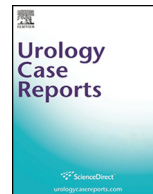




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Inflammation and infection

Emphysematous pyelitis in a solitary functioning kidney

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ABSTRACT

The present report describes the case of a 53-year-old male patient with solitary functioning right kidney admitted to the emergency room with acute abdominal pain, deranged blood sugar, and fever (38.5 °C). Laboratory investigations and computed tomography findings revealed urinary tract infection, deranged renal functions, raised inflammatory markers associated with the presence of gas in the collecting system, characterizing unilateral emphysematous pyelitis caused by Gram-negative bacteria. The present case report emphasizes the occurrence of this disease as a deranged blood glucose complication.

Introduction

Emphysematous pyelitis (EP) is a relatively benign disease characterized by gas production inside the collecting system of kidneys, secondary to acute bacterial infection. It needs accurate differentiation from the far more serious emphysematous pyelonephritis (EPN), which is gas production from an infection in the renal parenchyma rather than just in the collecting system. If not treated early, it may lead to EPN, fulminant sepsis and, therefore, carries a high mortality. Most of the cases are reported in diabetics, about 90% reported according to different series; obstructive uropathy is the other contributing factor in other cases. It is mostly unilateral but 10% is bilateral.¹ EP carries a mortality rate of up to 20%, which is significantly lower than that of emphysematous pyelonephritis, which carries a mortality rate of approximately 50%.²

Typical clinical features of EP are the same as EPN, include the following fever, abdominal pain, nausea, vomiting, shortness of breath, acute renal impairment and shock. We present a case of emphysematous pyelitis in a solitary functioning right kidney with an evaluation of radiological features, prognostic factors, and current management of this disease.

Case report

A 53-year-old man with congenitally solitary functioning right kidney, known diabetic and hypertensive presented to the urology emergency clinic with complaints of pain right side upper abdomen, fever with chills and deranged blood sugar for the previous 3 days. The patient appeared alert and oriented, but dehydrated. Past history of the patient reveals right pyelolithotomy and ureterorenoscopy

(URS) + Double-J-stenting three years back secondary to stones. Renal Scan (DTPA) at that time shows left markedly impaired functioning kidney (Fig. 1).

Laboratory investigations revealed hemoglobin; 8.6 g/dL, total leukocyte count (TLC); 16.0*10⁹/L, neutrophils 88%, C-reactive protein (CRP) 195 mg/L, random blood glucose: 467 mg/dL, serum urea: 41 mmol/L, creatinine: 761 mmol/L, serum Na + 128 mmol/L, and K + 6.6 mmol/L. The urinalysis showed plenty of pus cells with glycosuria. Urine culture grew *E. coli* with sensitivity to Cefoperazone/Sulbactam and levofloxacin. The ultrasonography demonstrated a heterogenous mass replacing the right kidney with the presence of strong focal echoes suggesting intraparenchymal gas, minimal fullness of pelvis + calyceal system and air has been predominantly in perinephric space medially (Fig. 2).

The patient was catheterized and hydrated with crystalloids, intravenous Cefoperazone/Sulbactam 2 g I.V twice daily was administered, electrolyte imbalance correction with continuous ECG monitoring, initiation of insulin injections and anti-hypertensive medications. He responded to conservative measures. Noncontrast CT KUB scan showed right emphysematous pyelitis with emphysematous ureteritis along with emphysematous changes in right psoas major muscle, right crus of diaphragm and in right lateral conal fascia, emphysematous changes in urinary bladder and a 7.2mm (HU 344) calculus in right ureter causing upstream dilatation of pelvicalyceal system and ureter (Fig. 3).

