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THE MANAGEMENT OF RENAL CANDIDIASIS IN THE NEWBORN*

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Renal candidiasis in the neonate is encountered infrequently. We report a newborn with ichthyosis, who during the hospital course had five episodes of culture-proven sepsis, probably due to skin lesions. For these infections various antibiotic combinations were used. During the therapy of the last sepsis attack, unilateral hydronephrosis developed secondary to renal candidiasis. Percutaneous nephrostomy with amphotericin B irrigation, coupled with five weeks of intravenous amphotericin B therapy was successful. We believe that with this approach the mortality and morbidity of renal candidiasis could be reduced. *Key words: renal candidiasis, percutaneous nephrostomy, amphotericin B.*

Candidal infection of the urinary tract is a well-known entity in adults, but it has been less well recognized in infants and children. However, with the improved survival of neonates and the widespread use of broad-spectrum antibiotics and intravascular catheters, the incidence of systemic and renal candidiasis has increased[1]. Involvement of the kidney is usually secondary to generalized systemic disease, but on occasion the kidney may be the only organ affected[2]. Herein we report a case of isolated, obstructive, upper urinary tract candidiasis in which percutaneous nephrostomy had a major role in the successful management.

Case Report

A 2700 g infant was born vaginally to a 23-year-old woman (gravida 2, para 2) at 35 weeks of gestation. He was brought to the neonatology unit on day 15 of life with poor sucking. It was reported that the pregnancy and labor had been

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uncomplicated. The baby had been well during the first two weeks of life. On admission, physical examination revealed a hypotonic infant with erythematous scaling skin lesions over the entire body. Given the clinical and laboratory findings, sepsis and ichthyosis were suspected, and antibiotic therapy was initiated. During the hospital course the patient had five episodes of culture-proven sepsis, and various antibiotic combinations were used. The immunological work-up was normal. On day 62 of life, the infant became hypertensive, his systolic blood pressure (BP) ranged between 80 and 120 mmHg, and his mean BP ranged from 70 to 80 mmHg. Leukocytosis, thrombocytopenia, and high C-reactive protein levels were noted. A mass was palpated on the left side of the abdomen. Serum creatinine, urine output and urine sediment were normal. Because of hypertension and the palpable mass, abdominal ultrasound was performed and revealed a hydropyonephrotic left kidney (Fig. 1). A percutaneous nephrostomy tube was inserted. Candida albicans grew in the specimen obtained directly by percutaneous puncture. Blood, urine and cerebrospinal fluid cultures yielded no organisms. The voiding cystoureterogram was unremarkable, but radionuclide scan showed a concentration defect of the left kidney. Administration of intravenous amphotericin B was initiated, and the dose was increased from 0.1 to 1 mg/kg/day over a one-week period. In addition, a solution of amphotericin B (1 mg/dl) was used for daily irrigation of the nephrostomy tube. Cardiac echography and ophthalmological examination were unremarkable. The patient's hypertension resolved on the second day, and control cultures grew no organisms. On the eighth day of therapy, renal ultrasound revealed resolution of the hydronephrosis (Fig. 2), and the nephrostomy tube was removed. A total dose of 35 mg/kg of i.v. amphotericin B was administered. No side effects were observed, and the infant recovered completely.

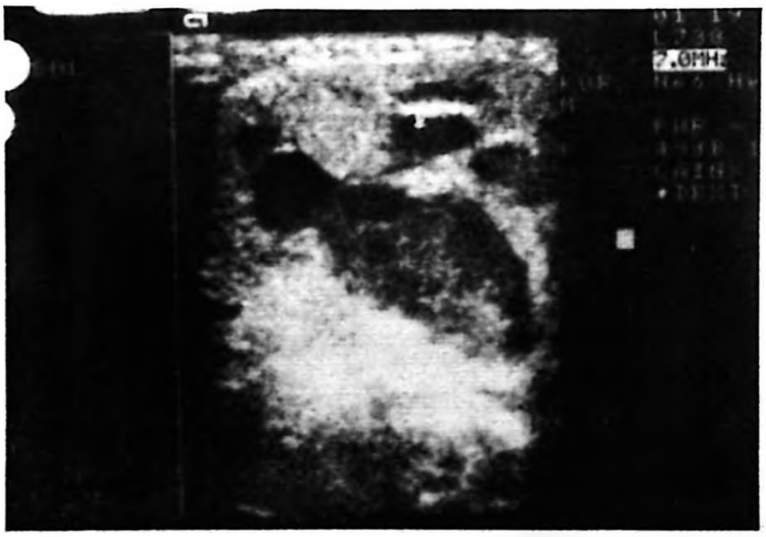

Fig. 1: Renal ultrasound showing grade II-III dilatation of the pelvicalyceal system. Distal to the calyces, fresh urine and hyperechogenic pus were seen.

