NDT Plus (2011) 4: 452–458

NDT PLUS
Nephrology Dialysis Transplantation

Letters to the Editor

Advance Access publication 24 August 2011

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 $568 \times 10^3/mm^3$, albumin 32 g/L, 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.

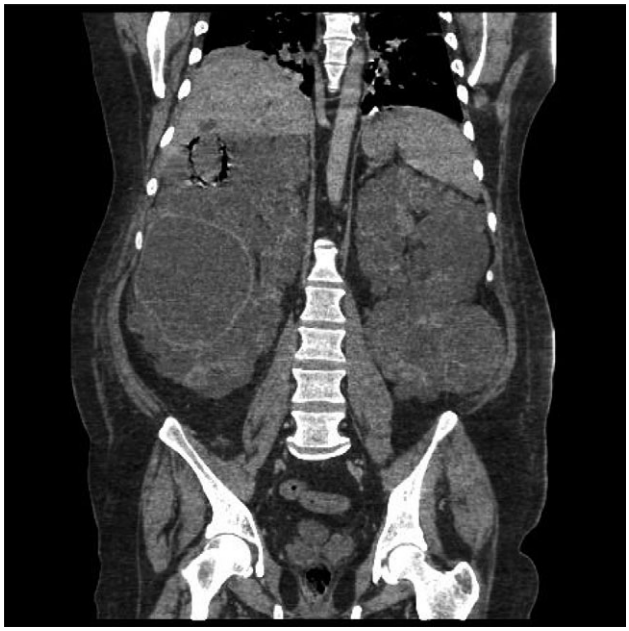

Fig. 1. Coronal reformatted CT image demonstrating bilateral massively enlarged kidneys due to APKD. There is consequent displacement of the liver and spleen. At the upper pole of the right kidney, gas is seen outlining one of the cysts. There were similar changes in the left kidney (not demonstrated on this image).

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. 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.

[1]Freeman Hospital, Newcastle upon Tyne NHS Foundation Trust, Newcastle upon Tyne
[2]James Cook University Hospital, South Tees NHS Foundation Trust, Middlesbrough
Edwin K. S. Wong[1]
Richard Hartley[2]
John Main[2]
Correspondence and offprint requests to: John Main; E-mail: John.main@stees.nhs.uk

References

1. Michaeli J, Mogle P, Perlberg S *et al.* Emphysematous pyelonephritis. *J Urol* 1984; 131: 203
2. Tahir H, Thomas G, Sheerin N *et al.* Successful medical treatment of acute bilateral emphysematous pyelonephritis. *Am J Kidney Dis* 2000; 36: 1267–1270
3. Huang JJ, Chen KW, Ruaan MK. Mixed acid fermentation of glucose as a mechanism of emphysematous urinary tract infection. *J Urol* 1991; 146: 148–151
4. Somani B, Nabi G, Thorpe P *et al.* Is percutaenous drainage the new gold standard in the management of emphysematous pyelonephritis? Evidence from a systematic review. *J Urol* 2009; 179: 1844–1849
5. Pontin AR, Barnes RD. Current management of emphysematous pyelonephritis. *Nat Rev Urol* 2009; 6: 272–279
6. Lee IK, Hsieh CJ, Liu JW. Bilateral extensive emphysematous pyelonephritis. *Med Princ Pract* 2009; 18: 149–151
7. Hart PD, Vaseemuddin M, Egiebor O *et al.* Bilateral emphysematous pyelonephritis in a patient with no known risk factors. *J Natl Med Assoc* 2007; 99: 179–181
8. Baas MC, van Donselaar-van der Pant KA, Bemelman FJ. Emphysematous pyelonephritis in a renal transplant patient *Neth J Med* 2009; 67: 403–404
9. Baliga KV, Narula AS, Sharma A *et al.* Successful medical treatment of emphysematous pyelonephritis in a renal allograft recipient. *Ren Fail* 2007; 29: 755–758
10. Chuang YW, Chen CH, Cheng CH *et al.* Severe emphysematous pyelonephritis in a renal allograft: successful treatment with percutaneous drainage and antibiotics. *Clin Nephrol* 2007; 68: 42–46

doi: 10.1093/ndtplus/sfr102