

Emphysematous pyelonephritis

A report of 2 cases

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Summary

Two cases of gas formation in the urinary tract are described. Both patients were diabetics. In the first patient the gas was situated in the collecting system while in the second the gas was confined to the perinephric space.

The prognosis in the latter situation is especially poor and review of the literature suggests that surgical intervention either by incision and drainage or by nephrectomy is the treatment of choice.

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Emphysematous pyelonephritis has been reported infrequently in the literature.¹⁻⁷ The condition refers to gas formation by organisms in the upper renal tract as a result of a suppurative infection. The gas may occur in three situations, namely perirenally, intrarenally and in the collecting system. The most common infecting agent is *Escherichia coli* but *Aerobacter aerogenes*, *Proteus*, *Klebsiella*, *Pseudomonas aeruginosa* or *Streptococcus* may also be responsible.^{4,7}

Two cases of emphysematous pyelonephritis in diabetic patients are discussed, together with the relevant features pertaining to this disorder.

Case reports

Case 1

A 59-year-old female diabetic on oral antidiabetic agents was admitted to hospital with severe lower backache, vomiting and fever. The pain radiated round both loins and was associated with dysuria and frequency. On examination her temperature was 39°C and the abdomen was markedly tender with guarding in both loins. The remainder of the physical examination was negative.

Urinalysis revealed 20 pus cells per high-power field with occasional hyaline and granular casts. The blood glucose level was 22 mmol/l (normal 3,9-5,6 mmol/l), the serum urea level 8,5 mmol/l (normal 1,7-6,7 mmol/l), and the serum creatinine 136 μmol/l (normal 75-115 μmol/l). *E. coli* was grown on blood culture. An abdominal radiograph showed gas in the calyces and pelvis of the right kidney (Fig. 1). Ultrasonography demonstrated a 4 cm hypo-echoic area in the upper pole of the right kidney. Intravenous antibiotics (penicillin and tobramycin) were started. Her temperature settled and she was discharged well.

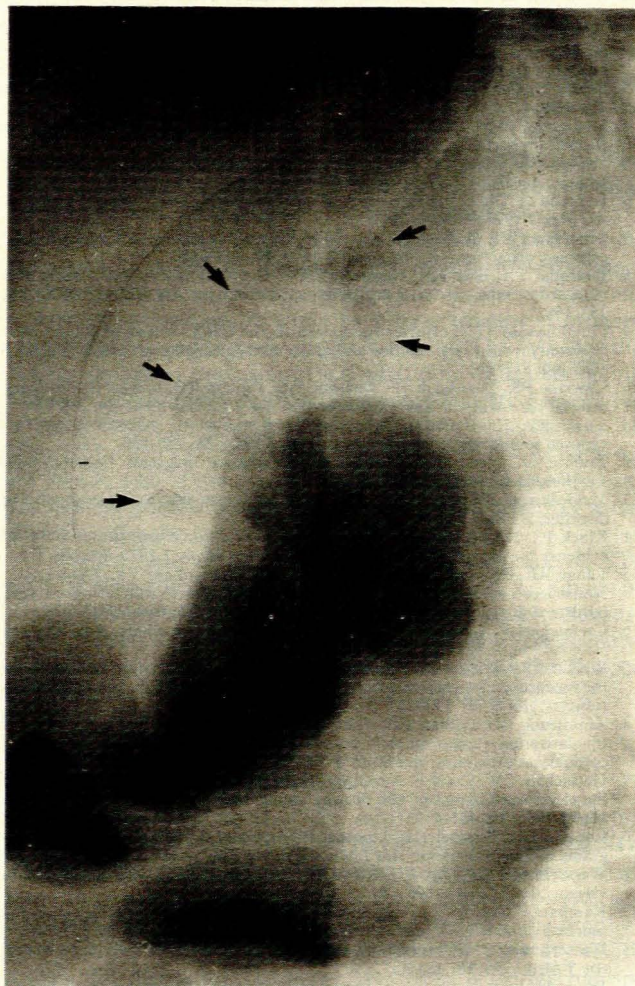


Fig. 1. Straight radiograph of the abdomen showing air in the calyces and pelvis of the right kidney (arrowed).

Case 2

A 62-year-old man with a 10-year history of insulin-dependent diabetes was known to have poor control because of poor compliance. He was admitted with a 3-day history of severe right-sided colicky loin pain and dysuria. On examination he was found to be dehydrated, with a temperature of 39°C, and on examination of the abdomen there was brawny oedema of the right flank with marked tenderness and guarding. A mass was palpated over this area.

