

Emphysematous Pyelonephritis in a Type II Diabetic Woman

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Abstract

Mrs. E. J. N is a 57-year-old Type II diabetic who presented to the emergency unit of internal medicine with a 1-week history of reduction in urine output and passage of foul-smelling urine with associated fever, nausea, vomiting, and right flank abdominal pain. This clinical case was diagnosed as emphysematous pyelonephritis with the help of ultrasonography. She recovered with medical therapy. This case highlights that aggressive medical management in severe cases may obviate the need for potentially dangerous surgical interventions in resource-limited settings.

Keywords: Emphysematous, pyelonephritis, Type II diabetic woman

INTRODUCTION

We present a case of emphysematous pyelonephritis (EPN) in a 57-year-old Type II diabetic who improved with an antibiotic. EPN is a necrotizing infection with a predilection for the renal parenchyma and is characterized by the presence of gas in the renal and paranephric tissues.^[1] Diabetes mellitus is a major predisposing factor in this condition. EPN occurs more commonly in females than males.^[1] EPN is a rare condition, and from renal records, this was the first case after 20 years in our hospital. This could be as a result of misdiagnosis, expertise, and low diagnostic threshold in the past. Therefore, a high index of suspicion is paramount in the diagnosis of this entity. The index patient presented in poor clinical state, and all efforts were made to get her stabilized, so abdominal ultrasound was done, and she was commenced on antibiotics and later had urgent hemodialysis. Abdominal computed tomography (CT) scan and other ancillary investigations were not done due to financial constraints.

CASE REPORT

A 57-year-old known diabetic of 12 years with poor drug compliance presented with a 1-week history of reduction in urine output and change in urine color. The urine was said to be milky and foul-smelling. There was no hematuria or dysuria. Symptoms were preceded by nausea, vomiting, and fever. There was an associated history of abdominal pain, which was dull in nature and located at the right flank.

On examination, she was acutely ill looking, febrile though conscious, and oriented. The abdomen was tender, worse in the suprapubic and right costovertebral angle.

A working diagnosis of acute kidney injury secondary to urosepsis to rule out acute right pyelonephritis was made.

On investigation, random blood sugar on admission was 280 mg/dl. Full blood count showed a white blood cell count of 14,500 cell/mm³ with a neutrophil count of 80%, lymphocyte count of 19%, eosinophil count of 1%, and basophil and monocyte counts of 0%, respectively. Hemoglobin was 6.2 g/dl, and hematocrit was 22.5%. Platelet count was 280,000 cells/mm³. Serum electrolyte, urea, and creatinine was deranged with urea of 35.1 mmol/L and creatinine of 720 μmol/L. Glycated hemoglobin was 8.4%.

Abdominopelvic ultrasound showed that both kidneys are normal in position. The right and left kidneys measured 10.0 cm × 5.2 cm and 11.3 cm × 5.9 cm, respectively. They both showed increased parenchymal echoes more than the liver and spleen. Multiple irregular echogenic foci with

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How to cite this article: Jisieike-Onuigbo N, Ozuemba B, Anyanor A, Osakwe A, Ndulue C, Hycainth E, *et al.* Emphysematous pyelonephritis in a type II diabetic woman. Niger J Med 2020;29:331-3.

Submitted: 15-May-2019

Revised: 28-Apr-2020

Accepted: 29-Apr-2020

Published: 26-Jun-2020

Access this article online

Quick Response Code:



Website:
www.njmonline.org

DOI:
10.4103/NJM.NJM_59_20

dirty shadows were noted within the pelvis; upper and mid poles of the right kidney, in keeping with gas within the pelvicalyceal system; and the cortex likely due to infection from gas-forming organisms EPN. The left kidney showed moderate pelvicalyceal dilatation with hydroureters. The left ureter was dilated and tortuous. A curvilinear echogenic structure with the posterior acoustic shadow was noted within its distal portion. This is consistent with ureteric stone at the vesicoureteric junction measuring 2.1 cm. The liver had a craniocaudal span of 15.3 cm and showed a smooth outline and homogenous parenchymal echoes. The spleen (11.8 cm) was normal in size and echogenicity.

Urine culture yielded heavy growth of *Escherichia coli*.

The patient was commenced on intravenous (IV) meropenem 500 mg 8 hourly for 5 days and subsequently changed to IV ceftazidime 1 g 8 hourly based on the sensitivity pattern. Regular insulin was used to control blood sugar.

Urology team was invited, and bladder washout was done. The urinary diversion was planned but was delayed due to uremia. Two sessions of dialysis were carried out.

The patient began to recover, and surgical intervention was put on hold.

Repeat urine m/c/s yielded no growth of microorganisms.

