

Case report

Emphysematous pyelonephritis: non surgical treatment approach

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Abstract:

Emphysematous pyelonephritis is a severe infection characterized by the presence of gas within the renal parenchyma tissues. It is a life threatening complication of bacterial interstitial nephritis, and it mainly occurs in patients with diabetes mellitus. We report a case of a 37 year old female who complained of fever and pain in left lumbar region on admission. Her past medical history included uncontrolled type 2 diabetes mellitus. On USG (ultrasonography), left kidney swollen and show echogenic linear specs with dirty shadowing suggestive of air in pelvicalyceal system (PCS). She was treated with intensive antibiotic therapy in high doses. On repeat USG there was marked reduction in air shadow in kidney and patient improved clinically.

Keywords: emphysematous pyelonephritis; Enterococcus faecalis; antibiotics; USG

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Introduction

The first case of gas-forming renal infection was reported in 1898 by Kelly and MacCallum¹. Since then many names have been used to describe emphysematous pyelonephritis (EPN) such as renal emphysema, pyelonephritis emphysematousa and pneumonephritis². Emphysematous pyelonephritis is a severe, potentially fatal, necrotizing pyelonephritis with a variable clinical picture ranging from mild abdominal pain to septic shock. The majority of cases occur in diabetics with poor glycemic control while a small percentage may be due to urinary tract obstruction^{3,4}. The infection with optional anaerobic microorganisms, which are able to produce gas, is supported by a reduced state of resistance, a high glucose level in the tissue in diabetic derailment, and ischaemia of the infected organ. The inflammation occurs unilaterally and in only 10% of all cases both kidneys are affected⁵. Previous researchers have postulated that vigorous resuscitation and appropriate medical treatment should be followed by immediate nephrectomy⁶. However current advances in treatment, allow patients to be treated with percutaneous drainage in combination with broad spectrum antibiotics^{7,8}.

We present a case of emphysematous pyelonephritis

in a patient with medical history of uncontrolled type 2 diabetes mellitus that was successfully treated with antibiotics.

Case report

A 37 year old female patient reported to the department with fever, vomiting, dry mouth and pain in left lumbar region since 2-3 days. Patient had history of uncontrolled type 2 diabetes mellitus. Fever was moderate to high grade, associated with burning micturation and vomiting. There were no other symptoms such as rashes, yellowish discoloration of eyes, bodyache, loose stool, cough and weight loss. Initial vital signs showed a temperature of 100°F, heart rate of 108 beats per minute, blood pressure of 130/80 mm Hg and a respiratory rate of 18 breaths per minute. Physical examination on admission revealed an ill appearing female with left sided costovertebral angle tenderness, she appeared confused and slightly agitated. Laboratory tests revealed a Hemoglobin of 9.3 gm/dl, Total leucocytes count is 21600/mm³, Differential leucocytes count shows 81% polymorphs, Creatinine level of 1.35 mg/dl, Urea of 39.5 mg/dl and Random blood sugar is 404.2 mg/dl. Urine analysis demonstrated numerous red blood cells, epithelial cells and pus cells. On culture sensitivity, there was Enterococcus Faecalis sensitive to Vancomycin,

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Figure 1: USG showing echogenic linear specks with dirty shadowing suggestive of air in PCS

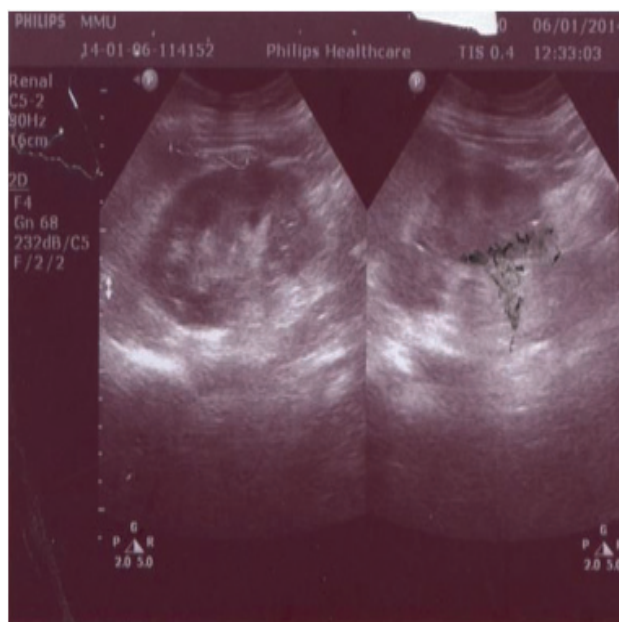


Figure 2: USG showing reduced echogenic linear specks with dirty shadowing suggestive of less air in PCS after treatment

