

Emphysematous Pyelonephritis In Type II Diabetes: A Case Report

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Citation

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Abstract

Emphysematous pyelonephritis (EPN) is a severe acute necrotizing infection of the renal parenchyma and peri-renal tissue, characterized by gas formation. 90% of cases are seen in association with diabetes mellitus. EPN carries a mortality of up to 40% with medical management alone. Early recognition of EPN in an obstructed kidney is essential to guide aggressive management, and in the presence of continued severe sepsis or organ dysfunction an urgent nephrectomy should be carried out. Diabetic patients who are known to have renal or ureteric calculi, irrespective of their symptoms should be considered for percutaneous or ureteroscopic treatment. We report an interesting case of EPN, which responded very well to obstruction release and aggressive antibiotics.

INTRODUCTION

Emphysematous pyelonephritis (EPN) is a severe acute necrotizing infection of the renal parenchyma and peri-renal tissue, characterized by gas formation. The condition presents amongst other things with abdominal pain, septic shock, vomiting, fever, lethargy and confusion. The majority of cases reported are unilateral, occur in patients with diabetes mellitus or urinary tract obstruction, and more commonly affect on the left kidney^{1, 2}. Here, we report an interesting case of EPN.

CASE REPORT

A 40-year old Hispanic male with medical history significant for newly Diabetes mellitus, pancreatitis and a recently treated E.coli urinary tract infection presented to the hospital with complaints of abdominal pain and passing "meat" in urine from last one week. These symptoms were associated with left flank pain which was radiating to the left groin. Urinary symptoms were significant for dysuria, polyuria and dark colored urine. Patient's last hospitalization was three weeks back when he was diagnosed with new onset diabetes and was found to have positive urine cultures for E.coli and he was discharged on appropriate antibiotics.

On Physical examination he was found to be tachycardiac (114 bpm) and hypotensive (90/60) with positive left cost-vertebral tenderness. On labs his white cell count was 18,000 with bands of 9, creatinine of 2.3 mg/dl and a lactic acid of

2.7 mg/dl. A code sepsis was initiated and patient was monitored in ICU with aggressive IV hydration. Meropenem was started.

A CT abdomen done at admission revealed left kidney enlargement with intra-renal extensive air collection. Bilateral, left greater than right, perinephric stranding and edema, associated with mild urinary bladder wall thickening was highly suggestive of urinary tract infection and associated kidney infection (fig 1).

Figure 1

Fig 1: CT Scan Abdomen Showing gas in the Left Kidney



Given the suspicious nature of the extensive intra renal air collection, a cystoscopy was done which revealed mild bladder trabeculation, hydroureter, hydronephrosis and left kidney moderate fluid collection. A left ureteral stent was placed during the procedure. Later patient's urine and blood grew ESBL negative E Coli and antibiotics were modified as per sensitivity.

Patient responded to IV fluids and antibiotics and there was visible clinical improvement. A CT abdomen was repeated in 5 days, which revealed a decreasing perinephric inflammation and intra renal gas in the left kidney. Patient's repeat urine and blood cultures were negative for any bacterial growth and patient was discharged home on PO antibiotics with close ID and urology follow-up.

DISCUSSION

EPN was first described in 1898, in association with pneumaturia as a result of gas forming pathogens³. The most common pathogen is *Escherichia Coli* (70%), followed by *Klebsiella pneumoniae* (29%) and *Proteus* 1. These bacteria ferment sugars within the urine producing gases including nitrogen, hydrogen, carbon dioxide, and oxygen⁴. EPN occurs nearly exclusively (90%) in people with diabetes¹. The exact patho-physiology of EPN is still unclear. This is evidenced on the observation that UTI's are very common in diabetic patients, and only a small proportion of these patients develop EPN. The factors that predispose to EPN in

people with diabetes may include uncontrolled diabetes, high levels of glycosylated hemoglobin, and impaired host immune mechanisms caused by local factors such as renal tract obstruction (tumors or lithiasis).

With regards to imaging the AXR, although reported as normal, demonstrated gas in the collecting system of the right kidney and a calculus at the PUJ. In the acute abdomen, the AXR should specifically be reviewed to exclude signs of all general surgical diagnoses, as well as vascular (aneurysms) and urological differential diagnoses.

Renal USS can confirm the presence of EPN in approximately 80% of cases⁵, whereas CT is 100% sensitive⁶. Thus, a CT scan is mandatory to diagnose EPN if the index of suspicion is high. The most recent CT classification of EPN is described by Huang et al¹, with minor adjustments from the previously proposed classification by Michaeli et al (1984)⁷.

It essentially describes the anatomical location of gas on CT scan:

- Class 1 – Gas confined to the collecting system
- Class 2 – Gas confined to the renal parenchyma alone
- Class 3a – Perinephric extension of gas or abscess
- Class 3b – Extension of gas beyond the Gerota fascia
- Class 4 – Bilateral EPN or unilateral EPN with a solitary kidney

It is now largely accepted that nephrectomy is the treatment of choice in most patients with EPN⁷. When treated with antibiotics alone, EPN is associated with a high mortality rate (40%)⁸. Huang et al concluded that Class 1 and Class 2 EPN could be managed with percutaneous drainage and antibiotics¹. In class 3 and class 4 EPN, the presence of fewer than two risk factors (thrombocytopenia, acute renal failure, stupor/coma and shock) indicated that percutaneous drainage and antibiotics could also be used (successful in less than 64% of cases). However, in the presence of three or more of the above risk factors, nephrectomy yielded better results. Mortality rates were 15–20% in two other case series in which nephrectomy was the treatment of choice^{2, 9}.

Our patient had Class 1 EPN, and underwent a ureteral stent

placement and he received adequate antibiotics. Our patient responded very well to the treatment.

CONCLUSION

EPN is a condition, which carries major morbidity and significant mortality. Rapid and thorough assessment, prompt diagnosis and appropriate aggressive treatment is likely to reduce mortality in these life-threatening cases of urinary tract obstruction in diabetics. As 90% of EPN occurs in patients suffering from diabetes mellitus, one should consider early intervention of renal and ureteric calculi, whether symptomatic or not, to prevent potentially devastating complications of EPN.

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