Right percutaneous nephrostomy (PCN) was planned under ultrasonographic guidance. The ultrasonographic assessment showed minimal fullness of the pelvicalyceal system and the air is seen predominantly in perinephric space medially. Using 18G Chiba needle with local anesthesia, an attempt was made to access the pelvicalyceal

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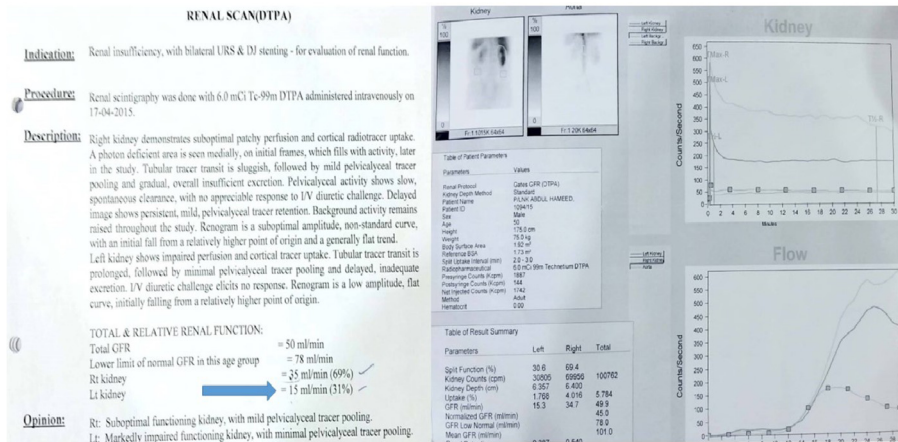


Fig. 1. DTPA Scan with markedly impaired functioning left kidney.

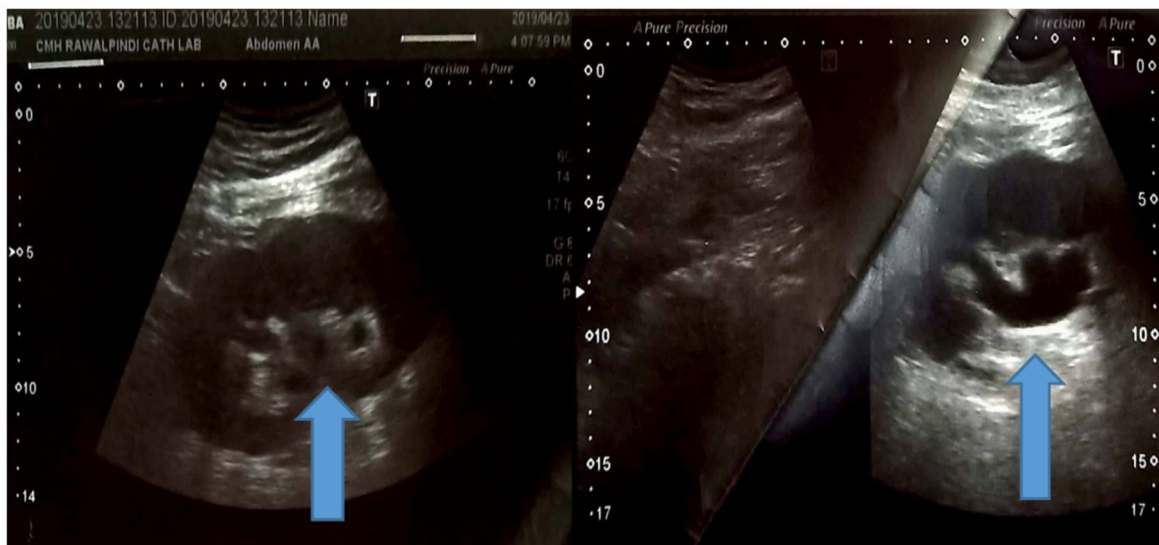


Fig. 2. Ultrasonography showing minimal fullness of system and intraparenchymal gas.

