

Emphysematous pyelonephritis in failed renal allograft: Case report and review of literature

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Abstract

Emphysematous pyelonephritis (EPN) in renal allograft is rare but potentially lethal complication and requires aggressive medical and/or surgical therapy to achieve cure. We report a case of 60-year-old diabetic male with poor cardiac function on maintenance hemodialysis, who underwent delayed allograft nephrectomy for EPN in failed renal allograft. Blood culture grew *Bacteroides*. He was stable in the postoperative period but passed away on day 4 due to myocardial infarction likely secondary to poor baseline cardiac function. Delay in diagnosis and treatment could have contributed to this unfavorable outcome. There is a paucity of published literature regarding EPN in the transplant population, such that management decisions (percutaneous conservative versus urgent surgical) are challenging. Further studies are required to establish treatment guidelines.

Key Words: Emphysematous pyelonephritis, nephrectomy, renal allograft

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INTRODUCTION

Emphysematous pyelonephritis (EPN) is a rare but serious necrotizing infection of the kidney, associated with the presence of gas in the kidney and peri-renal tissue. The most common pathogens are *Escherichia coli* and *Klebsiella pneumoniae*.^[1-3] There are several risk factors for EPN; notably poorly controlled diabetes mellitus and urinary tract obstruction being the most common.^[1,3] EPN is usually seen in the native kidneys and has been reported infrequently in functioning renal allografts. There are only three case reports of EPN in failed renal allografts in the English literature.^[4-6] We report a case of a 60-year-old diabetic male with multiple co-morbidities who presented with EPN in failed renal allograft, was treated with intravenous

antibiotics for 3 weeks followed by allograft nephrectomy. He was stable postoperatively but died due to cardiac complications likely secondary to poor baseline cardiac function.

CASE REPORT

A 60-year-old gentleman with insulin dependent diabetes mellitus and failed renal allograft on maintenance hemodialysis was transferred to our tertiary care center with fever, diffuse abdominal pain, an elevated white blood cell count and a computed tomographic (CT) scan eliciting the presence of air in his failed renal allograft. He had long complex medical history, with focal segmental glomerulosclerosis that resulted

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in end-stage renal disease in the 1990s and developed dilated cardiomyopathy in the mid-1990s. He had bilateral radical nephrectomies for kidney cancer (right side in 1997, left in 1999). There was no evidence of metastatic spread from kidney cancer. In 2001, he received deceased donor renal transplant; at this point, he had worsening left ventricular function, an ejection fraction of 25% and severe mitral regurgitation. In 2004, he developed acute renal failure secondary to a transplant ureteric stricture and underwent balloon dilatation and insertion of a stent. This failed and subsequently he underwent transplant ureterectomy and pyelovesicostomy of allograft with psoas hitch of the bladder. At this time, the allograft function was normal. In 2009, he suffered myocardial infarction and was treated with medical therapy without revascularization. However, his transplant failed, he became anuric and was started on hemodialysis and put on deceased donor transplant wait list. In 2012, he was admitted to the Intensive Care Unit (ICU) at a secondary care center with hypoglycemia, fever, non-ST-elevation myocardial infarction (NSTEMI) and in-hospital arrest. There was significant hepatomegaly, likely secondary to venous congestion from right-sided heart failure. He had elevated white blood cell count, and the blood culture grew *Bacteroides*. He received ciprofloxacin and metronidazole. A CT scan of the abdomen and pelvis was then performed [Figure 1], revealing locules of gas in failed renal transplant consistent with EPN. He had no history of foley's catheterization or recent urologic instrumentation. He was started on piperacillin-tazobactam to broaden his antibiotic coverage and transferred to our tertiary care institution 3 weeks after his admission for allograft nephrectomy.

After hemodynamic stabilization, an emergent subcapsular nephrectomy was performed. Intraoperatively, necrotic kidney with pus was encountered. There was no significant blood loss,



Figure 1: Noncontrast computed tomography scan of the patient at presentation showing gas in the renal parenchyma of allograft (white arrows)

and postoperatively patient was transferred to ICU, considering his poor cardiac function. He was stable over next few days but died on the 4th postoperative day due to myocardial infarction. Histopathology revealed a necrotic kidney with acute inflammation and total effacement of the kidney architecture.

DISCUSSION

EPN is an infrequent infection in renal allografts and has been rarely reported in nonfunctioning renal allografts.^[4-6] The present case is the fourth report on EPN in failed renal allograft. Two of the other cases had EPN after the embolization of failed but symptomatic renal allograft.^[4,6] One other and the present case presented with symptoms of severe sepsis.^[5] The pathogenic organisms were coagulase negative *Staphylococcus aureus*^[5] and *Bacteroides*^[4] in two including present case and one^[6] did not report the pathogenic organism. In the present case, blood culture grew *Bacteroides* and was thought to be causing EPN. Urine culture was not performed, as the patient was anuric. All the other three patients of EPN in failed renal allograft recovered after having emergent nephrectomy. The present case was stabilized initially with antibiotics, underwent nephrectomy and was recovering well from the surgical point of view but died of myocardial infarction on postoperative day 4. Poor baseline cardiac function, recent NSTEMI, multiple co-morbidities along with sepsis probably contributed to this outcome. In total, there are 25 cases of EPN in renal allografts reported in English literature and majority of them had diabetes (83%) as a risk factor.^[1,2] *E. coli* and *Klebsiella* were the most commonly isolated organisms.^[1,2] On the other hand, patients with EPN in failed allograft had different infective organisms; coagulase negative *S. aureus* in one and *Bacteroides* in two. The source of infection in these cases was probably hematogenous rather than urinary infection.

