

Case Report

Emphysematous Pyelonephritis in a Diabetic Patient on Maintenance Hemodialysis: a Case Report

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Abstract

Introduction: Emphysematous pyelonephritis (EP) is an uncommon acute infection characterized by the presence of gas in the renal parenchyma. It is extremely rare in hemodialysis (HD) patients and diabetics account for most cases. It is a rapidly progressive and life threatening infection with a high mortality rate. We report a case of emphysematous pyelonephritis in a HD patient who was treated successfully with radical nephrectomy and antibiotic therapy.

Case report: A 46-year-old diabetic male with end stage renal disease (ESRD) secondary to diabetic nephropathy and on maintenance HD for the last five years presented with a two weeks history of fever and loin pain. He was treated with oral ciprofloxacin for one week with no improvement. His blood culture isolated *Escherichia coli*. Computed tomography scan of the abdominal disclosed an enlarged left kidney with massive gaseous collections. Accordingly, the diagnosis of emphysematous pyelonephritis was put forward, the patient underwent left nephrectomy together with intravenous imipenem and amikacin with good clinical response. The removed kidney showed features of acute pyelonephritis with micro-abscesses on histopathology.

Conclusion: Emphysematous pyelonephritis should always be considered in diabetics presenting with fever, loin pain, and features of sepsis not responding to antibiotic therapy; even though being on dialysis. Computed tomography scan of the abdomen remains an early diagnostic tool. Early treatment with potent antibiotics with or without surgical intervention can save patients' life.

Keywords: Emphysematous Pyelonephritis; Hemodialysis; Nephrectomy

The authors declared no conflict of interest

Introduction

Emphysematous pyelonephritis (EP) is a rare but life-threatening acute suppurative infection of the kidney. It is characterized by production of gas within the renal parenchyma, collecting system, or perinephric tissues [1, 2]. Emphysematous pyelonephritis is extremely rare among hemodialysis (HD) patients [1, 3].

We describe a diabetic patient on maintenance hemodialysis for the last five years who presented with severe emphysematous pyelonephritis and was treated successfully with radical nephrectomy plus intravenous antibiotic therapy.

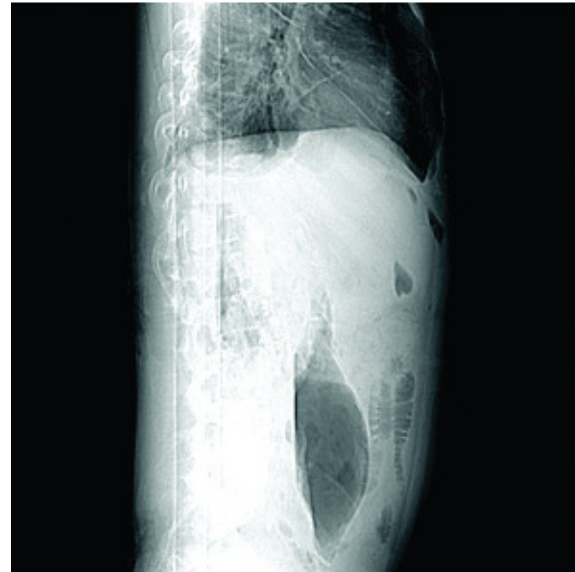
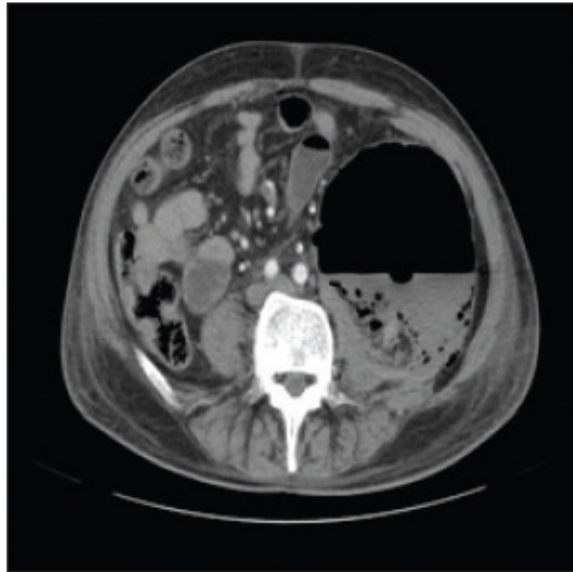
Case report

A 46-year-old diabetic male with end stage renal disease (ESRD) secondary to diabetic nephropathy and on maintenance hemodialysis for the last five years, presented with a two week history of fever and loin pain for which he had oral ciprofloxacin for one week with no improvement.