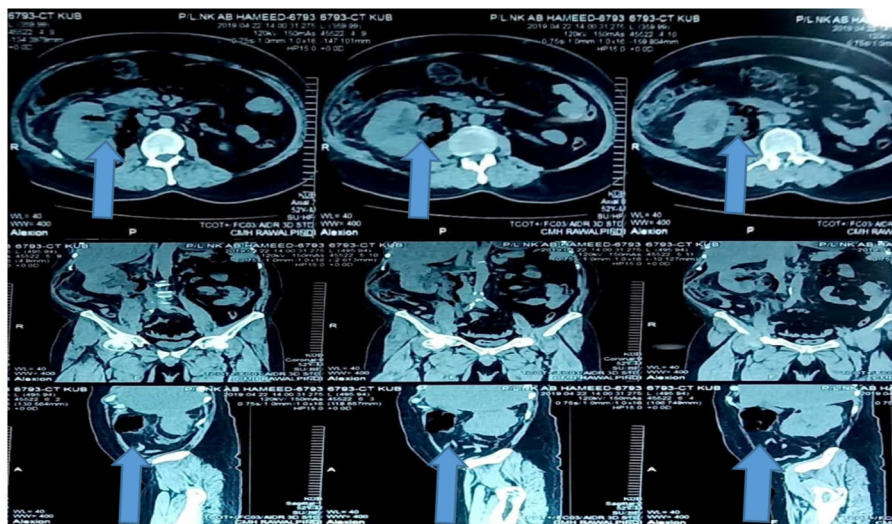


Fig. 3. CT KUB axial film shows the presence of air in the collecting system of kidneys. Coronal & sagittal films show the air extending to the psoas muscle and diaphragm area.

system in lower pole region. The patient was unable to hold his breath and blood pressure was persistently rising (190/110 mmHg) despite antihypertensive medications so PCN was postponed.

We contemplated Double-J stenting which shows pus, debris, and calculus in the right ureter. On the 1st postoperative day of DJ-stenting, the patient had sudden onset frank pyuria, which drained around 500 m/l of pus with the resolution of the abdominal pain, fever, and serum creatinine: 405 $\mu\text{mol/l}$. After nephrology consultation, the patient had 3 sessions of hemodialysis on 1st, 2nd and 5th day of admission only. He was continued on conservative management with oral Levofloxacin after 7 days of parenteral therapy, and his blood sugar and blood pressure were controlled. His renal function tests improved to serum urea 7.2mmol/l, creatinine 184mmol/l and inflammatory markers CRP 18.2 mg/l and TLC count $8.2 \times 10^9/L$. No other invasive form of treatment was needed.

The patient was discharged with follow-up in Urology Outpatient department. Ureterorenoscopy for right ureteric stone and removal of Double-J-stenting was planned after 6 weeks.

Discussion

Emphysematous pyelitis, if not approached aggressively has a high mortality rate. An early suspicion should be raised when a patient is thought to have uncomplicated pyelonephritis with deranged blood sugar and poor response to antibiotic therapy. Urgent laboratory and imaging studies should be performed, and surgery should be considered early in patients who are at high risk of mortality.

Common organism isolated from the culture of urine, blood or aspirate material in patients with EP includes *Escherichia coli* (most common), *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterococcus* species, and *P. aeruginosa*. Management includes intensive resuscitation in case of shock followed by the initiation of broad-spectrum antibiotics

and immediate surgical consultation and intervention if needed. Surgical measures include percutaneous catheter drainage, incision, and drainage or nephrectomy depending on the condition of the patient, extent of disease and comorbidities.

EP may progress to EPN which is a uniformly fatal illness if left untreated. Patients who are treated medically have a higher mortality rate than those treated surgically, 70% vs. 30%. Most cases are associated with uncontrolled diabetes mellitus, around 90% in different series, obstructive uropathy is the other predisposing factor.^{3,4} Factors which are related to high mortality are systolic blood pressure < 90 mmHg, altered mental status, increase in serum creatinine, thrombocytopenia, bilateral disease and the treatment of disease only with antibiotics. Mortality due to septic complications may be as high as 21%.⁵

Other conditions in which a patient presents with air in and around the kidney include the perinephric abscess with gas around the kidney, intrarenal abscess in which gas is localized to the abscess cavity inside the kidney and emphysematous pyelonephritis with gas throughout the renal parenchyma with a very high mortality rate.

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