Emphysematous pyelocystitis in a renal allograft secondary to sigmoid diverticular disease and colovesical fistula: a case report

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Abstract

Pyelonephritis is a serious common complication of transplantation that can lead to either acute renal failure or graft loss. The occurrence of diverticulitis in a renal transplant recipient is a rare complication but may lead to major morbidity and mortality. The overall incidence of diverticular disease in patients over the age of 60 years is 30%. Intense immunosuppression plays a major role in the development of infection during the first 6 months after transplantation. This may take the form of emphysematous pyelonephritis due to gas-forming organisms, xanthogranulomatous nephritis and malacoplakia. The incidence of colonic perforation secondary to diverticulitis in renal transplant patients is 0.9%. Emphysematous cystitis and pyelitis affecting a renal transplant allograft is a rare but serious condition and patients with diabetes mellitus, neurogenic bladder, bladder outlet obstruction, and recurrent urinary tract infections (UTIs) are at increased risk for the disease. In this case, severe urinary sepsis culminated in disseminated intravascular coagulation involving the mesenteric vessels leading to ischaemic infarction of the midgut which proved fatal. In non-diabetic patients with pneumaturia and recurrent UTIs, inflammatory enterovesical communication should be suspected and investigation by computed tomography and the institution of appropriate treatment is indicated.

Keywords

Emphysema; pyelitis; cystitis; renal allograft; diverticular disease; colovesical fistula.

Case report

A 74-year-old non-diabetic woman underwent a cadaveric renal transplant in April 1994. The kidney functioned immediately, with no recorded rejection episodes. The cause of her background kidney disease, which dated back to 1991, was uncertain. Home hemodialysis was started the following year and continued until transplantation.

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Three years after her transplant, the diagnosis of diverticulitis was confirmed by sigmoidoscopy. Subsequently, she suffered recurrent urinary tract infections (UTIs) with *Escherichia coli*/*Klebsiella* and *Campylobacter* infection in the stools between 1998 and 2003. She died in 2006. During the episodes of infection, her renal function deteriorated steeply.

In 2002, a peritoneal dialysis catheter was inserted but had to be removed because of infection. She presented with a persistent increase in her white cell count due to recurrent UTIs, which increased to 19.2 in February 2006, just before her death. Her renal function deteriorated sharply to reach a glomerular filtration rate of 7 ml/min, creatinine 407 μmol/l, urea 10.4 mg/dl and a serum albumin level of 16 g/dl.

She developed pneumaturia accompanying the clinical features of UTI, and rapidly developed generalized abdominal pain with peritonism and progressive deterioration in her general condition. A computerized tomographic (CT) scan of her abdomen showed extensive diverticulosis of the sigmoid colon, a colovesical fistula with gas in the bladder and the allograft renal pelvis (Figs. 1–3). After resuscitation a laparotomy was performed, which revealed severe diverticulosis affecting the sigmoid colon, and ischaemic infarction involving the whole of the midgut caused by thrombosis of the superior mesenteric vessels. The abdomen was closed and terminal care was provided.
Discussion

Infections in renal transplant recipients have serious outcomes, and there are early diagnostic guides relating to optimum antimicrobial treatment and timely surgical management. The outcome of these infections reflects changes in risk factors with time relating to date of surgery, hospitalization, the level of immunosuppression, acute/chronic rejection and the emergence of latent infections as well as exposure to community infections. Fifty percent of all gastrointestinal complications occur while patients are receiving intense immunosuppression. Mortality is high and appears to be related to the interaction of immunosuppression and the associated sepsis[1].

Clinical scenarios vary. Patients may present with masked symptoms and signs of invasive infection, fever, graft rejection or drug toxicity. Intense immunosuppression has been found to play a major role during the first 6 months after transplantation. Renal biopsy is not the usual method of diagnosis; however if neutrophils are abundant, diagnosis of pyelonephritis must be at the top of the list. Other variants are emphysematous pyelonephritis due to gas-forming organisms, xanthogranulomatous nephritis and malacoplakia[2].