Linezolid. On USG there is left kidney swollen and show echogenic linear specks with dirty shadowing suggestive of air in pelvicalyceal system i.e Emphysematous Pyelonephritis. The diabetes of the patient was controlled with Inj. insulin. For antibiotic cover, patient was put on Linezolid 600mg BD and Inj Vancomycin 1 gm bd for 15 days, following treatment her clinical symptoms, general well being markedly improved. Even her glycemetic control comes in normal range with reduced requirement of insulin. On repeat USG, there as significant reduction in air with renal medulla. Patient discharged on satisfactory note after 18 days. During her hospital stay her symptoms resolved completely.

Discussion

Emphysematous pyelonephritis has been defined as a necrotizing infection of the renal parenchyma and its surrounding areas that results in the presence of gas in the renal parenchyma, collecting system or perinephric tissue³. More than 90% of cases occur in diabetics with poor glycemetic control. Other predisposing factors include urinary tract obstruction, polycystic kidneys, end stage renal disease and immunosuppression. More of the affected patients are women, with a female: male ratio of 1.8:1. The average age at presentation is about 54 years, with a range of 19 to 81 years. Most clinical presentations are fever with chills, or abdominal pain, and nausea and vomiting. Mostly affected on one side but bilateral EPN is occasionally reported in about 10%. The

most infecting organism is *E. coli*. and subsequently *Klebsiella pneumoniae*, *Proteus mirabilis* or even fungus such as *Bacteroides fragilis*. The left kidney was more frequently involved than the right one⁹. The pathogenesis of EPN remains unclear however four factors have been implicated, including gas-forming bacteria, high tissue glucose level, impaired tissue perfusion and a defective immune response due to impaired vascular supply^{3,4}. The clinical manifestations of EPN appear to be similar to those encountered in classical cases of upper urinary tract infections. According to Huang and Tseng³ fever was encountered in 79% of the patients, abdominal or back pain in 71%, nausea and vomiting in 17%, lethargy and confusion in 19%, dyspnea in 13% and shock in 29%. Laboratory testing revealed elevated glycosylated hemoglobin in 72%, leukocytosis in 67%, thrombocytopenia in 46% and pyuria in 79%. Various imaging techniques can be used to detect gas within the genitourinary system. Ultrasound is insensitive for the diagnosis of renal gas, but useful in diagnosing urinary tract obstruction. It is also a readily available, non-invasive method that is quite useful in the hands of experienced practitioners¹⁰. Non-contrast CT scan remains the diagnostic method of choice. In addition to showing the presence of gas, it defines the extent of the infection and can diagnose any obstruction^{3,4}. According to radiographic findings and computed tomography scans, emphysematous pyelonephritis can be classified as follows: class 1-

gas in the collecting system only; class 2- gas in the renal parenchyma without extension to extrarenal space; class 3A- extension of gas or abscess to the perinephric space; class 3B - extension of gas or abscess to the pararenal space; and class 4 - bilateral emphysematous pyelonephritis or solitary kidney with emphysematous pyelonephritis¹¹.

Our patient was classified as class 2 Emphysematous Pyelonephritis according to its radiologic findings. According to literature, mortality rate in patients who received antibiotic therapy alone was 40%. In patient with class 1 or 2, treatment with extensive antibiotic therapy was associated with survival. Patients with extensive Emphysematous Pyelonephritis class 3 and 4, could be successfully treated with percutaneous catheter drainage combined with antibiotic therapy. Our patient has two risk factor at the time of admission i.e. thrombocytopenia and acute renal function impairment with impaired glucose tolerance, which all responded well to antibiotic therapy and

rehydration.

Acute renal infection with *Escherichia Coli* or *Klebsiella Pneumoniae* in patients with diabetes mellitus or urinary tract obstruction is the cornerstone for the development of Emphysematous Pyelonephritis. Mixed acid fermentation of glucose by Enterobacteriaceae is the major pathway of gas formation. For localized emphysematous pyelonephritis, antibiotic treatment alone or in combination with PCD can provide a good outcome¹¹.

Conclusion

The treatment of EPN remains controversial. Still in early class of emphysematous Pyelonephritis with uncontrolled Diabetes, active management with antibiotic for infection with good glycemic control result in marked reduction in morbidity associated with disease.

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