A 54-year-old male with long-standing diabetes presented with vague left flank pain for 5 days with uncontrolled blood glucose. The patient was commenced on insulin and injectable ceftriaxone empirically, for possibly acute pyelonephritis. Ultrasound examination revealed extensive emphysematous pyelonephritis of upper half of left kidney with involvement of perinephric space. Computed tomography of abdomen confirmed the diagnosis of emphysematous pyelonephritis which was categorised as class IIIa. The recommended treatment for class IIIa emphysematous pyelonephritis is nephrectomy but the patient refused to give consent for surgery or even percutaneous drainage. Thus, the patient was continued on medical management alone and surprisingly showed marked recovery over the next few days. There were no new complications, and the patient was discharged after 2 weeks of antibiotics with 2 more weeks of oral antibiotics. After 4 months, the ultrasound showed normal kidneys. We present this case because it adds to the little existing evidence that conservative management can successfully cure patients with class IIIa emphysematous pyelonephritis, although supplementation with percutaneous drainage would have been better in this case.

Introduction

Emphysematous pyelonephritis (EPN) is a complication seen in patients with long-standing diabetes and is characterised by formation of gas in the renal parenchyma. Such gas may extend into the peri-nephric or para-renal spaces and additionally in advanced case, there may be bilateral and extensive involvement. The primary cause of EPN is urinary tract infection caused by either Gram-negative organisms or anaerobes in some cases. The diagnosis of EPN is confirmed by non-contrast computed tomography (CT) and treatment is usually based on the CT classification. In the case of class IIIa EPN, the current recommended treatment of choice is nephrectomy or percutaneous drainage. Herein, however, we managed our patient with class IIIa EPN conservatively with only medical management, without percutaneous drainage or even haemodialysis.

Case report

In August 2010, a 54-year-old male with diabetes for the past 20 years presented to the Dr Rajendra Prasad Government Medical College in Himachal Pradesh, India. His chief complaints were pain in left flank for 5 days and fever for 1 day. The symptom of pain was gradually progressive, continuous type localised in left flank. The patient developed fever on the fourth day which was recorded as 102°F (38.9°C). He was given ornidazole and ofloxacin tablets orally at a primary health centre and was then referred to our medical department because of uncontrolled blood glucose. He reported a history suggestive of osmotic symptoms and burning micturition for 5 days, and there were no other significant present or past complaints. The vital signs showed blood pressure of 90/60 mm Hg at presentation, pulse rate of 106 beats/min, respiratory rate of 16 breaths/min, and temperature of 103°F (39.4°C) was recorded. On examination, the patient was conscious, oriented, and there was tenderness in the left renal angle, but all the other systems were normal. The biochemistry results showed a haemoglobin level of 101 g/L (reference range, 120-150 g/L), total leukocyte count of 17,700/mm³, neutrophils of 88%, and erythrocyte sedimentation rate of 68 mm/h (reference range, 0-22 mm/h), with normal platelet counts and liver functions. Metabolic control was very poor with glycated haemoglobin level of 12.8%, urea of 19.27 mmol/L (reference range, 4-8.3 mmol/L), and serum creatinine of 132.6 μmol/L (reference range, 50-110 μmol/L). Urine examination showed no albumin, traces of sugar, while urine microscopy showed 15 to 20 pus cells per high-power field, and therefore urine culture and sensitivity was ordered. However,
A 54-year-old man with diabetes presented with left flank pain and uncontrolled blood glucose levels. We diagnosed acute pyelonephritis and treated him with insulin and ceftriaxone (1 g administered intravenously every 12 hours). Chest X-ray showed an elevated left dome of the diaphragm. Ultrasound examination of the abdomen revealed emphysematous pyelonephritis (EPN) of the left kidney with destruction of the upper portion and extension into the perinephric space near the upper pole. The treatment given was continued and the abdominal CT scan revealed evidence of a small renal calculus on the left side with extensive EPN of the left kidney and the presence of small amount of fluid in the left perinephric space (Fig). In this patient, the CT classification was class IIIa EPN.

