

## Bilateral Emphysematous Pyelonephritis: A Case Report

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### Introduction

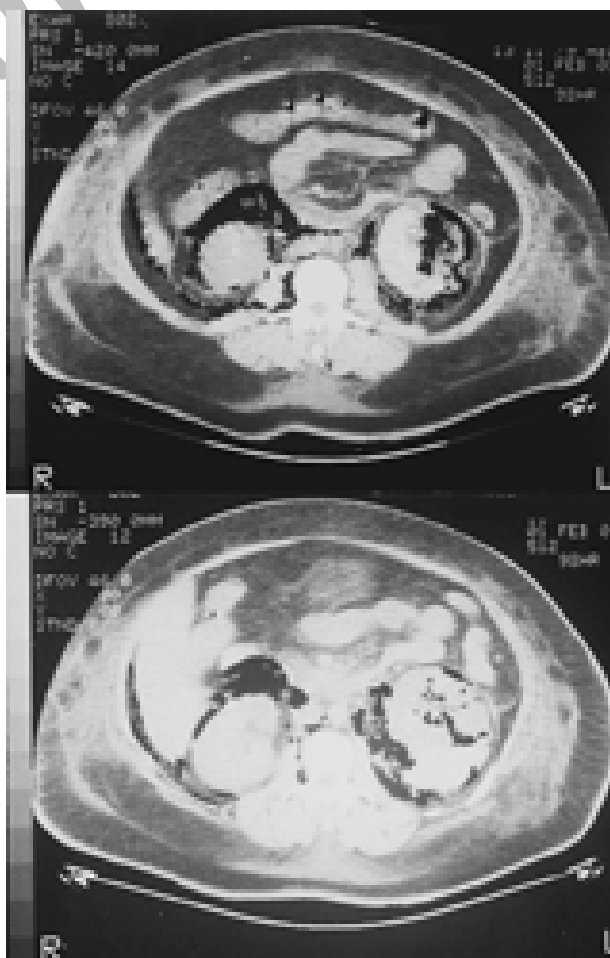
Emphysematous pyelonephritis is a rapidly progressive acute necrotizing infection of the kidney parenchyma caused by gaseous anaerobic bacteria.<sup>(1-3)</sup> It is almost always seen in diabetic patients (more than 90% of cases) and is sometimes associated with urinary obstruction induced by renal stone, papillary necrosis, chronic infections, or kidney dysfunction.<sup>(1,3)</sup> It is bilateral only in 10% of cases.<sup>(3)</sup> Here, we report a patient with bilateral emphysematous pyelonephritis.

### Case Report

A 31-year-old woman with flank pain and fever of 3 days' duration was referred to our emergency department. The flank pain was vague and had increased in intensity over time. Results of a physical examination revealed bilateral costovertebral angle tenderness and a distinct mass.

The patient had a 9-year history of diabetes mellitus, which was under control by NPH insulin, administering 32 units in the morning and 16 units in the evening (fasting blood glucose = 160 mg/dL). Her family history was unremarkable. Urinalysis revealed a pH of 6, glucose of 3+, 10 to 12 WBC/HPF, and 13 to 16 RBC/HPF. Results of a urine culture were positive for *Escherichia coli*. Results of a blood culture were negative. Complete blood count (CBC) showed a WBC of 8600/ $\mu$ L with 83% neutrophils, 15% lymphocytes, 1% eosinophils, and 1% monocytes. Hematocrit, aspartate aminotransaminase, alanine aminotransferase, lactate dehydrogenase, alkaline phosphatase, creatine phosphokinase, blood urea nitrogen, and

creatinine were 24%, 14 IU/L, 8 IU/L, 1240 IU/L, 102 IU/L, 475 IU/L, 36 mg/dL, and 1.5 mg/dL, respectively. A kidney, ureter, and bladder plain radiograph (KUB) was performed and revealed a gaseous pattern in the region of both kidneys, in which the psoas muscle was blurred. On computed tomography (CT) scan, severe destruction of the left kidney, accompanied by multifocal gas accumulations, was seen, with extension to the perirenal tissue (Figure 1). Decreased renal function of the right kidney and multifocal gas accumulations (less than those



**FIG. 1.** CT scan demonstrating severe destruction of the left kidney, accompanied by multifocal gas accumulations, with extension to perirenal tissue

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seen in the left kidney) were found in the right kidney, as well. A dimercaptosuccinic acid (DMSA) scan demonstrated a nonfunctional left kidney and right kidney with severely decreased function.

