Emphysematous pyelonephritis treated with elective nephrectomy in a 75-year-old diabetic patient

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Abstract

We present a case of 75-year-old man with type 2 diabetes and emphysematous pyelonephritis (EPN). The patient presented with abdominal pain, fever of undetermined origin and progressive decrease in urine output. Computerized tomography scan revealed gas formation in the left renal parenchyma and capsule. A left nephrectomy was performed. He made a quick recovery. EPN should be taken into consideration in diabetic patients with symptoms of pyelonephritis who show a poor response to conventional treatment. Elective nephrectomy may be life saving in some patients.

Introduction

Emphysematous pyelonephritis (EPN) is a rare but life-threatening necrotizing infection of renal parenchyma and perirenal tissues. Most cases of EPN occurr in patients with diabetes.[1,2] Delayed diagnosis and rapid progression of symptoms usually result in a poor prognosis.[1] Emergency nephrectomy was considered to be life-saving management in most studies of EPN.[1,2] Here we report an elderly patient with EPN accompanied by complicated conditions who had a remarkable recovery after an elective nephrectomy.

Case Report

A 75-year-old man was transferred to our hospital with a 15-day history of chest distress and shortness of breath. He had been discharged from the local hospital after being treated for a pulmonary infection only five days before. Two days after discharge, the above symptoms recurred and became aggravated, accompanied by cough with mucus, dyspnea, nausea and abdominal pain. He was again admitted to the local hospital. Intermittent high fever over 39°C with chills then developed. Blood investigations showed hyperglycemia, increased white blood cell count (WBC) (Table 1). Oliguria was observed. His serum creatinine (Cr) and blood urea nitrogen (BUN) increased (Table 1). He became anuria and was transferred to our hospital. Past medical history included type 2 diabetes, chronic obstructive pulmonary disease and hypertension.

On admission, his body temperature was 36°C, pulse rate 88/min, respiratory rate 20/min, and blood pressure 106/70 mmHg. The patient was forced to stay in a semi-reclining position. His heart rhythm was regular. Moist rales and rhonchi were audible scattering over the bilateral lung, especially in both bases. The whole abdomen was distended with marked tenderness. Percussion tenderness over the right kidney was detected. Both lower extremities showed mild pitting edema. Hypospadias was found after later careful physical examination.

On arrival, blood and urine samples were collected for biochemistry assays and cultures. A preliminary diagnosis of type 2 diabetes, acute renal function impairment, thrombocytopenia and hypoproteinemia was made according to the blood test (Table 1). Therapy with sulbactam/cefoperazone was started as empirical treatment. Body temperature was controlled to normal after the first three days. However, it increased gradually at day 4 and peaked to 40.5°C at day 6 accompanied by a change in blood profile (Table 1). No evidence of other pyrogens, including hemorrhagic fever virus and plasmodium was found. Since *Escherichia coli* was detected in blood and urine, intravenous treatment was replaced by moxiflxacin according to the drug sensitive test. After that, body temperature fluctuated between 37°C and 38°C, with a persistent abdominal distension. Examination showed a left ventricular diastolic dysfunction and limitation ventilation dysfunction. A computerized tomography (CT) scan showed a moderate hydronephrosis in the right kidney with gas in the left renal parenchyma and capsule (Figure 1) which was enlarged when reassessed six days later. Analysis of the medical history in association with the positive physical and laboratory findings suggested a final clinical diagnosis of EPN.

In addition to antibiotics, the patient received supportive treatments including blood glucose control, human serum albumin and plasma transfusion and other combination care. Given the improvement in general patient condition and blood profiles a left nephrectomy was performed. The patient had a progressive recovery and was discharged from hospital (Table 1).

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Table 1. Blood profiles of the patient during treatment.

	Local hospital	On admission	Day 6	Pre-operative	Before discharge
Glucose (mmol/L)	19.41	36.86	13.62	8.60	7.60
WBC count (×10⁹/L)	27.50	15.90	35.92	11.20	7.50
Hemoglobin (g/L)	132	134	135	97	95
Platelets (×10⁹/L)	109	45	47	341	411
BUN (mmol/L)	9.93	30.42	22.83	5.90	6.86
Creatinine (umol/L)	352	296.24	179.07	179.5	114.30
Total protein (g/L)	-	47.50	-	63.10	65.80
Albumin (g/L)	-	22.80	-	31.10	36

BUN, blood urea nitrogen; WBC, white blood cell.