With regard to further management, we gave an option of nephrectomy to the patient, but he refused to give consent for any surgical intervention. The patient refused even for percutaneous nephrostomy, so we continued with medical management alone. To our surprise, throughout the hospital stay, the patient remained afebrile and fully conscious. He showed a steady recovery in clinical and laboratory parameters without any new complaints or complications. After 1 week of insulin and antibiotic (ceftriaxone) treatment, his renal functions remained normal with a serum creatinine of 106.1 μmol/L and blood glucose was adequately controlled with human mixed insulin injections over the next few days. The patient was started on intravenous ceftriaxone empirically on admission and this was continued for a total of 2 weeks. During this period, the patient became fully active and mobile. Due to absence of any complications or features of sepsis after 2 weeks of treatment, the patient was discharged on oral antibiotics for a further 2 weeks. After 4 months, ultrasound examination showed normal kidneys and even the small calculus had disappeared.

Discussion

Emphysematous pyelonephritis is a well-known condition which mainly affects the diabetic population (90%) and seen in patients with chronic diabetes. Some interesting facts about EPN are that it has a strong female preponderance with female-to-male ratio of 5:1, mean age of occurrence is around the fifth decade, and most often it involves the left kidney in almost 60% of cases. The gas contains carbon dioxide mainly because of bacterial fermentation of glucose along with some hydrogen and nitrogen. Presentation is often vague with non-specific abdominal pain, fever, and tenderness in the renal angle.

Since most cases are sporadic and spread over time, it is not easy to formulate definitive guidelines for all cases of EPN. The best evidence available for EPN is dependent on a few large prominent studies by Huang and Tseng in 2000 with 48 patients and a review by Pontin and Barnes in 2009 with 52 patients. Such studies serve as a good guide for the rest of the world, but may suffer from bias from the treating physicians and surgeons. So it is prudent to report all cases of EPN with details of presentation, extent of involvement, line of management, and outcomes.

The medical management of EPN was proposed a long time ago when it was first described by Schultz and Klorfein in 1962. In fact, in their report it was stated that “Vigorous treatment of uncontrolled diabetes and the use of appropriate antibiotics, avoiding anaesthesia and surgery seems a more rational approach.”

FIG. Contrast computed tomographic scan of abdomen showing left renal calculus with left emphysematous pyelonephritis and presence of small amount of fluid in the left perinephric space (arrows)
The current management recommendations are based on the CT-based classification used by Huang and Tseng\(^2\) in which they divide EPN into classes I, II, IIIa, IIIb, and IV (Table).

Class I  
Gas in collecting system only

Class II  
Parenchymal gas only

Class IIIa  
Extension of gas into perinephric space

Class IIIb  
Extension of gas into pararenal space

Class IV  
EPN in solitary kidney, or bilateral disease

Since India is one of the epicentres of diabetes epidemic, we wish to emphasise that systematic reporting of all EPN cases from this region can aid in formulating guidelines, especially for poor resource settings like ours. Most of our cases go unreported due to lack of proper record maintenance. Our patient had received ciprofloxacin tablets for 5 days before presenting to our hospital. Early initiation of antibiotics may have limited the progress of EPN in this patient and may have also been responsible for the sterile cultures that were reported. The patient had long-standing diabetes and also had a renal calculus, both of which can predispose to infection and subsequently lead to EPN. The patient was categorised as class IIIa EPN, who responded exceptionally well to antibiotics alone and had complete resolution of EPN on follow-up.

In conclusion, this is a rare case report because our patient recovered without drainage, surgery, or even haemodialysis. There have been reports that in class IIIa EPN that medical management alone with percutaneous drainage has a 92% failure rate.\(^2\) We wish to emphasise sensitisation of treating physicians regarding early investigations using contrast CT scan in diabetes patients with fever, renal angle tenderness, and vague abdominal pain. We do not recommend medical treatment for all such cases, but follow-up should be based upon patient’s response to the initial treatment.

### References


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**TABLE. Emphysematous pyelonephritis (EPN) classification by Huang and Tseng\(^2\)**

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<thead>
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