

## Introduction

Emphysematous pyelonephritis (EPN) is a severe necrotizing pyelonephritis which is an infection of the renal parenchyma that causes gas accumulation in the tissues. EPN predominantly occurs in diabetes mellitus patients and more commonly in females. Its presentation may mimic acute pyelonephritis, but EPN has a fulminating course which can be fatal if not recognized and treated promptly. It is a rare disease whereby only 1-2 cases reported in the United States yearly.

## Case Description

A 62-year-old Chinese male presented to the Emergency Department (ED) with a 3-day history of abdominal pain, nausea, vomiting and lethargy. Upon arrival, he was hyperglycemic, acidotic with ketonemia. Physical examination revealed right lumbar and hypochondriac tenderness with guarding. Initial impression was diabetic ketoacidosis with intra-abdominal sepsis. Bedside point-of-care-ultrasound (POCUS) showed no free fluid in abdomen but revealed dirty shadowing and reverberation artifacts in the right kidney. Abdominal radiograph demonstrated crescentic gas in the right renal fossa.

Patient was then admitted to the ward and on day 2 of admission, Computed Tomography (CT) abdomen was done which revealed the right kidney appears irregular with  $>1/3$  renal parenchymal destruction resulting in poor cortico-medullary differentiation. There is mottling of air within the right renal capsule with extrarenal extending beyond right Gerota's fascia- consistent of right EPN Type 1 (mortality rate of 70%). The patient underwent percutaneous drainage and completed a 6-week course of intravenous antibiotics. He was discharged with ongoing follow-up under urology care.



## Discussion

Emphysematous pyelonephritis is a rare but severe, suppurative infection of the renal parenchyma characterized by gas formation in intra-renal and perirenal tissues. Predisposing factors for EPN are diabetes mellitus and obstructive uropathy. Prompt radiological evaluation is most useful in making a definitive diagnosis of EPN. Plain abdominal radiographs may only demonstrate the presence of air in the renal parenchyma in a limited number of EPN cases. On POCUS, kidney may appear enlarged with coarse internal echoes within the renal parenchyma or collecting system. Occasionally, it can be seen as "dirty shadowing"- presence of dirty echogenic foci accompanied by reverberation or ring-down artifacts. CT scan is the gold standard both for diagnosing EPN and demonstrating the extent of the disease. In mild cases, treatment is with intravenous antibiotics. Percutaneous catheter drainage of perirenal or retroperitoneal collections can be performed. Severe cases may warrant nephrectomy.

## Conclusion

Due to potential for morbidity and mortality in EPN cases, early identification via POCUS or plain radiograph is critical to guide timely intervention. Definitive diagnosis with CT is essential, as treatment strategies vary based on disease severity—from medical therapy to surgical management.

## References

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