At presentation in the emergency department, he was ill, pale, febrile with a temperature of 38 °C, his heart rate was 100 beats/min, respiratory rate 20 cycles/min, blood pressure 140/63mmHg, and oxygen saturation was 100%. Further clinical examination revealed gaseous distention of his abdominal. His laboratory investigations showed an elevated white blood cell count of 32 600 / mm³, hemoglobin of 6.1 g/dL and a platelet count of 492 × 10⁹/L. Blood glucose level, serum electrolytes and liver function tests were all satisfactory. Urine could

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Figure-1, 2: Computed tomography scan disclosed massive gas collections within an enlarged left kidney



not be tested due to lack of a residual renal function. His blood culture isolated *Escherichia coli*.

Abdominal ultrasonography revealed multiple hyperechoic foci in the left kidney suggestive of intraparenchymal gas. Computed tomography scan of the abdomen disclosed an enlarged left kidney with massive gaseous collections (Figures 1 & 2). Accordingly the diagnosis of emphysematous pyelonephritis was put forward, the patient underwent left nephrectomy together with intravenous Imipenem and Amikacin for a total of 21 days, as per the blood culture and sensitivity report. Response to therapy was good. The removed kidney showed features of acute pyelonephritis with micro-abscesses on histopathology.

Discussion

Bacterial infections encountered in patients on maintenance dialysis are mostly due to *Staphylococcus aureus* or gram-negative organisms. Common sites are the respiratory tract and the vascular access sites [1].

Urinary tract infection (UTI) is an important cause of mortality and morbidity in patient on hemodialysis. In the absence of normal urinary output, common symptoms of UTI including dysuria, frequency and urgency are reduced or may be absent. Therefore, early diagnosis of UTI is necessary to prevent subsequent complications such as sepsis, nephrectomy and death [4].

Gas-producing infections account for a very small percentage (%) of all bacterial infections of the urinary tract but they are important to recognize because of their life-threatening potential [1,2]. EP, occurring secondary to diabetes and urinary tract obstruction, or immune system incompetence is potentially fatal. Early image interventions are warranted for those with toxic manifestations or prolonged fever of up to 10–14 days despite antibiotic treatment [1].

Escherichia coli is the most common pathological agent reported in 69% to 90% of cases. Other possible causative pathogens include *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Proteus mirabilis*, *Pseudomonas* species, anaerobic streptococci, *Candida* spp. and other fungi. The diagnosis of EP is often difficult clinically; it is usually established via specific imaging techniques [3,5]. Computerized tomography scan of the kidneys is the imaging procedure of choice, as it can determine the extent of infection and guide management.

Delayed management of EP can lead to septic shock and multi-organ failure, with a mortality rate of up to 30% being reported [2,6]. The high mortality rate of emphysematous pyelonephritis has been attributed to septicemia and the hypothesis of the gas transport [3,7]. With improvement in antibiotics and blood culture and sensitivity yield management of EP had evolved from aggressive surgical intervention to more conservative medical management [7]. However, nephrectomy can still provide the best

management outcome and should promptly be attempted for those with extensive emphysematous pyelonephritis, with a fulminant course. In these critically ill patients immediate nephrectomy with intravenous antibiotics remain the treatment of choice [8, 9].

Conclusion

Emphysematous pyelonephritis should always be considered in diabetics with fever, loin pain, and features of sepsis not responding to antibiotic therapy; even though being on dialysis. Computed tomography scan of the abdomen remains an early diagnostic tool. Early treatment with potent antibiotics with or without surgical intervention can save patients' life.

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