Acute anuric renal failure in an infant with systemic candidiasis

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SUMMARY We report a newborn baby who presented with acute anuric renal failure resulting from systemic candidiasis. The predisposing factors and diagnostic features are examined.

Although the newborn baby is susceptible to infection and mucocutaneous thrush is common, systemic candidiasis is rare. When it does occur in babies it usually causes osteomyelitis, arthritis, and meningitis. Renal failure is not a recognised feature.

Case history

A boy was born in August 1977 at 29 weeks' gestation, birthweight 1.430 kg. Respiratory distress syndrome developed and he required ventilation for 23 days. A blood culture taken at 2 days grew Staphylococcus aureus and he was given ampicillin and cloxacillin. Subsequently he received courses of gentamycin and carbenicillin.

He was fed intravenously from 3 to 22 days of age via silastic cannulae. These were placed in various veins, including the left long saphenous. At 21 days the long saphenous site became infected and blood cultures grew Candida albicans. The cannula was therefore removed. Five days later 3 ml pus was drained from the abscess; Gram's stain showed yeast cells and mycelial elements; cultures produced a profuse growth of C. albicans. He was given benzylpenicillin, streptomycin, and lincomycin from 25 to 30 days and the abscess healed. Thereafter he made good progress and for 5 weeks he fed normally and gained weight. Five blood cultures during this period were sterile.

When he was 64 days old he suddenly became anuric and was transferred to Leeds. There was no urine in the bladder on catheterisation. An intravenous urogram showed nephrograms of 2 normal size kidneys which failed to excrete dye into the renal pelvis. A cystogram was normal; there was no urethral obstruction and no vesico ureteric reflux. After a week of anuria blood tests showed: Hb 6.4 g/dl, WBC $14.8 \times 10^9$/l (14 800/mm$^3$) (75%
neutrophils, 24% lymphocytes), normal platelets, and no evidence of disseminated intravascular coagulation; plasma urea 20 mmol/1 (120 mg/100 ml), K 6.3 mmol/1.

In order to find out if recovery was likely, and if dialysis was justified, the baby was given an open renal biopsy on day 71. Macroscopically the kidney looked mildly oedematous. The renal pelvis felt normal and contained no obstructing mass. On microscopic examination the renal tissue appeared viable, so peritoneal dialysis was begun the next day and continued for 3 days. Further study of the sections showed Candida within the kidney. Intravenous 5-fluorocytosine therapy was begun with 200 mg/kg per day initially. Blood levels a thousand times the minimum inhibitory concentration (MIC) of the Candida were obtained (MIC 0·15 mg/dl). Two days later he began to pass urine which on microscopic examination contained budding yeast cells and hyphae (Fig. 1).

During this time he also had extensive broncho-pneumonia and required further ventilation. The blood culture grew C. albicans. There was clinical improvement, the pneumonia resolved and he continued to pass urine. The blood cultures remained positive although the Candida in the blood was allegedly sensitive to fluorocytosine. For a while clinical improvement was maintained, but he deteriorated suddenly to die at 86 days of septicaemia.

Renal biopsy (Fig. 2)

A total of 65 glomeruli was seen per section, none being hyalinised or scarred. There was a marked dilatation of Bowman’s space in 20%. The tubules were preserved but showed marked epithelial, cloudy swelling, and focal dilatation. At two points there were small foci of necrosis involving tubules and interstitium, accompanied by mixed inflammatory cell infiltration (Fig. 2). Along the side of the biopsy, but not within the areas of necrosis, were abundant fungal filaments which were PAS- and Gram-positive and which stained positively with Grocott’s stain for fungi (Fig. 1). These filaments had the morphology of C. albicans. It was considered that the biopsy revealed viable renal tissue which showed toxic and reactive changes, probably due to renal infection with C. albicans.

Necropsy

The right kidney. This had become a pyonephrosis and was about 4 times normal size. There was a pronounced reduction in renal tissue in some areas and the lower lobe was infarcted.

The left kidney. This was a little enlarged. Small white abscesses were scattered throughout the parenchyma and there were areas of Candida in the interstitium. There was a large abscess, 1 cm across, occupying the lower lobe.

Discussion

It is unusual for an apparently healthy baby to develop acute renal failure. The total anuria suggested urinary tract obstruction, but that was excluded by the urogram and cystogram. Intrinsic renal disease was the only alternative. Acute tubular necrosis or renal venous thromboses were unlikely because of the immediate good health of the baby. Despite intensive investigation the cause was not found until Candida was identified in the renal biopsy tissue. It is possible that the anuria was a result of intrarenal obstruction by fungal growth in the renal tubules. Alternatively an ‘acute pyelonephritis’ shutdown might have occurred from fungal infection.

Systemic candidiasis in infants usually presents as osteomyelitis, arthritis, and meningitis (Businco et al., 1977). In most cases the infant is premature and receiving antibiotics. A vein has usually been catheterised for intravenous feeding (Boeckman and

Fig. 1 Unstained urine HP × 100. Budding yeast cells and hyphae.
Krill, 1970). Systemic candidiasis is rare in the healthy infant. However, with the increase in intensive care of the newborn systemic candidiasis may become more common. For effective treatment early diagnosis is essential and there may be clues: the growth of Candida from a cannula tip, or the appearance in the urine of budding yeast cells and, in particular, hyphae (Bernhardt et al., 1974). Indeed urine examination and cultures may be a more reliable method of diagnosis than venous blood culture (Stone, 1974).

Candida infection of the urine, although rare, may occur at any age. Most urine infections are not accompanied by systemic candidiasis or by renal involvement (Littlewood, 1968). Gherardi (1965) reported a baby who presented with severe hypertension resulting from renal artery fungal obstruction. Acute renal failure has not been considered a complication of either systemic or urinary candidiasis in children, although there are reports of its occurrence in adults (Louria et al., 1962; Lehner, 1964).

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References


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