

Case Report

Emphysematous Pyelonephritis in a 32-Year-Old Diabetic Female

Muhammad Abdur Rahim¹, Mehruba Alam Ananna¹, Tabassum Samad²,
Tufayel Ahmed Chowdhury², Wasim Md. Mohosinul Haque³, Sarwar Iqbal³

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Abstract

Emphysematous pyelonephritis is a rare, severe, necrotizing renal parenchymal infection characterized by gas accumulation in kidney(s) with or without involving surrounding tissues. Patients with diabetes mellitus are the usual sufferers. Here we describe a case history of a young Bangladeshi diabetic lady who presented with dysuria, fever and abdominal pain. Investigations confirmed left sided emphysematous pyelonephritis. She responded to and recovered with intravenous antibiotics.

Key words: Diabetes mellitus; Emphysematous pyelonephritis

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Introduction

Emphysematous pyelonephritis (EPN) is a severe and life-threatening infection of the renal parenchyma, collecting system or perinephric tissue and is characterized by presence of gas in the parenchymal tissue.¹ Diabetes mellitus (DM) is an important risk factor being responsible in 95% cases or even more.^{2,3} Other risk factors include urinary tract obstruction, anatomic deformities of urinary tract, neurogenic bladder, polycystic kidneys, drug overuse, alcoholism, end-stage renal disease and immune-suppression.^{2,4} Presentation is like that of acute pyelonephritis. Imaging studies can readily detect gas in kidney(s), computed tomographic (CT) scan can best delineate extension of gas.⁵

Case report

A 32-year-old diabetic lady presented with a 4-day history of dysuria, fever and supra-pubic pain. She took diclofenac sodium for pain before being hospitalized.

She was mildly anemic with normal hemodynamic status and normal temperature. She had mild supra-pubic tenderness and tenderness over left renal angle on percussion. She had uncontrolled diabetes, anemia, neutrophilic leukocytosis, thrombocytopenia, raised erythrocyte sedimentation rate, C-reactive protein, blood urea, serum creatinine and low serum sodium, bicarbonate and albumin (Table I). She had glycosuria, albuminuria, pyuria and hematuria (Table I). Abdominal ultrasonogram (USG) showed swollen and hypoechoic left kidney with echogenic components with dirty shadows within parenchyma, calyces and pelvis of left kidney suggesting left sided emphysematous pyelonephritis (Fig 1) and minimal pleural effusion on left side. Chest radiography showed elevated left hemidiaphragm (Fig 2). CT scan confirmed left sided EPN (Fig 3A and 3B). Urine culture revealed growth of *non-Enterococcus spp.* Blood culture did not show growth of any organism.

1. Assistant Professor, Department of Nephrology, Bangladesh Institute of Rehabilitation in Diabetes, Endocrine and Metabolism (BIRDEM) General Hospital, Dhaka

2. Registrar, Department of Nephrology, BIRDEM General Hospital, Dhaka

3. Associate Professor, Department of Nephrology, BIRDEM General Hospital, Dhaka

Correspondence Muhammad Abdur Rahim, Email: muradrahim23@yahoo.com

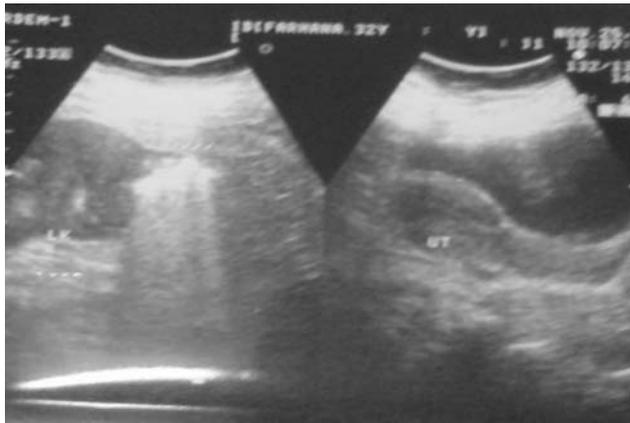


Fig 1. Ultrasonogram showing echogenic components with dirty shadows within parenchyma, calyces and pelvis of left kidney suggesting left sided emphysematous pyelonephritis



