

Emphysematous Pyelonephritis: A Case Report

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ABSTRACT

Emphysematous pyelonephritis is a rare but serious bacterial infection of renal parenchyma and perirenal tissue characterized by gas formation. This article

presents the report of a 63-year-old diabetic male in whom the disease was detected promptly and managed conservatively.

Keywords: Emphysematous Pyelonephritis; Gas; Diabetes

INTRODUCTION

Emphysematous pyelonephritis (EPN) is a rare but serious, gas-producing necrotizing bacterial infection that involves the renal parenchyma and perirenal tissue [1]. It is generally found in diabetics [2]. Prompt diagnosis and early treatment is crucial and delayed intervention might result in high mortality. Management may be conservative or surgical depending upon the status of the patient.

CASE REPORT

A 63-year-old diabetic male reported with colicky pain in the right flank extending to right groin of two days duration. The patient had nausea but there was no history of vomiting or anorexia. The patient reported dark-colored urine. There were no other gastrointestinal or urinary symptoms. Over the past years, patient had history of passing urinary calculi on three occasions. The patient also had undergone CABG (coronary artery bypass graft) surgery two years ago, without any complications. On examination, patient was febrile (38.7 °C) with tenderness and minimal fullness in the right renal angle. Complete blood count showed leukocytosis with neutrophilia (hemoglobin 11.4 g/dl, total leukocyte count 15290/cc, polymorphonuclear leukocytes 88%, lymphocytes 11% and eosinophils 1%). Liver and kidney function tests were within normal limits. Urinalysis showed 9-10 pus cells and 7-8 red blood cells per high power field. Ultrasound showed two abscesses, one along the superior pole and another in extra capsular region of the right kidney and a ureteric calculus measuring 6.3 x 3 mm. Standard enhanced volumetric computed tomography (CT) scan of the abdomen

and pelvis (Figure 1A) was performed with intravenous and oral contrast. The study revealed a well-defined high fluid density collection with gas foci (abscess) at the upper pole of the right kidney, measuring about 3 x 3 x 3 cm. Besides, there was a medially located juxtarenal (extracapsular) rim of fluid with similar characteristics measuring 8mm in width and spanning over 5.4 cm in anteroposterior and 4.4 cm in craniocaudal directions with few gas pockets as well as peri-focal fat stranding with a few enlarged retroperitoneal lymph nodes. There was no significant hydronephrosis. The finding of ureteric calculus (6.3 mm x 3 mm), as seen on ultrasound, was also confirmed. The left kidney had no abnormal findings except a tiny (2 mm) calculus in the lower calyx. On the basis of clinical picture and investigations, the patient was diagnosed as a case of Class 3A emphysematous pyelonephritis (EPN). Management was conservative with antibiotics (piperacillin/tazobactam, gentamycin, metronidazole) and the CT scan taken at an interval of 10 days showed resolution of most of the findings and minimal edema and gas (Figure 1B). The calculus passed spontaneously with urine after 1 week of admission in hospital. The patient was healthy at 3 months follow-up with normal renal function tests.

DISCUSSION

Emphysematous pyelonephritis is a rare but severe acute necrotizing infection of the renal parenchyma and perirenal tissue that causes gas accumulation in the tissues [1]. Most of the cases (90-95%) are seen in association with diabetes mellitus, often with a fulminating course and can be fatal if diagnosis and treatment is delayed [2]. Kelly and MacCullum [3], in 1898, reported the

