
Case report

Emphysematous Pyelonephritis in a Diabetic Patient with Kidney Stone

Kemal Magden¹, Utku Erdem Soyaltın¹, Gursel Yıldız², Cihan Celik³ and Ender Hur¹

¹Department of Nephrology Bulent Ecevit University Medical School, Zonguldak, ²Atatürk State Hospital, Clinic of Nephrology, Zonguldak, ³Department of Radiology Bulent Ecevit University Medical School, Zonguldak, Turkey

Abstract

Emphysematous pyelonephritis (EPN) is an acute necrotizing infection of the renal parenchyma, resulting in presence of gas within either the collecting system or perinephric tissue. Females and diabetics are more prone to the disease. We present a case with EPN caused by *Escherichia coli* sepsis. A 54-year-old woman was admitted to emergency service in a status of septic shock. Radiodiagnostic computed tomography revealed gas bubbles bilaterally in the renal parenchyma and also left ureter. Treatment consisted of antibiotics and intravenous fluids. She died at the second day of hospitalization because of urosepsis.

Keywords: Complicated urinary tract infection, diabetes mellitus, emphysematous pyelonephritis, urosepsis

Introduction

Emphysematous pyelonephritis (EPN) is a rare and severe infection of the kidney, characterized by production of gas within the renal parenchyma, collecting system or perinephric tissue [1]. It predominantly affects diabetics and immunocompromised patients. Women are much more frequently affected than men. Obstruction of the pelvicalyceal system is the main cause of EPN in non-diabetics [2]. EPN is caused by gas-producing enterobacteria (*Escherichia coli* and other gram negative bacteria are the usual agents; fungi or anaerobic organisms are extremely isolated) [3,4]. Common presentation includes; fever, chills, abdominal pain, dysuria, vomiting, depressed level of consciousness, costovertebral junction tenderness, and acute kidney injury [5]. More severe symptoms, like confusion, shock or signs of uremia, can also be observed [3]. Computed tomography (CT) is the examination of choice for diagnosing EPN and the "gold-standard" for identification of gas [6,7]. Management of EPN ranges from aggressive surgical intervention to conservative management [8].

Case report

A 54 year old woman presented with nausea, vomiting,

flank pain, chills to the emergency service. Her past medical history consisted of kidney stones and Type II diabetes for 10 years. She was on treatment with oral antidiabetic drugs. At physical examination; general condition was poor, conscious was depressed, on admission her blood pressure was 80/50 mmHg, pulse rate was 88/minute and rhythmic, the body temperature was 37.3°C, and there was tenderness of bilateral costovertebral junction.

Laboratory findings were: Random blood glucose 324 mg/dl, urea 53 mg/dl, creatinine 5.1 mg/dl, white blood cells 21500/mm³, hemoglobin 11.9 g/dl, C-reactive protein 197 mg/L, arterial blood gas analysis pH: 7.28, pCO₂:25.5 mmol/L, pO₂:64.6 mmol/L, cHCO₃:12.0 mmol/L.

Abdominal ultrasound revealed grade II hydronephrosis in the left kidney. At the abdomino-pelvic computed tomography scan air densities were recognized in the left ureter (Figure 1) and both kidneys (Figure 2). The patient was consistent with the prognostic class 4 according to radiological classification of EPN. Treatment started with 400 mg of parenteral moxifloxacin. Nephrectomy was planned but because of the situation of shock and urosepsis it couldn't be performed. The patient died on the second day of hospitalization due to urosepsis from *E. Coli* that was isolated in urine culture.

Discussion

Emphysematous urinary tract infections (UTIs), involving either the lower or the upper part of the urinary tract are associated with gas formation. Cystitis, pyelitis and pyelonephritis can be seen at the clinical presentation. Diabetes mellitus is an important risk factor for these infections and asymptomatic bacteriuria, cystitis, renal and perinephric abscess and infections due to candida are associated with an increased risk of symptomatic UTIs [9-11]. Pathological and clinical signs of bacterial UTI do not explain the production of emphysematous gas [2,12]. Increased tissue glucose levels in diabetic patients may provide favorable microenvironments than for gas-producing microorganisms. Urinary tract obstruction represents another risk factor for emphysematous UTI. Usually the causative agent is *Escherichia coli* and other gram-negative bacteria

[3,4]. Most patients with acute uncomplicated cystitis and pyelonephritis are women above 60 years old [12]. Computed tomography findings for prognosis of emphysematous urinary tract infections (UTI) are divided in four classes [2]. The presences of gas in the collecting system (emphysematous pyelitis) is characteristic of the first class whereas the presence of air in the parenchyma without extrarenal extension represents is the feature of the second

