urine culture revealed heavy growth of *Candida albicans* (106 CFU/ml). US showed increasing urine stasis in the left pyelocalyceal system, containing multiple inhomogeneous hyper- and hypoechogenic structures, probably fungal masses (fig. 1). The boy was catheterized and diuresis and blood pressure were monitored. Intravenous fluconazole was commenced at 6 mg/kg/24 h. On the 4th day of treatment the child's general condition improved. Control US demonstrated regression of the previously observed lesions. A gradual normalization of kidney function was noted. Control urine culture was sterile and urinalysis was normal. Imaging studies were completed by cystourethrography which revealed a left-sided grade IV vesicoureteral reflux (VUR) and left-sided ureterocoele. In the next stage of diagnosis a colostogram was also performed, demonstrating a recto-vesical fistula (fig. 2).

Discussion

In our patient a few risk factors of fungal UTI were noted. The infant had urinary tract malformations and was treated with intravenous antibiotics due to bacterial infection of the urinary tract. Taking into account all potential risk factors of UTI the patient was monitored for fungal UTI and during antibiotic therapy antifungal prophylaxis was applied. Despite such an approach, he developed serious fungal UTI and AKI. Further diagnostics showed additional developmental anomaly in the gastrointestinal tract and urinary

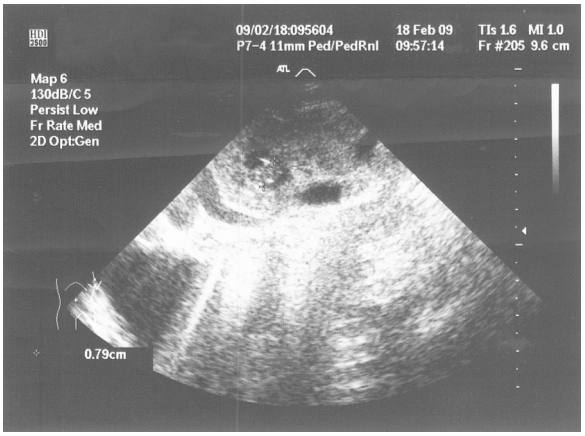

Fig. 1. Fungal masses in the pyelocalyceal system

Fig. 2. Recto-vesical fistula

tract such as VUR and ureterocoele. Finally an intestino-vesical fistula was found, which can predispose to dissemination of fungal pathogens.

From the literature data, obstruction anomalies of the urinary tract predispose to frequent fungal UTI [1]. In our child other anomalies were noted as well. Moreover, we think that inadequate hydration, caused by fever, and the use of nephrotoxic drugs could trigger fungal infection and finally lead to the development of AKI.

Generally, fungal UTI can be caused by primary pathogens and opportunistic fungi (such as *Candida, Cryptococ-*

cus, Aspergillus) common in our environment [3]. These opportunistic pathogens evoke infection in patients who have defective phagocytic function due to a variety of causes that include metabolic dysfunction and chronic disease. *Candida albicans* is the most common etiologic agent of fungal UTI. Most often the involvement of kidneys is initiated through the haematogenous route because of tropism of the fungi to this organ [4]. More seldom, as was observed in our patient, the ascending route is the cause of infection.

Fungal infection is very difficult to cure and success of treatment depends on timely detection of fungal infections and institution of therapy. In the case of upper urinary tract obstruction by a fungal bezoar, often nephrostomy drainage is required [5]. Since the antifungal therapy was started early, our patient recovered without surgical intervention.

This study shows that fungal UTI in infants can even lead to AKI. Fungal UTI can spread through the intestino-vesical fistula. Therefore we suggest that in every case detailed analysis of predisposing factors should be performed and appropriate diagnostic studies ordered including the possible presence of other – less common – factors, e.g. defects in the gastrointestinal tract.

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The authors have no potential conflicts of interest to declare