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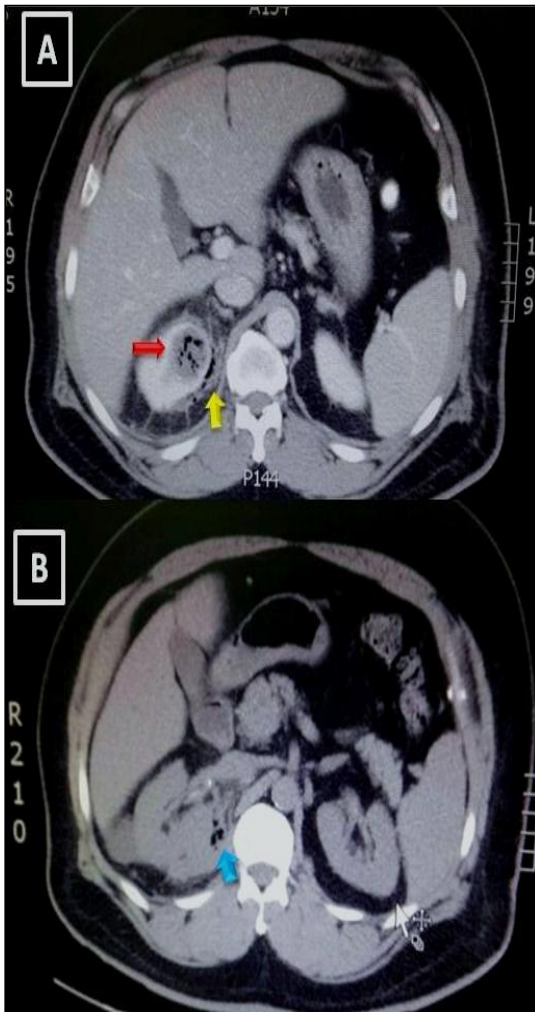
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Figure 1: (A) CT scan showing renal parenchymal abscess with inspissated gas (red arrow) and an extracapsular abscess with gas (yellow arrow) (B) Follow up CT scan after 10 days showing significant improvement (blue arrow)



first case of pneumaturia from a gas-forming renal infection and since then, various terms have been used to describe the condition, which include renal emphysema, pneumonephritis, and EPN.

Organisms like *Clostridium* sp, *Candida* sp, *Entamoeba histolytica* and *Aspergillus fumigatus* have also been reported as rare causes of EPN [4]. The major components of the gas formed in EPN include nitrogen (60%), hydrogen (15%), carbon dioxide (5%), and oxygen (8%) [5-6]. Multiple theories have been suggested for the mechanism of gas formation such as mixed acid fermentation [5] or rapid tissue catabolism and impaired transport of the end products at the

inflammatory site. EPN is mostly reported in the sixth decade of life and the condition is six times more common in women. Rare cases have been reported in non-diabetics with urinary obstruction, advanced renal failure and immunosuppression as contributing factors [7]. The left kidney gets affected more commonly than the right, but bilateral involvement has also been reported in literature. The typical presentation includes fever and abdominal or flank pain in about 70-80% of the cases. Other features include nausea and vomiting, dyspnea, acute renal impairment, altered sensorium, shock, and thrombocytopenia. In advanced cases, crepitus over the flank area, pneumaturia, subcutaneous emphysema and pneumomediastinum may occur. Laboratory investigations may show leukocytosis with shift to the left, thrombocytopenia, pyuria, elevation of serum creatinine levels and positive blood cultures [8].

CT scan is the definitive imaging test and Huang and Tseng's modification [9] of Michaeli et al's classification is commonly used to define the extent of EPN.

The case mentioned above falls in Class 3A classification as the patient had an abscess in renal parenchyma as well as in the perirenal area. The mortality of EPN is still around 20-30% [10] and the treatment mentioned in literature is either conservative or surgical. However, in the absence of prompt diagnosis and an early start of treatment, the disease carries a mortality rate of up to 78% [11].

Conservative management involves intensive medical management including control of blood sugar, renal parameters, serum electrolytes, stabilization of cardio-respiratory status and antibiotic treatment (as done in present case) with or without image-guided drainage. Surgical management involves nephrectomy after optimization of general condition of the patient. Altered consciousness, multiple organ failure, hyperglycemia and elevated leukocyte count have been found to be poor prognostic indicators in a recent study conducted by Olvera-Posada D et al [12].

CONCLUSION

Although rare, EPN should be suspected in patients with multiple co-morbidities presenting with features of sepsis and abdominal pain. Delayed diagnosis and deficient management leads to poor prognosis. Management may be conservative or surgical.

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