Emphysematous Pyelonephritis Caused by Candida Parapsilosis: An Unknown Etiological Agent

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Abstract

Emphysematous pyelonephritis (EPN) a rare complication commonly seen in diabetic patients is a necrotising gas producing infection of the renal parenchyma and perinephric tissue predominantly caused by uropathogenic bacteria. Fungi have been rarely reported as the etiological agents, isolated from blood and/or urine culture. We report a case of EPN caused by a rare etiological agent. A 60 year old diabetic female with no previous history of hospitalization presented to us with a short history of fever. Investigations revealed unilateral EPN “Wan type 1”. Patient was treated with systemic antifungal therapy as per culture sensitivity and it alone proved to be an effective treatment of this clinically difficult condition. Patient was discharged in a satisfactory clinical condition. A rare etiology should always be kept in mind while evaluating a case of EPN.

Keywords: Candida parapsilosis, Diabetes mellitus, Emphysematous pyelonephritis, Fungal infection

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Case Report

A 60 year old female known case of hypertension and diabetes mellitus was on Angiotensin II receptor blocker and oral hypoglycemic agents presented to the emergency department with complaints of abdominal pain. Workup for other etiological agents should be carried out if patient doesn’t respond to antibiotic therapy or deteriorates clinically. Fungal etiology has rarely been reported with Candida albicans, Candida tropicalis, candida glabrata and Cryptococcus usually implicated. We report a case of EPN where candida parapsilosis was grown from urine culture and patient responded to medical management in the form of antifungals. This case is being reported because of two reasons: (1) to our knowledge, this case is the first report of EPN caused by Candida parapsilosis in a diabetic patient. (2) The patient was managed without any surgical intervention.

Investigations revealed hypochromic microcytic anemia with hemoglobin (Hb) of 7.1 g/dL, total leukocyte count (TLC) of 21,000/mm³ with 84% of neutrophils, platelet count of 118000/mm³. Kidney function test (KFT) revealed urea of 29 mg/dL and creatinine of 0.72 mg/dL. Urine examination revealed 40-50 pus cells and was negative for ketone bodies.
Initial Urine and blood cultures were sterile. Arterial blood gas (ABG) analysis revealed pH-7.52, sodium (Na⁺)- 138 mmol/L, potassium (K⁺)- 2.5 mmol/L, pco₂ 30 mmHg, po₂ 50 mmHg, sao₂ 89%, Hco₃⁻ 18 mmol/L. Initial sugars were in the range of 400 mg/dL. Glycosylated hemoglobin (HbA1c) was 12.3%.

Ultrasonography (USG) revealed large right kidney (14 × 6 mm) with gas in the pelvis and perinephric area. Left kidney was normal (11 × 6 mm). Patient clinically showed features of severe sepsis in the form of tachycardia, tachypnea, hyperventilation, respiratory alkalosis and Hypoxic respiratory failure. An abdominal computed tomography (CT) scan was done which showed gas in the right renal calyces, renal parenchyma and in the perinephric area [Figure 1].

Patient was started on oxygen inhalation, intravenous antibiotics (Imipenem and Vancomycin). Patient became afebrile and remained so for two days despite showing no improvement clinically. Patient again developed fever on the third day. Repeat urine examination showed persistent pyuria. Blood culture was sterile. Urine culture showed growth of Candida Parapsilosis [Figure 2]. Sensitivity pattern was not available. Patient was empirically started on IV Amphotericin B and antibiotics were stopped. The patient also received two pints of Blood transfusion. Patient became afebrile and improved clinically. Repeat laboratory parameters were as under – Hb - 8.0 g/dL, TLC - 10.7/mm³, Polymorphs-72%, lymphocytes- 20%, Platelets- 284,000/mm³, pH- 7.35, Na⁺- 136 mmol/L, K⁺- 4.0 mmol/L, pco₂- 25 mmHg, po₂- 74 mmHg, sao₂- 96%. Repeat USG showed right kidney of 11 × 5 mm in size with normal left kidney. Repeat urine cultures were sterile. Patient was admitted for a period of two weeks and his symptoms improved fully. Patient was discharged in a satisfactory clinical condition. CT abdomen at the time of discharge showed normal kidneys.

**Discussion**

EPN is a necrotizing gas producing infection of the renal parenchyma and perinephric tissue. […] In 1962, Schultz and Klorfein first coined the term EPN to describe an acute infectious process resulting in gas formation in the renal parenchyma. […] Various factors for gas formation have been postulated which include high tissue glucose concentrations, impaired immunity, tissue ischemia and mixed acid fermentation by gas-forming bacteria. Poorly controlled diabetes is the most common predisposing factor for EPN. […] Other predisposing factors include urinary tract obstruction, polycystic kidneys, end stage renal disease and immunosuppression. […] It is a rare infection caused by gas producing bacteria which inhabit the urinary tract and includes Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis and Pseudomonas aeruginosa. […] Certain candida species like candida albicans, candida guilliermondii and candida parapsilosis are capable of producing gas in vitro. Sugar fermentation test is used to detect fungus in laboratory and positive sugar fermentation test is one which shows presence of acid and gas in the tube. […] There are only few case reports describing fungus as an etiological factor. […] Our patient is the first reported case of EPN caused by Candida parapsilosis. The patient did not require any form of surgical intervention which is usually required in most of the cases.

CT scan is the most effective tool of diagnosing EPN. […] Wan et al. described two types EPN depending on CT findings. […] Type I included patients showing parenchyma destruction with streaky or mottled gas

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*Figure 1:* CECT abdomen showing enlarged emphysematous right kidney. Gas collection can be seen in perinephric area (green arrow), renal parenchyma (red arrow) and renal pelvis (black arrow).

*Figure 2:* Microscopic view showing growth of candida in corn meat agar. Yeast cells can be seen (black arrow) along with pseudohyphae (red arrows).
but with no fluid collection. These patients had a mortality rate of 69%. Type II patients had renal or perirenal fluid collections that contained bubbly or loculated gas or gas within the collecting system. The mortality rate in this group was 18%. Our patient had features consistent with Type 1.

**Conclusion**

EPN is a fatal complication commonly seen in diabetic patients and requires early diagnosis and management for a favorable outcome. Although uropathogens are the common etiological agents, other etiological agents like fungi can act as a sole pathogenetic factors or a part of mixed infection in unfavorable settings. Although most cases require surgical intervention, a selected number of patients can be managed by medical management only.

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