Microscopy of the urine showed sheets of red blood cells and 5 pus cells per high-power field. In addition there was mild proteinuria. The blood glucose level was 40 mmol/l, the serum urea level 39 mmol/l, and the serum creatinine level 327 μmol/l. *Bacteroides fragilis* and *E. coli* were grown on blood culture. Ultrasonography revealed the presence of a right perinephric abscess containing gas. As the patient was a poor surgical risk, the abscess was drained under ultrasound guidance by the inser-

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tion of a small pigtail catheter. A triple antibiotic regimen was commenced in the form of penicillin, gentamicin and metronidazole. During the following 72 hours there was an impressive response to this treatment and the patient was now considered a better surgical risk for nephrectomy. However, in view of the response to conservative treatment, it was decided to continue with this regimen. His renal function subsequently deteriorated and peritoneal dialysis was commenced without any change in his general condition. He also remained persistently acidotic despite control of his diabetes. Eight days after admission computed tomography (CT) of the abdomen revealed gas around both kidneys and paracolic regions (Fig. 2). He deteriorated further and died 15 days after admission.

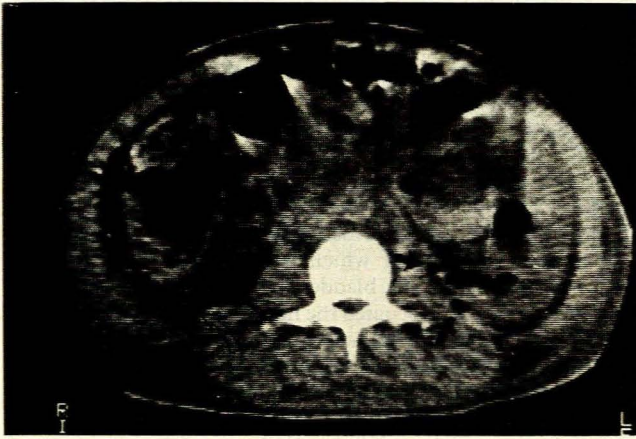


Fig. 2. CT scan showing air in the perinephric space below the left kidney (straight arrow). Air is seen in the right posterior pararenal space (curved arrow).

Discussion

Emphysematous pyelonephritis in a compromised host is a serious life-threatening illness with a high mortality rate despite appropriate medical and surgical treatment.^{1,4,7}

The clinical presentation is commonly a severe acute pyelonephritis with fever, vomiting and flank pain. Gross pyuria and proteinuria may occur and a mass is palpable in 45% of patients.³ The diagnosis is made by demonstration of gas in the renal parenchyma or collecting system by X-ray or ultrasound examination of the abdomen. It is important to be aware that the gas may be obscured by overlying bowel gas and therefore cause a delay in diagnosis.¹

The 2 cases reported here illustrate the presence of gas in two different situations, the first in the collecting system and the second in the perirenal area. This distinction is important as the prognosis is much better in patients with gas confined to the collecting system.^{1,2} Where gas-forming infections extend to the renal parenchyma and to the perinephric space, the prognosis is

much worse and the overall mortality in a series of 20 cases was 50%.¹

In patients with true emphysematous pyelonephritis nephrectomy is the treatment of choice if adequate antibiotic therapy does not result in rapid clinical improvement and disappearance of gas.^{3,4} Of 39 patients, 8 received medical treatment only and the mortality rate was 75%, while 31 were treated surgically with a mortality rate of 23%.⁴ This compares with another series of 31 patients, 7 of whom were treated medically with a mortality rate of 71% and 24 surgically with a mortality rate of 33%.¹

Although only 3 cases of bilateral disease have been reported^{3,5,6} surgical treatment has been advocated to reduce the possibility of spread of the infection to the opposite normal kidney.⁴ This was well demonstrated in our second patient, who responded initially to conservative therapy but then developed emphysematous pyelonephritis in the opposite kidney.

Incision and drainage has been recommended for patients too ill to tolerate nephrectomy.⁴ As this condition usually occurs in diabetics who may also have metabolic problems, a drainage catheter inserted under ultrasound guidance may be used to good effect, as in case 2. The role of nephrectomy in patients who initially respond to closed drainage and antibiotics is not known. In the patient presented here spread to the opposite kidney may already have occurred at the time when his clinical response to conservative treatment was noted. Nephrectomy as soon as the patient became a better operative risk might have reduced the subsequent morbidity, had ultrasound failed to detect any perirenal gas on the normal side. Unfortunately, because the condition is not common, one can only present anecdotal evidence in this regard.

Emphysematous pyelonephritis commonly occurs in diabetic patients and less commonly in patients with obstructive uropathy.^{3,7} It appears to be more common in females and on the left side of the abdomen.³

Although uncomplicated acute pyelonephritis is not uncommon in diabetics, an ultrasound examination should be considered in those patients who do not respond to conventional antibiotic treatment.

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