



Case report

Bilateral emphysematous pyelonephritis



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ARTICLE INFO

Article history:

Received 19 July 2020

Received in revised form 4 October 2020

Accepted 28 December 2020

Keywords:

Emphysematous pyelonephritis

Pyelonephritis

Bilateral emphysematous pyelonephritis

ABSTRACT

A 57-year-old man presenting with bilateral flank pain and hematuria was found to have severe bilateral emphysematous pyelonephritis. The patient was managed with a conservative approach consisting of systemic antimicrobials and decompression via percutaneous nephrostomy tubes with piperacillin-tazobactam instillations via nephrostomy and made a full recovery.

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Introduction

Emphysematous pyelonephritis is a necrotizing infection of the kidney resulting in gas formation in the renal parenchyma and surrounding tissues. This impressive presentation is seen to affect more females than males, with several studies finding between a 3:5 and 4:5 female to male predominance [1,2]. The most prevalent causative organism is *Escherichia coli*, a lactose-fermenter, which metabolizes lactose and glucose to produce high levels of carbon dioxide and hydrogen resulting in significant gas formation [3]. A case series comprising forty-six affected patients revealed *Escherichia coli* as the causative organism in 69 % and *Klebsiella pneumoniae* in 29 % [4]. Other contributing factors include high tissue glucose levels, defective immune response, and vascular compromise. Therefore, it is unsurprising that uncontrolled diabetes mellitus and ureteric obstruction predispose one to this severe infection [3]. Bilateral emphysematous pyelonephritis, as described here, is an extremely rare finding.

Case report

A 57-year-old male presented due to persistent hematuria and bilateral flank pain. Past medical history included severely uncontrolled diabetes mellitus as well as daily tobacco and alcohol use. Shortly after arrival the patient became tachycardic and hypotensive, ultimately requiring intubation and pressor support. CT imaging of the abdomen/pelvis revealed air in the renal parenchyma bilaterally extending into the retroperitoneum as well as the bladder (Fig. 1A and B). Empiric therapy with vancomycin,

piperacillin-tazobactam and fluconazole was initiated. Bilateral nephrostomy tubes were placed for drainage and the patient required renal replacement therapy due to severe acute kidney injury. The patient received piperacillin-tazobactam flushes via the nephrostomy tubes for four days. Blood cultures revealed pan-sensitive *Escherichia coli*. Therapy was de-escalated to ceftriaxone two grams daily and continued for two weeks. The patient's condition stabilized and he was noted to have significant improvement in flank pain. Follow up imaging demonstrated significantly less air in the renal parenchyma. On discharge, the patient was prescribed oral ciprofloxacin. He no longer required renal replacement therapy and had adequate urine output. On follow up after completion of antibiotic therapy his renal function remained stable and his nephrostomy tubes had been removed. Overall, the patient received eight weeks of antibiotics.

Discussion

Historically, treatment options have been limited, most often including emergent nephrectomy. However, the mortality rate with this procedure remains quite high. Our patient presented with significant involvement of both kidneys which would be associated with significant morbidity should he have undergone bilateral nephrectomy. As demonstrated by this case, more recent data has suggested that a conservative approach consisting of antibiotic therapy combined with percutaneous drainage offers an effective alternative in select patients [5]. Several small case series have demonstrated successful nephrectomy-sparing treatment combining percutaneous drainage with antibiotic therapy [6–8]. Nephrectomy should be considered for refractory shock or persistent bacteremia. The role of direct antibiotic instillation through nephrostomy tubes is unclear. In our case, piperacillin-tazobactam was instilled via bilateral percutaneous nephrostomy

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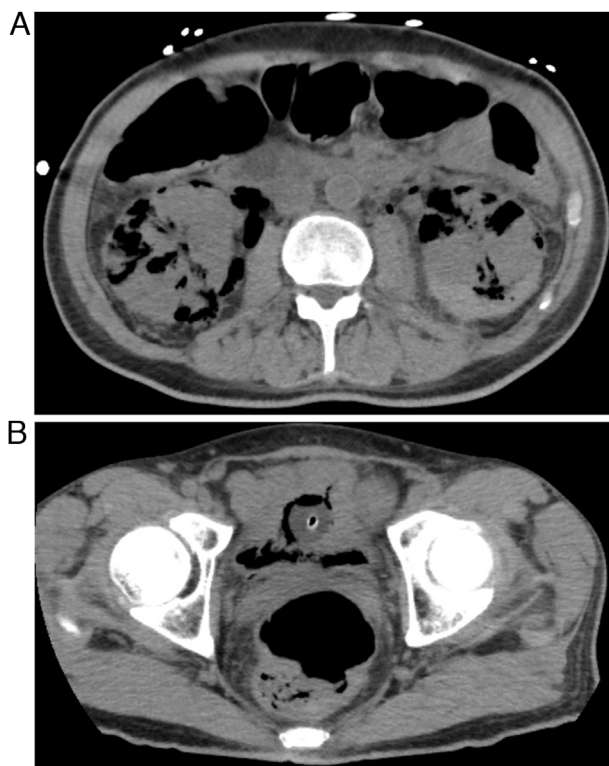


Fig. 1. CT abdomen/pelvis revealing air in the renal parenchyma bilaterally extending into the retroperitoneum and bladder.

tubes. Data is lacking regarding the administration of antibiotics via this route. Fluconazole has been used successfully and without ill effect for persistent candiduria due to a renal fungus ball [9]. Amphotericin B irrigation via nephrostomy was continued for seven days in addition to systemic itraconazole therapy after ureteroscopic removal of a *Aspergillus* fungal ball in another case [10]. However, no guidance is currently available regarding antimicrobial instillation via nephrostomy tube. Theoretically, it may provide large concentrations of active drug in patients who otherwise have a low creatinine clearance and reduced concentrations of antibiotics in urine. Furthermore, it is possible that the act of irrigation alone mechanically results in reduction of burden of disease. A study performed evaluating surgical complications due to stone retropulsion in upper ureteral stones revealed better outcomes when antegrade irrigation via percutaneous nephrostomy tube was delivered rather than retrograde irrigation via the bladder, suggesting that the irrigation alone may play a large role to decrease infective burden in this case [11]. Bladder irrigations with gentamicin were used successfully in preventing recurrence of cystitis in neurogenic bladder patients without systemic absorption [12]. However, to our knowledge, no data exists on

systemic absorption of aminoglycosides and direct toxicity by antegrade instillation via nephrostomy, which is the main reason why this class was avoided in our patient. Caution should be employed when utilizing this modality. It should be noted that in this case, piperacillin-tazobactam was instilled via nephrostomy tube in the setting of systemic beta-lactam therapy. Our patient did not suffer any adverse effects from this treatment.

Transparency document

The [Transparency document](#) associated with this article can be found in the online version.

Declaration of Competing Interest

The authors report no declarations of interest.

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