There are multiple staging systems described in literature for management of EPN,^[1,3,7] with the one by Huang and Tseng being used most frequently^[3] [Table 1]. Their series did not include EPN in renal allografts. Subsequently Al-Geizawi *et al.* proposed staging system for EPN in renal allografts along with treatment recommendations^[1] [Table 2]. As the destruction of renal parenchyma is a major factor in deciding treatment, this staging may not apply to the present case, as the preservation of renal function is not a concern in failed renal allograft.

Co-morbidities play a crucial role in patient recovery after successful nephrectomy for EPN, as reported by Arai *et al.*^[8] They performed successful nephrectomy for EPN in renal allograft leading to improvement of sepsis and disseminated intravascular coagulation. Unfortunately, patient died of fulminant hepatic insufficiency 25 days after the surgery.

Table 1: Classification system of emphysematous pyelonephritis (Huang and Tseng^[3])

| Class | Characteristics |
|----------|--|
| Class 1 | Collecting system gas |
| Class 2 | Renal parenchymal gas without extension |
| Class 3A | Perinephric extension of gas/abscess |
| Class 3B | Pararenal extension of gas/abscess |
| Class 4 | Emphysematous pyelonephritis bilaterally or in a solitary kidney |

Table 2: Staging system for emphysematous pyelonephritis in renal allografts (Al-Geizawi et al.^[1])

| Stage | Characteristics | Recommended treatment |
|-------|--|--|
| 1 | Gas in the collecting system | Aggressive medical management (fluid and electrolyte correction, targeted antibiotic therapy, strict glycemic control, reduction in immunosuppression) and relief of obstruction, if present, via percutaneous nephrostomy or ureteral stent |
| 2 | Gas replacing <50% of renal parenchyma, with minimum spread to the surrounding tissues, sepsis rapidly controlled | Aggressive medical management with placement of 1 or more percutaneous drains, with early and frequent follow-up imaging (either ultrasound or CT) |
| 3 | Gas replacing >50% of renal parenchyma; or extensive spread of infection in the perinephric area; or patient with evidence of multiple organ failure, uncontrolled sepsis, or shock not responding to medical management | Allograft nephrectomy |

CT: Computed tomographic

In the present case, patient underwent allograft nephrectomy 3 weeks after the initial admission, but his poor baseline cardiac function and recent NSTEMI likely contributed to mortality. Delay in the diagnosis and treatment could have also contributed to this unfavorable outcome. All the patients with EPN in failed renal allograft (4/4 including present case) have undergone nephrectomy as the treatment option with other three recovering normally. The scarcity of this disease

process, combined with a lack of published literature has prevented definite treatment guidelines to be established. Based on limited literature evidence, prompt nephrectomy seems to be a reasonable treatment for EPN in failed renal allografts. Further studies need to be done to establish the optimal role and timing of treatment, as well as validate existing proposed staging systems.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Al-Geizawi SM, Farney AC, Rogers J, Assimos D, Requarth JA, Doares W, et al. Renal allograft failure due to emphysematous pyelonephritis: Successful non-operative management and proposed new classification scheme based on literature review. *Transpl Infect Dis* 2010;12:543-50.
- Agreda Castañeda F, Lorente D, Trilla Herrera E, Gasanz Serrano C, Servian Vives P, Izuetza Saavedra I, et al. Extensive emphysematous pyelonephritis in a renal allograft: Case report and review of literature. *Transpl Infect Dis* 2014;16:642-7.
- Huang JJ, Tseng CC. Emphysematous pyelonephritis: Clinicoradiological classification, management, prognosis, and pathogenesis. *Arch Intern Med* 2000;160:797-805.
- Ortiz A, Petkov V, Urbano J, Contreras J, Alexandru S, Garcia-Pérez A, et al. Emphysematous pyelonephritis in dialysis patient after embolization of failed allograft. *Urology* 2007;70:372.e17-9.
- Goral S, Stone W. Emphysematous pyelonephritis in a nonfunctioning renal allograft of a patient undergoing hemodialysis. *Am J Med Sci* 1997;314:354-6.
- Atar E, Belenky A, Neuman-Levin M, Yussim A, Bar-Nathan N, Bachar GN. Nonfunctioning renal allograft embolization as an alternative to graft nephrectomy: Report on seven years' experience. *Cardiovasc Intervent Radiol* 2003;26:37-9.
- Wan YL, Lee TY, Bullard MJ, Tsai CC. Acute gas-producing bacterial renal infection: Correlation between imaging findings and clinical outcome. *Radiology* 1996;198:433-8.
- Arai S, Makino T, Okugi H, Hasumi M, Shibata Y, Hatori M, et al. A case of emphysematous pyelonephritis in a renal allograft. *Transplantation* 2006;81:296-7.