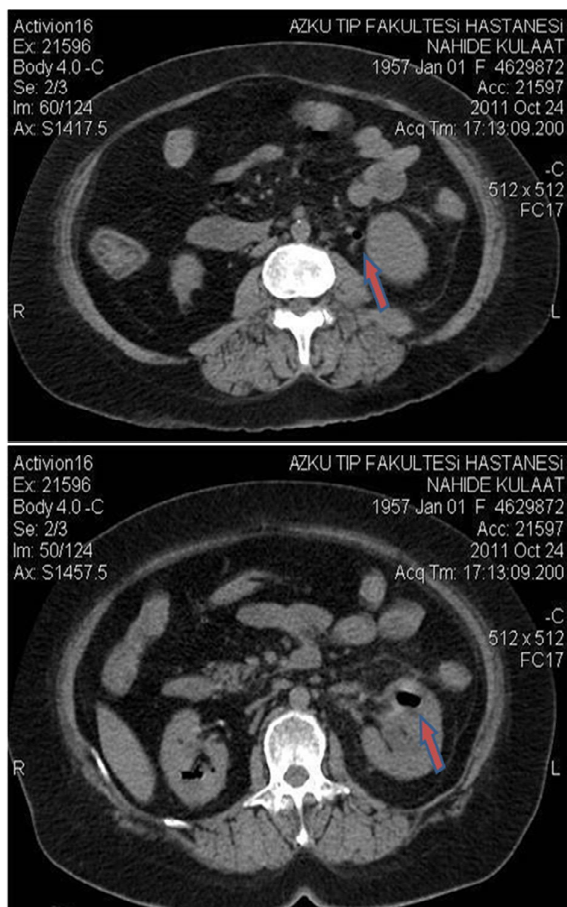


Fig. 1. (Upper pannel) Abdomino-pelvic computed tomography scan with air densities in the left ureter

Fig. 2. (Lower pannel) CT scan with air densities in the both kidneys

class. The third class is divided in class 3A that is characterized by the presence of gas or abscess in the perirenal space and in class 3B that is characterized by the presence of gas or abscess in the pararenal space. Finally class four represents bilateral disease or disease in a solitary kidney. Emphysematous pyelonephritis is a disease with high morbidity and mortality. Mortality from EPN is primarily attributable to septic complications. The mortality rate is 21-

29% with surgical treatment, 60-75% with conservative treatment and 80% if the disease extends to the perirenal area (Class 4) [3,13]. Nephrectomy is the gold standard of treatment. Patients presenting with shock or sepsis could be treated with less invasive percutaneous drainage or lumbarotomy [2,14].

Conclusions

In diabetic patient presented with sepsis, EPN must be included in the differential diagnosis and confirmed by abdominal CT. Although EPN is rare, it leads to a serious condition with high morbidity and mortality and needs urgent and aggressive intervention.

Conflict of interest statement. None declared.

Reference

1. Johnson JR. Spectrum of gas within the kidney: emphysematous pyelonephritis and emphysematous pyelitis. *Am J Med* 1988; 84: 800.
2. Huang JJ, Tseng CC. Emphysematous pyelonephritis: clinico-radiological classification, management, prognosis, and pathogenesis. *Arch Intern Med* 2000; 160: 797-805.
3. Moreno Romero R, Viveros Contreras C, Lugo Garcia J, *et al.* Pielonefritis enfisematosa. *Rev Mex Urol* 2006; 66 (2): 74-82.
4. Peter JV, Biradar V, Peaje SL. Emphysematous pyelonephritis. *Med J Australia* 2006; 184 (10): 533.
5. Michaeli J, Mogle P, Perlberg S. Emphysematous pyelonephritis. *Journal of Urology* 1984; 131(2): 203-208.
6. Blanco Diez A, Barbagelata Lopez A, Fernandez Rosado E, *et al.* Pielonefritis enfisematosa: Presentación de un caso y revision de la literatura. *Actas Urol Esp* 2003; 27 (9): 721-725.
7. Roy C, Pfleger DD, Tuchmann CM, *et al.* Emphysematous pyelitis: findings in five patients. *Radiology*. 2001; 218(3): 647-650.
8. Hudson M, Weyman P, Van der Vliet A, *et al.* Emphysematous pyelonephritis: successful management by percutaneous drainage. *J Urol* 1986; 136: 884-886.
9. Ronald A, Ludwic E. Urinary tract infections in adults with diabetes. *Int J Antimicrob agents* 2001; 17: 287.
10. Geerlings SE, Stolk RP, Champs MJ, *et al.* Risk factors for symptomatic urinary tract infection in women with diabetes. *Diabetes Care* 2002; 23: 1737.
11. Boyko EJ, Fihn SD, Scholes D, *et al.* Diabetes and the risk of acute urinary tract infection among postmenopausal women. *Diabetes Care* 2002; 25: 1778.
12. Grupper M, Kravtsov A, Potamsan I. Emphysematous cystitis: illustrative case report and review of literature. *Medicine (Baltimore)* 2007; 86: 47.
13. Herring W. Emphysematous pyelonephritis. Disponible en: <http://www.learningradiology.com>, consultado el 18/07/08.
14. Melero MJ, Sarquis SG, Biancolini C, *et al.* Pielonefritis enfisematosa aguda bilateral. Un desafio terapeutico. *Medicina*, 2007; 67 (3): 282-284.