Successful management of bilateral emphysematous pyelonephritis in end-stage polycystic kidneys: bilateral native nephrectomies and preservation of functioning renal transplant

Sir,

Background

Emphysematous pyelonephritis (EPN) is a rare life-threatening infection. It is characterized by the accumulation of gas within the renal parenchyma and surrounding tissues [1]. It typically occurs in the presence of gram-negative facultative anaerobic organisms, such as *Escherichia coli* (*E. coli*), *Klebsiella* spp. and *Proteus* spp [2]. In the presence of high tissue glucose levels, these organisms ferment glucose and lactate to carbon dioxide causing necrotizing infection [3]. It is strongly associated with diabetes mellitus (96%) and urinary tract obstruction (29%) [4].

We describe a case of EPN with unique factors. Our patient had bilateral EPN within native non-functioning polycystic kidneys and a functioning renal transplant. Diabetes was diagnosed after renal transplantation concurrently with EPN.

Case

A 42-year-old man with established renal failure secondary to adult polycystic kidney disease (APKD) developed recurrent urinary tract infections following renal transplantation 7 months earlier.

He was admitted with dysuria and right-sided loin pain. On admission, blood pressure was 140/80 mmHg, pulse 80 beats/minute and temperature was 38.5°C. His white cell count was 12.5 \times 10^3/mm^3, haemoglobin 9.5 g/L, platelet count 568 \times 10^3/mm^3, serum creatinine 258 μmol/L (similar to baseline creatinine post-transplant), urea 15.8 mmol/L, potassium 6.2 mmol/L and bicarbonate 16 mmol/L. Intravenous co-amoxiclav was commenced. An ultrasound scan did not demonstrate any focus of infection. *E. coli* sensitive to co-amoxiclav was found on both urine and blood culture. His immunosuppression consisted of tacrolimus and prednisolone.

His clinical condition deteriorated after a week despite antibiotic therapy. He had stable graft function, but his serum blood glucose level had risen to 50 mmol/L. He was transferred to the critical care unit, and his antibiotics were switched to piperacillin and tazobactam. A computerized tomography (CT) scan demonstrated gas within both renal parenchyma and a diagnosis of bilateral emphysematous pyelonephritis was made (Figure 1). The patient was subsequently intubated and ventilated and placed on inotropic support.

After 3 days, percutaneous drainage of the collection within the right kidney was performed. *E. coli* was cultured from the minimal pus aspirated. Further blood cultures again grew *E. coli* in addition to *Enterococcus* and *Candida*. Additional anti-microbial therapy at this stage included meropenem, teicoplanin and caspofungin.

A repeat CT scan 6 days later showed that the infection in both sides had improved. However, though his ventilatory and inotropic requirements initially reduced, his transplant graft function declined and continuous veno-venous haemofiltration was commenced. It was decided to proceed to bilateral nephrectomies, 22 days after first admission and 14 days after transfer to the critical care unit. A second operation was required for bleeding, and he received 8 units of whole blood, 4 units of fresh frozen plasma and 2 units of cryoprecipitate.

Within 48 h of the initial operation, the patient’s condition had improved. Transplant function recovered, and organ support was not required beyond the sixth post-operative day. Histological examination of the kidneys revealed inflammatory changes consistent with infection.

He was discharged home 2 months post-operatively with a serum creatinine of 168 μmol/L. He continues to have occasional urinary tract infections. He otherwise remains well, and 18 months later, he has a serum creatinine of 200 μmol/L. His diabetes mellitus is well controlled on metformin.
Discussion

Our patient had responded to antibiotics on multiple occasions but the deterioration in clinical condition and diagnosis of EPN coincided with a new diagnosis of diabetes mellitus. Post-transplant diabetes is an increasing problem and is a major risk factor in the pathogenesis of EPN. Development of diabetes should be considered in patients with recurrent urinary tract infections [5].

In the management of EPN, a targeted approach to management of severe sepsis is required, often involving critical care. Antibiotics and supportive medical therapies alone have a high failure rate. Nephrectomy or open drainage has historically been the preferred option, but improved imaging and interventional techniques have led to a shift towards percutaneous drainage [4]. An extensive review [4] suggests that mortality rates in patients having percutaneous drainage is favourable (13.5%) compared to nephrectomy (25%) and conservative treatment (50%). A scenario where a non-surgical approach may be particularly favoured is in bilateral EPN [6, 7] or in EPN within a functioning transplant [8–10]. Successful conservative or percutaneous drainage could preserve the functioning renal unit.

Within the literature, few case reports describe EPN in patients with APKD, and none are also associated with a functioning renal transplant. In our case, initial non-surgical management seemed promising, but without bilateral native nephrectomies, we feel the patient would not have survived.

In summary, we have described a unique case of bilateral EPN in native polycystic kidneys in a renal transplant recipient with new-onset diabetes mellitus. After failure of antibiotic therapy and percutaneous drainage, he had bilateral native nephrectomies after which he made a good recovery with good return of transplant function.

Conflict of interest statement. None declared.

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