Repeat Abdominal ultrasound revealed a right kidney with parenchymal echotexture slightly higher than the liver. The right kidney showed irregular outline with indentations over the calyces as well as heterogenous echotextures. The left kidney measured 12 cm × 5.5 cm, and the right kidney measured 9.2 cm × 4.4 cm. The right kidney showed multiple, small, aggregated echogenic structures casting sharp posterior acoustic shadows in the upper pole consistent with multiple calculi; the largest measures 1.8 cm with dilatation of the upper pole calyces on the right. The left kidney showed moderate pelvicalyceal dilatation. The left ureter was tortuous and dilated.

The patient recovered without the need for invasive procedures and was subsequently discharged home on regular outpatient follow-up.

DISCUSSION

EPN is a necrotizing infection with a predilection for the renal parenchyma.^[1] It is characterized by the presence of gas in the renal and perinephric tissues.^[1] Diabetes mellitus is a major predisposing factor in this condition. Other predisposing factors include obstruction of the urinary tract, septicemia, reduced renal perfusion, and immunosuppression. It is associated with high mortality rates when treatment is not prompt and optimal. This disease entity occurs more in females than males, and there is affection of the left kidney in two-third of cases more than the right. The most implicated organism is *E. coli* (70%), and others include *Proteus mirabilis*, *Klebsiella pneumoniae*, *Streptococcus* Group D, *Staphylococcus coagulase* (–), and

more rarely anaerobes such as *Clostridium septicum*, *Candida albicans*, *Cryptococcus neoformans*, and *Pneumocystis jiroveci*.^[2]

Patients present with fever associated with chills and rigors, nausea, vomiting, and flank pain.^[3] Laboratory investigations usually show the presence of urinary tract infection, leukocytosis with thrombocytopenia, and azotemia. Imaging is important in the diagnosis of EPN. Plain abdominal X-ray shows gas distribution over the region of the kidneys. Ultrasonography shows echogenic foci and dirty acoustic shadows within the renal parenchyma, and CT clearly shows the gas distribution, fluid collection, abscess collection, and features of obstructive uropathy if there are concomitant renal stones. There are various classifications for EPN. The more detailed CT classification was proposed by Huang and Tseng in the year 2000,^[4] and it has four classes which are based on severity. Class 1 is gas in the collecting system and has the best prognosis.^[4] Class 1 is managed with parenteral antibiotics and fluid, glucose, and electrolyte control.^[4] Class 2 is gas in the renal parenchyma; management involves antibiotics, percutaneous catheter drainage, and relief of urinary tract obstruction if present.^[4] Class 3 is subcategorized into A and B. Class 3A is gas or abscess to perinephric space, and Class 3B is gas or abscess extending beyond the kidney.^[4] Class 3 EPN treatments will depend on the presence or absence of the following patient's risk factors: thrombocytopenia, acute renal failure, disturbance of consciousness, and shock.^[4] Class 3 EPN patients can be managed with antibiotics and percutaneous catheter drainage if they have one or no risk factors; management for two or more risk factors is nephrectomy.^[4] Class 4 is bilateral or solitary kidney involvement and is managed with bilateral percutaneous catheter drainage and antibiotics.^[4] Nephrectomy is indicated in Class 4 if bilateral percutaneous catheter drainage and antibiotics fail.^[4]

In the case described above, the patient has a long-standing history of diabetes that was poorly controlled as noted by her abnormal random blood sugar and glycated hemoglobin on admission. She presented with typical symptoms of EPN, which included fever, nausea, vomiting, and right flank pain. Additional risk factors were female gender and renal calculi. Investigations revealed anemia, leukocytosis, azotemia, and *E. coli* as the causative organism. *E. coli* is the most common organism implicated in EPN. In terms of imaging, the patient was not able to access CT scan on admission due to financial constraints but was able to get an abdominal scan with a mobile ultrasound machine. It showed gas within the right collecting system and cortex. She was managed with fluid resuscitation, antibiotic therapy, blood transfusion, and hemodialysis. The index patient did not undergo CT, which could have helped in her classification, prognostication, and treatment. However, she recovered with conservative medical management as repeat ultrasound showed resolution of gas distribution, leaving behind echogenic structures which casted posterior acoustic shadows consistent with renal calculi.

CONCLUSION

EPN is a rare condition. A high index of suspicion is paramount in the diagnosis. Imaging is important in the diagnosis, and treatment will depend on the severity and clinical state of the patient. The index patient could not afford CT due to lack of fund. CT scan could have helped in the classification, prognostication and treatment of the index patient. However, aggressive medical management might have obviated the need for potentially dangerous surgical interventions in this patient.

Informed consent

Informed consent was obtained from the patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that

her name and initial will not be published, and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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