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Case Report

Emphysematous pyelonephritis: A rare and severe form—case report ☆

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ABSTRACT

Emphysematous pyelonephritis is a necrotic infection of the kidney characterized by gas production within the kidney parenchyma, which can extend through the renal capsule into the perirenal space. Computed tomography scan is the gold standard for diagnosis and helps classify the condition into 4 prognostic stages, guiding therapeutic decisions. This condition typically occurs in individuals with underlying risk factors such as diabetes mellitus, and its management depends on the stage of the disease. The case we are reporting involves a 55-year-old man and highlights the importance of early diagnosis and staging in determining appropriate treatment strategies to prevent renal damage or systemic complications.

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Introduction

Emphysematous pyelonephritis is a necrotic infection of the kidney, first described in 1898 [1], which is usually treated radically. This condition occurs preferentially in diabetic patients.

We report a case of emphysematous pyelonephritis in a diabetic patient diagnosed by radiological imaging; it progressed favourably under appropriate antibiotic therapy without recourse to radical treatment.

In this case report, we discuss the clinical and radiological aspects of emphysematous pyelonephritis and the treatment modalities.

Case report

A 55-year-old man, of rural origin, diabetic on oral treatment for ten years, was admitted to the emergency department with

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Fig. 1 – Plain radiograph shows the presence of mottled gas shadows over the right hypochondrium (arrow).

the onset of febrile right renal colic at 39°C, with urinary burning, nausea and vomiting, which had been evolving for a week.

Clinical examination on admission revealed a drowsy but fully orientated patient. With a slightly tender abdomen on palpation, particularly in the right lumbar fossa, but with no signs of peritoneal irritation.

Laboratory investigations showed an hyperleukocytosis of 17,000/mm³ with 73% neutrophils, a C-reactive protein (CRP) level of 80 mg/l, blood urea of 0.63 g/l, creatinine concentration of 17 mg/l, a glycated hemoglobin of 13% and blood glucose concentration of 3 g/l.

An abdominal X-ray was performed initially and showed the presence of mottled gas shadows over the right hypochondrium, with no evidence of lithiasis (Fig. 1).

An abdominal CT scan was then performed, without injection of intravenous contrast, and showed gas streaks in renal parenchyma with extension of gas to the perinephric space (Fig. 2). This suggested class 3A emphysematous pyelonephritis.

Antibiotic treatment was initiated parenterally and continued per os for 6 weeks after bacteriological results identified a susceptible *Escherichia Coli* in the urine and blood culture. The patient improved clinically, with a return to normal of his biological parameters.

Discussion

Emphysematous pyelonephritis (EP) is a severe, necrotizing form of acute pyelonephritis, characterized by gas production

within the kidney parenchyma that may extend through the renal capsule into the perirenal space [2].

The incidence of this condition is increasing, due to the rising incidence of diabetes. Over 90% of patients with EP have diabetes, often with a poorly controlled form of the disease [3]. Extrinsic or intrinsic obstruction to urine flow occurs in 20%–40% of cases [3]. The mortality rate ranges from 11% to 50% [4].

The condition begins with a kidney infection caused by germs that produce gas through the intrarenal fermentation of glucose. *Escherichia coli* is found in the urine or blood in more than half of cases [5].

Clinically, the combination of diabetes mellitus, urinary tract infection and obstruction is highly suggestive of EP. Symptoms are similar to those of acute pyelonephritis, with fever and vomiting [6].

Diabetic neuropathy may delay diagnosis by attenuating painful symptoms, which may favour the appearance of severe forms of the disease [3].

Biological tests usually reveal hyperleukocytosis, hyperglycaemia and elevated C-reactive protein, or sometimes signs of renal failure or consumption coagulopathy, often associated with severe sepsis [6].

Radiography of the urinary tract may reveal renal emphysema or retro-pneumoperitoneum in 85% of cases [7].

Renal ultrasound may show clusters of gas bubbles in the form of hyperechoic areas with reverberation and posterior attenuation [8].

Computed tomography (CT) is the gold standard for positive diagnosis, Huang and Tseng have proposed a radiological classification with prognostic value, influencing the choice of treatment [6]:

- Stage 1: gas only in the excretory tract.
- Stage 2: gas in the renal parenchyma without extension into the extrarenal space.
- Stage 3A: extension of gas or presence of an abscess in the perirenal space.
- Stage 3B: extension of gas or presence of an abscess in the paranephric space.
- Stage 4: emphysematous pyelonephritis in both kidneys or in a single kidney.

Emphysematous pyelonephritis is a medical emergency requiring immediate management. Symptomatic treatment of haemodynamic and electrolyte disorders and organ dysfunction is essential, and must be carried out in intensive care [9].

Therapeutic decisions must be taken progressively, based on the patient's clinical analysis and the results of the CT scan, while seeking to preserve the kidney, even in bilateral forms [6].

Treatment of EP is based on 3 main approaches [10]:

- ✓ Antibiotic therapy against Gram-negative bacilli, administered in high doses parenterally and in synergistic combination. It is suitable for the early stages of the disease and for patients who are inoperable or refuse surgery, but it has a poor prognosis for patients, with a mortality rate of 60% when the gas is confined to the renal parenchyma and rising to 80% if it extends into the perinephric space.
- ✓ Percutaneous drainage, often performed under local anaesthetic, is a minimally invasive method that allows

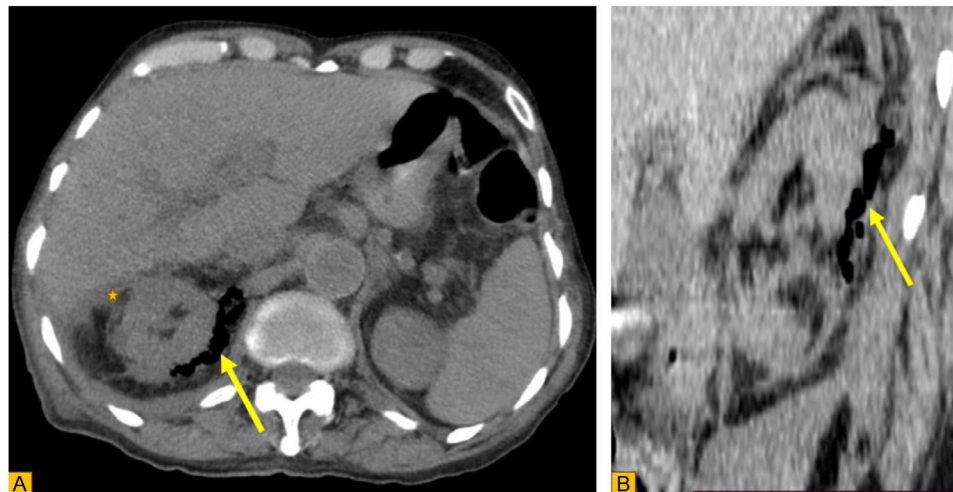


Fig. 2 – Computed tomography scan in axial (A) and sagittal (B) view: presence of gas locules in the right kidney parenchyma extended to the perinephric space (arrow) with perinephric fat stranding (star).

rapid treatment of the infectious focus while preserving the kidney.

- ✓ Nephrectomy is indicated in more severe forms stages III and IV.

Conclusion

In diabetic patients, any pyelonephritis should raise the suspicion of emphysematous pyelonephritis. In this case, a CT scan should be carried out, as it is the gold standard for confirming the diagnosis and accurately assessing the lesions, which will guide the choice of treatment.

Patient consent

All authors confirm that they have obtained written consent from the patient for publication of this case.

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