Pyelonephritis is a common serious complication of transplantation. It can lead to acute renal failure and subsequent graft loss. Diverticulitis is a rare complication but may lead to major morbidity and mortality. The overall incidence of diverticular disease is 30% in patients above the age of 60 years. It remains asymptomatic in 90% of patients. The clinical picture of diverticulitis can be variable as a result of the immune suppressed state and the use of steroids, which can make early diagnosis extremely difficult. Patients may present with multiple UTIs when the main pathology is in fact diverticulitis leading to fistula formation with the urinary tract[3].

The incidence of colonic perforation after diverticulitis in renal transplants is 0.9%. In a reported series of 8 patients, the clinical picture of fever, abdominal pain, localized or diffuse peritonitis and leukocytosis was present in 7/8 (87.5%). Three patients (37.5%) were not receiving steroids and 2 patients (25%) had serum steroid levels of more than 20 mg/dl. The mean interval between transplantation and perforation was 4.1 years; the interval between the onset of symptoms and surgery was greater than 48 h in 1 patient (12.5%). Mortality was 12.5%[4].

In another retrospective analysis, complicated diverticulitis has been defined as diverticulitis with free perforation, abscess, phlegmon and fistula. Thirteen patients in this series had episodes of diverticulitis starting from between 25 days and 14 years after transplant. All patients required surgical management. The perioperative mortality was 7.7% (1 patient). The authors pointed to the importance of immediate diagnosis, aggressive surgical treatment as well as reduction of immunosuppression and the prescription of optimum antibiotic chemotherapy in order to achieve a significant reduction in mortality[5].

Fig. 3. CT scan showing colovesical communication.
In another retrospective analysis, antirejection treatment showed a role in modifying the clinical spectrum of gastrointestinal complications; with the resultant risk of diagnostic as well as therapeutic error. There has been no relationship between the underlying diagnosis of renal failure and warm/cold ischaemia times associated with transplant surgery. No case of diverticulitis was found in this analysis[6].

Colonic perforation is commonly associated with a cadaver kidney, increased body weight and a history of diverticulitis[6]. Patients with polycystic kidney disease were found to have a significantly higher rate of diverticulitis, which occurred in 46% of cases. The incidence of diverticulitis was not significantly related to cyclosporin treatment or with the source of the kidney (live/cadaveric transplant)[7].

Retrocolic fistula has been reported as a very rare complication of chronic pyelonephritis. There have been 100 cases reported worldwide in the literature, including a case scenario of a cutaneous retrocolic fistula in a patient who had a staghorn calculus and diverticulitis[8]. Xanthogranulomatous pyelonephritis was among the most common primary renal diseases associated with renoic fistula. Inflammation from kidney disease may place patients with colonic diverticulitis at higher risk of developing retrocolic fistulae[9]. Laparoscopic nephrectomy (hand assisted) for xanthogranulomatous pyelonephritis with colocutaneous fistula is a challenging treatment modality[10].

A case of xanthogranulomatous pyelonephritis in a renal allograft has been reported[10]. Such inflammatory disease in the renal parenchyma is either focal or diffuse and has been found in 0.6–4% of cases with chronic pyelonephritis. Histopathology of the renal parenchyma as well as the diverticulitis is the key to diagnosis. Lipid-filled macrophages are the key landmark in histology. Nine cases have been reported in the literature. This rare type of pyelonephritis is usually associated with urinary obstruction, previous ineffective antibiotics, calculus disease and chronic infection[10].

Conclusion

Emphysematous cystitis and pyelitis (ECP) affecting a renal transplant allograft is a rare but serious condition and patients with diabetes mellitus, neurogenic bladder, bladder outlet obstruction, and recurrent UTIs are at increased risk of acquiring the disease[11]. The presence of air within the urinary tract and in the retroperitoneal tissue suggests gas-producing organisms as the causative agent. Sporadic cases of ECP in diabetic renal transplant recipients have been reported in the past[12,13] but ECP in a non-diabetic patient, as in our case, where colovesical fistula secondary to colonic diverticulitis has led to ECP is a rarity and has not been reported in the literature. Severe urinary sepsis culminated in disseminated intravascular coagulation involving the mesenteric vessels and ischaemic infarction of the midgut, which proved fatal.

Teaching point

In non-diabetic patients with pneumaturia and recurrent UTIs, the suspicion of enterovesical communication should be raised and investigated by CT, followed urgently by the institution of appropriate treatment.

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