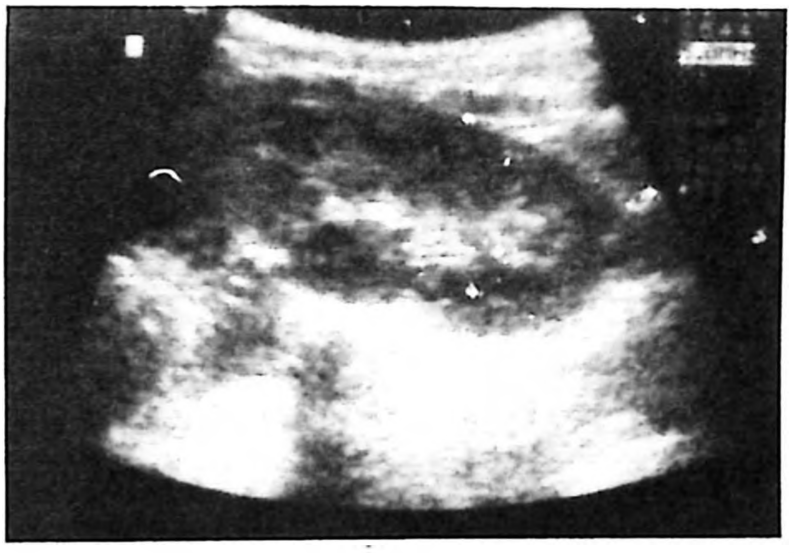

Fig. 2: Ultrasound scan demonstrating normal pelvicalyceal system after therapy.

Discussion

Despite improved survival rates of neonates, sepsis remains an important cause of morbidity and mortality. Although bacterial infections are most common, the incidence of fungal infections has also increased. Predisposing factors include antibiotic therapy (57%), prematurity (29%), intravenous and umbilical artery catheterization (24%), and parenteral alimentation (18%)[3]. Candida albicans is responsible for 75 percent of fungal infections during the neonatal period[4]. Two major forms of candida infections are recognized. Systemic candidiasis runs a course in which there is multiple organ involvement with candidemia. The second form, or primary renal candidiasis, presents with a less serious clinical picture, with renal invasion being the primary feature[5]. Hurley and Winner[6] demonstrated that large doses of candida given intravenously to mice produced systemic candidiasis, whereas smaller doses caused isolated renal disease. That shows that primary renal candidiasis is indeed the end-stage of an initially mild candidemia. Factors related to the kidney are 1. a delay in the renal inflammatory response, and 2. a favored environment for candida in the tubular lumen. The combination of urine acidity and hypertonicity is believed to promote mycelial proliferation[7].

Renal infection may be clinically silent or present as acute renal failure, systemic hypertension or flank masses[2,8,9]. The infection may be limited to the bladder or may include multiple renal abscesses and renal papillary necrosis. Fungal ball formation may occur, usually at the ureteropelvic junction, and may result in obstruction and hydronephrosis.

When there is a clinical suspicion of renal candidiasis, appropriate cultures of blood, urine and catheter tips should be taken and renal ultrasonography should be performed. Candida has been difficult to demonstrate in children's blood

cultures, but candiduria is quite common. Examination of the urinary sediment revealing yeast as well as candida may be an indication for agressive antifungal therapy. Urine cultures with colony counts > 15,000/ml reveal significant candida growth[10]. However, despite the severity of renal involvement, only 37 percent of the infants in one study had positive urine cultures[3]. This emphasizes the importance of direct renal access for culture in suspected cases of candidiasis. The simplest method of obtaining it is by percutaneous puncture. With the widespread availability of real-time ultrasound, renal candidiasis can be diagnosed and managed earlier[11]. Two sonographic patterns may be seen: a dilated collecting system with echogenic masses (snowballs) within the renal pelvis and/or bladder, or enlarged kidneys with homogenous echogenity and loss of architecture[12].

The diagnosis is made from the patient's history, the typical ultrasound appearance, the microscopic finding of mycelium in the urine and appropriate cultures. Therapy consists of antifungal treatment and percutaneous nephrostomy under sonographic guidance[13]. This may not be sufficiently effective in removing the fungal masses, and surgical revision may be necessary to relieve the obstruction[14].

Medical therapy presents a difficult problem. It usually includes i.v. amphotericin B combined with p.o. 5-fluorocytosine, and local irrigation with amphotericin B (1 mg of amphotericin B per deciliter of normal saline) via percutaneous nephrostomy tube[2, 15]. Bartone at al.[16] suggested that prompt irrigation and guide-wire manipulation to disintegrate obstructing mycelia may prevent the need for surgery in some cases. The combination of amphotericin B and 5-fluorocytosine reduces the development of resistence, and the drugs are believed to act synergistically. The duration of treatment is usually approximately six weeks, but no objective data exist regarding the appropriate length of therapy. Another possible therapy in pelviureteric candidal bezoars is placement of a nephrostomy tube, shot-term irrigation with amphotericin B and later oral administration of fluconazole, which is an antifungal agent of triazole class[17].

In our patient, the scaling skin lesions led to recurrent infections, and renal candidiasis probably developed due to long-term antibiotic treatment during these infections. A nine-day course of drainage and irrigation, and five weeks of i.v. amphotericin B therapy were successful. This case emphasizes the fact that in any neonate with a clinical suspicion of renal candidiasis, renal ultrasonography should be performed to facilitate early diagnosis and treatment of renal fungal disease. In the presence of obstructive uropathy due to secondary renal candidiasis, percutaneous nephrostomy drainage should be the initial management of choice. This provides for renal decompression and amphotericin B irrigation. Intravenous and local amphotericin B are sufficient in treating renal candididasis. With this approach, the morbidity and mortality associated with renal candidiasis will be reduced.

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