Discussion

Diabetic patients always present a high level of glucose in both blood and interstitial fluid. Patients with diabetes made up approximately 90% cases of EPN.[1,2] The remaining 10% of cases often showed some degree of immunological impairment.[1,3] Moreover, obstruction of the urinary tract was found in about 20% cases of patients with EPN.[1,2] The gas-producing bacteria, such as *Escherichia coli* and *Klebsiella pneumonia*, can ferment sugars within the urine and produce gases which infuse and infiltrate the upper urinary system, leading to a progressive functional loss of renal units.[1,3,4]

As the patient refused physical examination of edea and did not reveal a history of hypospadias on admission, diagnosis was at first difficult. Fever was persistent after an initial treatment of antibiotics and the abdominal distention was not relieved. We presumed there might be continued gas production in the peritoneum or urinary system. Evaluation of a detailed history and physical examination of edea were carefully performed again. We were surprised to find that the patient suffered from a congenital hypospadias, which was a critical clue for diagnosis of EPN on the basis of history of diabetes. The diagnosis was eventually confirmed by CT scan.

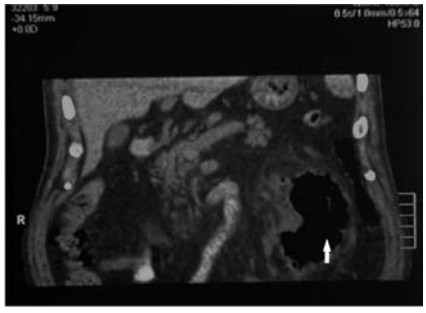

Figure 1. Computerized tomography scan demonstrated hydronephrosis in the right kidney and gas in the left kidney (white arrow).

EPN can be classified according to the location of gas accumulation, which leads to different outcomes.[1,2,5] Management of EPN has been controversial. Nephrectomy was considered to be an effective approach in msot cases.[1,6,7] However, Somani *et al.* demonstrated that mortality in patients undergoing elective nephrectomy after medical treatment with percutaneous drainage was 6.6%.[8] In addition, patients with two or more risk factors for EPN, such as thrombocytopenia, acute renal function impairment, disturbance of consciousness, and shock were recommended to receive intensive care followed by nephrectomy.[2]

Given the above, the patient in our case was classified as class 3A (gas or abscess extended to the perinephric space) and has at least two risk factors (thrombocytopenia and acute renal function impairment). Besides, the CT image indicated the infection was aggressive and there had been extensive infarction. Nephrectomy may be the only management approach. However, the patient was 75 years old, and the risk from surgery and anesthesia would be much higher. Moreover, he also presented impaired respiratory and heart function. Finally, a delayed elective nephrectomy was chosen as a life-saving approach after effective preoperative preparation.

In conclusion, it is very important to consider the possibility of EPN in diabetic patients with symptoms of pyelonephritis who show a poor response to conventional treatment. We agree with previous studies that elective nephrectomy may be necessary in some patients.

References

1. Lin WC, Chen YF, Lin CH, et al. Reappraisal of the management and outcome of emphysematous pyelonephritis. Kaohsiung J Med Sci 2009;25:16-24.
2. Huang JJ, Tseng CC. Emphysematous pyelonephritis: clinicoradiological classification, management, prognosis, and pathogenesis. Arch Intern Med 2000;60: 797-805.
3. Shokeir AA, El-Azab M, Mohsen T, et al. Emphysematous pyelonephritis: a 15-year experience with 20 cases. Urology 1997;49: 343-6.
4. Nabi Z, Almukdad H, Alnassri A, et al. Gas-forming urinary tract infection. J Coll Phys Surg Pak 2008;18:652-4.
5. Huang JJ, Chen KW, Ruaan MK. Mixed acid fermentation of glucose as a mechanism of emphysematous urinary tract infection. J Urol 1991;146:148-51.
6. Michaeli J, Mogle P, Perlberg S, et al. Emphysematous pyelonephritis. J Urol 1984; 131:203-38.
7. Vollans SR, Sehjal R, Forster JA, et al. Emphysematous pyelonephritis in type II diabetes: A case report of an undiagnosed ureteric colic. Cases J 2008;30:192.
8. Somani BK, Nabi G, Thorpe P, et al. Is percutaneous drainage the new gold standard in the management of emphysematous pyelonephritis? Evidence from a systematic review. J Urol 2008;179:1844-9.