Fig 2. Chest X-ray (postero-anterior view) showing elevated left hemidiaphragm

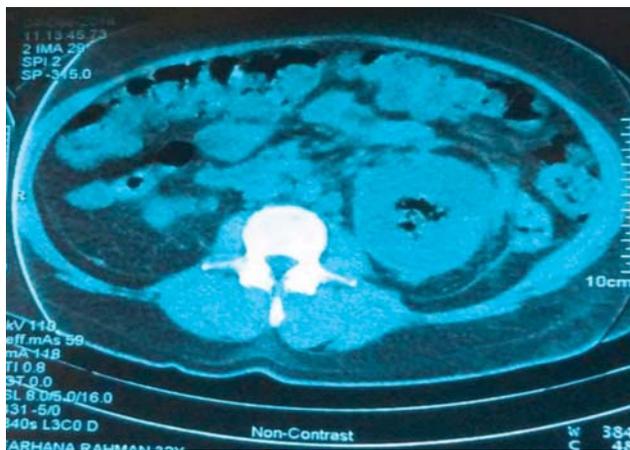


Fig 3A. CT scan of abdomen showing gas in left renal pelvis and parenchyma

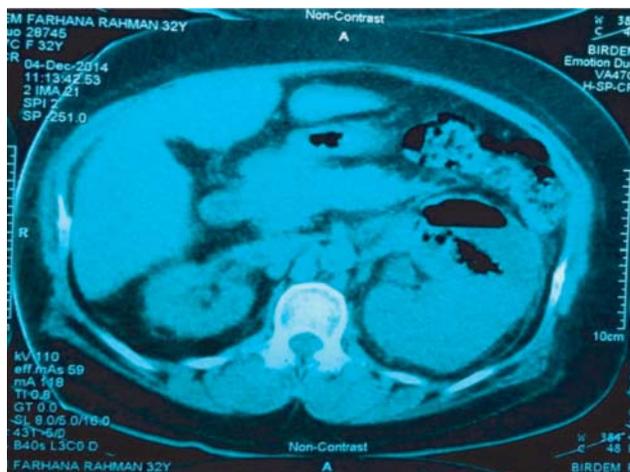


Fig 3B. CT scan of abdomen showing gas in left renal pelvis and parenchyma

After getting urine culture report, her antibiotic was changed from ceftriaxone to meropenem according to antibiotic sensitivity. Other supportive treatment included intravenous fluid, insulin and paracetamol. She was discharged on 15th day after admission. Her serum creatinine came back to 1.2 mg/dL. Follow up USG after one week showed presence of air in left renal pelvis but less than in previous scan. She was on meropenem for four weeks and cured completely both clinically and radiologically.

Table I: Abnormal laboratory findings of the patient with emphysematous pyelonephritis

| Laboratory tests | Patient's results | Reference values |
|----------------------------------|--|-------------------|
| Random blood glucose (mmol/L) | 20.2 | <11.1 |
| HbA1c (%) | 15.5 | <7 |
| Urine | | |
| Glucose | +++ | |
| Protein | Trace | |
| Pus cells/HPF | Plenty | |
| RBC/HPF | Plenty | |
| Culture | Growth of non-Enterococcus spp. (1×10^5 CFU/mL) | |
| Hb (gm/dL) | 9.5 | 11.5-16 |
| Total white blood cells/cmm | 23,700 | 4000-11,000 |
| Neutrophils (%) | 85 | 40-70 |
| Platelets/cmm | 25,000 | 1,50,000-4,50,000 |
| ESR (mm in 1 st hour) | 110 | <20 |
| CRP (mg/L) | 24 | <6 |
| Blood urea (mg/dL) | 92 | 10-50 |
| Serum creatinine (mg/dL) | 4.7 | 0.67-1.2 |
| Serum Na (mmol/L) | 122 | 136-145 |
| Serum TCO ₂ (mmol/L) | 12 | 23-27 |
| Serum albumin (gm/L) | 28 | 35-57 |

