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Clinical image: emphysematous pyelonephritis

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A 48-year-old woman with alcohol-related cirrhosis and poorly controlled diabetes (hemoglobin a1c 11.9%) presented with five days of left-sided flank pain, fevers, and a distended abdomen. Laboratory investigations showed acute kidney injury (creatinine 2.22 milligram (mg)/deciliter (dL)), hyponatremia (124 mg/dL), anion gap metabolic acidosis (22 milliequivalents/liter (L)), elevated lactate (6.9 millimoles/L). Urinalysis showed pyuria with >30 white blood cells/high-power field with many bacteria. Culture grew >100 K Escherichia coli.

Computed tomography (CT) with intravenous contrast (Fig. 1a) revealed parenchymal necrosis and gas in the left kidney (8.6 \times 9.7 cm, asterisk), while magnetic resonance imaging (MRI) (Fig. 1b) confirmed enhancement consistent with a renal abscess (arrow), supporting the diagnosis of emphysematous pyelonephritis (EPN).

The patient received empiric ceftriaxone (1 gram/d for 7 days, escalated to 2 g/d for 5 days) and metronidazole (500 mg every 12 h for 5 days), then transitioned to intravenous ciprofloxacin (400 mg/d for 3 days) once susceptibilities became available. Interventional radiology (IR) placed a drain, yielding bloody, non-purulent fluid. Blood and IR aspirate cultures and gram stains were negative. She improved clinically and was discharged on oral ciprofloxacin (500 mg every 12 h for 10 weeks). However, her low-grade fever did not improve, and she ultimately underwent a nephrectomy. Her symptoms resolved post-operatively.

EPN, first described by Kelly and MacCallum in 1898, is a necrotizing infection involving the renal parenchyma, collecting system, and sometimes the perirenal tissue, characterized by the presence of gas [1]. The main risk factor is diabetes mellitus, with 95% of cases occurring in patients with poorly controlled diabetes [2-4]. More prevalent in women, E. coli is the primary pathogen; other common pathogens are Klebsiella pneumoniae, Proteus mirabilis, Enterococcus, and Pseudomonas aeruginosa [2, 5, 6]. Fever, flank pain, and pyuria are typical symptoms. Thus, EPN is often clinically indistinguishable from severe pyelonephritis. CT is the imaging modality of choice with a diagnostic accuracy of 100% [1]. CT imaging also helps to establish the degree of EPN, which is classified via the Huang-Tseng or Wan classification systems, with Huang-Tsang as the most commonly used [3]. Necrosis and gas are common findings in EPN but are rarely observed to the extent illustrated in this case [2, 7–10]. Given the severity of the infection, the need for hospitalization, and the initial therapy



Figure 1. Panel A Coronal view of computer tomography (CT) imaging obtained on presentation of the patient. The image shows parenchymal necrosis and gas in the left kidney (8.6 \times 9.7 cm, asterisk). Panel B Axial view of magnet resonance imaging (MRI) obtained on presentation of the patient. The image shows ring enhancement of the left kidney (arrow). The features indicate emphysematous pyelonephritis.

with parenteral antibiotics, treatment with a third-generation cephalosporin is recommended [2, 3, 11]. Surgical management (i.e. nephrectomy or open drainage) is reserved for patients who do not respond to nonsurgical treatment but is required only in a minority of cases [2, 3]. Overall, EPN is associated with a high mortality rate, underscoring the importance of early diagnosis and treatment to enhance survival [2, 3].

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CONFLICT OF INTEREST STATEMENT

There is no conflict of interest.

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ETHICAL APPROVAL

NA.

CONSENT

Written informed consent for publication of their clinical details and/or clinical images was obtained from the patient.

GUARANTOR

Lara K Rotter, MD, is the guarantor for this publication.

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