The patient was treated with ceftriaxone and metronidazole and subsequently, underwent left nephrectomy because she had no response to medical treatment. Grossly, a huge kidney with several necrotic foci was seen.

Combined treatment with ceftriaxone and metronidazole was started, postoperatively. The patient's general condition improved, her vital signs became stable, and results of a urine culture became negative. On postoperative CT scan, gas density disappeared completely in the left side and extremely decreased in the right side. The patient was discharged in good general condition on a regimen of ciprofloxacin. Serum creatinine was 1.3 mg/dL, on discharge. On 5-month follow-up CT scan, complete recovery in the right kidney was seen. The patient underwent close monitoring of blood sugar and urine culture, afterwards.

## Discussion

Bilateral emphysematous pyelonephritis is a rapidly progressive infection of the kidney parenchyma that is usually seen in diabetic women; juvenile diabetes mellitus has no role in its pathogenicity.<sup>(3)</sup> Patients may have a prolonged history of urinary tract infection, urologic operations, or chronic pyelonephritis.<sup>(1,3,4)</sup> Its symptoms are similar to those of acute pyelonephritis but are more severe, as improvement is not achieved after a 3-day course of antibiotic therapy. Almost all patients experience fever, nausea, vomiting, and flank pain.<sup>(1,3,5)</sup> Pneumaturia will be seen if a collecting system is involved.<sup>(3)</sup> DIC, hyperglycemia, and/or diabetic ketoacidosis may be present.<sup>(6)</sup> A detectable mass may be one of the signs of the disease.<sup>(3,6)</sup> A CBC usually reveals leukocytosis with a shift to the left (immature myeloid cells), and results of urine and blood cultures may be positive.<sup>(3)</sup> Confirmation of the diagnosis is radiologic (eg, gas accumulation in parenchymal, subcapsular [crescent sign], or pararenal site on CT scan, KUB, or ultrasonography).<sup>(3)</sup> The kidney often has little or no function on intravenous pyelography.<sup>(3,7)</sup> Ultrasonography reveals several hyperechoic foci, demonstrating the presence of gas.<sup>(3,7)</sup> CT scan is used to determine the stage of

the disease, and renal scan is performed to evaluate kidney function.<sup>(3,7)</sup> Three radiologic stages are observed in this disease: stage 1, blurred lucency along the kidney pyramids; stage 2, gas in the kidney parenchyma limited to Gerota's fascia in a bubbled pattern; and stage 3, gas in the kidney parenchyma beyond Gerota's fascia and retroperitoneum in a diffused pattern.

These patients should immediately undergo wide-spectrum antibiotic therapy and careful blood sugar control. If obstructive uropathy is present, it must be relieved.<sup>(3)</sup> However, most patients do not respond to medical treatment.<sup>(8)</sup> The persistence of gas despite medical treatment demonstrates treatment failure, and other procedures (eg, surgical drainage or nephrectomy) are needed.<sup>(2)</sup> Percutaneous drainage has been reported to be useful.<sup>(3)</sup>

Emphysematous pyelonephritis is an extremely destructive disease of the kidney, which is curable if diagnosed and treated rapidly; however, if it is unresponsive to medical treatment, then surgical drainage or nephrectomy is necessary.<sup>(2,3)</sup> In our patient, her right kidney disease was cured, but left nephrectomy was performed due to unresponsiveness to medical treatment.

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