Discussion

EPN was first described in 1898.⁶ Since then various names like 'renal emphysema', 'pneumonephritis' were used and the term 'Emphysematous pyelonephritis' was adopted in 1962.⁷ *Escherichia coli* and *Klebsiella pneumoniae* are predominant organisms and rarely gas forming organisms like *Clostridia* are reported to cause EPN.^{2,8} In our case urine culture report revealed growth of non-*Enterococcus* spp. and treatment was started with meropenem. DM is an important risk factor. Rarely EPN is the presenting feature of DM.^{5,9}

Gas formation in EPN results from fermentation of glucose by *Enterobacteriaceae*.² Plain radiograph can show air in regions of kidneys, USG can detect gas in kidneys, but CT has highest sensitivity and specificity.^{5,10} Huang & Tseng² gave classification of EPN depending upon CT findings – class 1, gas in the collecting system only; class 2, gas in the renal parenchyma without extension to extra-renal space; class 3A, extension of gas or abscess to perinephric space, class 3B, extension of gas or abscess to pararenal space and class 4, bilateral EPN or solitary kidney with EPN. Our patient had class 2 EPN. The higher the class, the worse the prognosis.² Moreover, thrombocytopenia, acute kidney injury (AKI), disturbance of consciousness, shock and conservative approach with antibiotic only are risk factors for bad prognosis.^{2,3} Our patient had thrombocytopenia and AKI and she responded well to antibiotics and other supportive treatment. It is to be noted that interventions should not be delayed whenever indicated, eg, class 3B or more and any class with more than 2 risk factors.²

Treatment consists of antibiotic alone, percutaneous catheter drainage combined with antibiotic treatment or

nephrectomy. Mortality is high, even up to 40% when antibiotic alone is tried as sole treatment.² In conclusion, it can be said that any patient with DM having upper urinary tract infection, if not responding to antibiotics, should be suspected and investigated promptly for EPN.

References

1. Pontin AR, Barnes RD, Joffe J, Kahn D. Emphysematous pyelonephritis in diabetic patients. *Br J Urol* 1995; 75: 71–74.
2. Huang JJ, Tseng CC. Emphysematous pyelonephritis: clinicoradiological classification, management, prognosis and pathogenesis. *Arch Intern Med* 2000; 160: 797–805.
3. Ubee SS, McGlynn L, Fordham M. Emphysematous pyelonephritis. *BJU Int* 2011; 107: 1474–1478.
4. Shokeir AA, El-Azab M, Mohsen T, El-Diasty T. Emphysematous pyelonephritis: a 15-year experience with 20 cases. *Urology* 1997; 49(3): 343–346.
5. Rafailidis V, Karadimou V, Liouliakis C, Kougioumtzoglou D. Emphysematous pyelonephritis: a case report. *Hippokratia* 2013; 17(4): 373–375.
6. Kelly HA, MacCallum WG. Pneumaturia. *J Am Med Assoc* 1898; 31: 375–381.
7. Schultz EH, Klorfein EH. Emphysematous pyelonephritis. *J Urol* 1962; 87: 762–766.
8. Christensen J, Bistrup C. Emphysematous pyelonephritis caused by *Clostridium septicum* and complicated by a mycotic aneurysm: case report. *Br J Radiol* 1993; 66: 842–843.
9. Nasr MA, Kishk AG, Sadek EM, Parayil SM. A case report of emphysematous pyelonephritis as a first presentation of diabetes mellitus. *Iran Red Cres Med J* 2013; 15(12): e10384.
10. Bamanikar A, Dhobale S. Fever with abdominal pain and diabetes – is it emphysematous pyelonephritis? *Malays J Med Sci* 2014; 21(3): 85–88.