Emphysematous pyelonephritis with IVC thrombus in new onset diabetes mellitus

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ABSTRACT
Emphysematous pyelonephritis (EPN) is a rapidly progressive necrotizing infection characterized by gas in the kidneys. We describe a 48-year-old woman, a newly diagnosed diabetic, who presented with clinical features of right sided pyelonephritis with hematuria of short duration. On further evaluation, she was diagnosed to have right sided EPN, with thrombus in the renal vein and inferior vena cava (IVC). She was managed conservatively with hydration, insulin, intravenous antibiotics, anticoagulants and ureteric stenting on the right side. On follow-up, the gas shadows resolved and the thrombus completely regressed.

Key words: Diabetes, emphysematous pyelonephritis, thrombus

INTRODUCTION
Emphysematous pyelonephritis (EPN) is a urologic emergency, characterized by an acute necrotizing parenchymal and perirenal infection caused by gas-forming uropathogens. It has been postulated that high tissue glucose levels in diabetic patients provide the substrate for microorganisms such as Escherichia coli, which are able to produce carbon dioxide by fermenting the sugar. Untreated cases of EPN may be fatal. Medical treatment alone may lead to uncontrollable sepsis and surgical intervention is frequently required. Perinephric abscess formation and renal failure are other complications. The incidence of renal vein or IVC thrombus in EPN is rare. We describe one such case that we treated.

CASE REPORT
A 48-year-old, premenopausal lady was admitted with constant and dull aching right sided flank pain of a week’s duration. She had a fever for three days and three episodes of gross painless hematuria without clots. She had decreased urine output for 5 days, but no lower urinary tract symptoms. She was recently diagnosed to have diabetes mellitus but was not on any anti-diabetic measures.

On examination, she was febrile, with pulse rate of 90/min and blood pressure of 120/80 mmHg. She was not anemic or icteric and was fairly well hydrated. Abdomen was soft with no distension but tenderness was present in the right renal angle without any mass. External genital examination and per vaginal examination were normal.

Her laboratory results were notable for a raised total leukocyte count with increased polymorphs and the platelet count was 180,000 cells/cu.mm. Urine examination revealed deposits showing plenty of WBC and 20-25 RBCs/hpf. Urine culture and sensitivity showed E. coli 10^3/hpf, sensitive to amikacin, piperacillin-tazobactum, and cefoperazone sulbactum. Blood culture was sterile. Renal functions showed blood urea of 120 mg/dl, serum creatinine of 5.4 mg/dl, serum sodium of 130mEq/dl, serum potassium of 4.2mEq/dl. Serum prothrombin time, activated Partial Thromboplastin Time (APTT), assay of antithrombin III, proteinC, proteinS, and anti-phospholipid antibodies were normal.

X-ray KUB showed colonic shadows displaced downwards and the right renal area was occupied by gas shadows. Right kidney measured 14 cm × 4.4 cm and hyperechogenic gas shadows were observed on the ultrasonogram (USG). Left kidney measured 10.2 cm × 3.8 cm. Coticomedullary
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DISCUSSION

EPN is a urologic emergency characterized by an acute necrotizing parenchymal and perirenal infection caused by gas-forming uropathogens. EPN may be classified into four classes according to computed tomography (CT) findings, Class 1: Gas in the collecting system, Class 2: Gas confined to renal parenchyma alone, Class 3A: Perinephric extension of gas or abscess, Class 3B: Extension of gas beyond Gerota’s fascia and Class 4: Bilateral EPN or EPN in a solitary kidney.[1] The overall mortality rate has been reported to be 25%.[2] There has been no grading for our peculiar situation of EPN with renal vein and IVC thrombus.

We ruled out predisposing factors for inherited and acquired causes of thrombosis with investigations including AntithrombinIII, protein C, protein S, and anti-phospholipid antibodies which were normal. We believe that the release of inflammatory mediators such as endotoxin, IL-6 could have resulted in thrombosis.[3]

EPN presenting with renal vein and IVC thrombus has been reported in the literature. In a similar case, the patient underwent nephrectomy and thrombectomy with caval filter placement.[4] Another case was reported by Bhatt et al. where a 53-year-old woman with bilateral EPN and new-onset diabetes developed septic emboli to her brain, lungs, liver, and portal vein thrombosis and succumbed to the disease despite aggressive medical management.[5]

In the management protocol, if the kidney is obstructed, catheter drainage must be instituted. Nephrectomy is recommended for patients who do not improve after

Figure 1: (a) USG KUB: Right kidney 14 cm x 4.4 cm and hyperechogenic dirty gas shadows with normal CMD and PCS, (b) ColorDoppler USG: Thrombus seen in right renal vein extending into IVC, (c) CECT KUB: Right kidney enlarged with perinephric stranding, air pockets in PCS, parenchyma and deep to the Gerota’s fascia, (d) Reconstructed CECT: Thrombus in the right renal vein and extension into the IVC.

Contrast enhanced computed tomographic scan of (CECT) revealed right kidney enlargement with perinephric stranding, air pockets in the pelvicalyceal system, parenchyma, and deep to the Gerota’s fascia. A thrombus was seen in the right renal vein, extending into the IVC. Color Doppler confirmed the findings [Figure 1b-d]. Diethylene triamine pentaacetic acid (DTPA) isotope study was deferred due to raised renal parameters. The patient was started on injection Piperacillin with tazobactum, 4.5 g IV twice daily for 7 days. Metronidazole 500 mg IV thrice daily was also started empirically to cover anerobic infections. She was also anticoagulated with Heparin 5,000 units IV four times a day. She was hemo-dialysed 4 times and her urine output improved to 1.5-2L/day. Her serum creatinine decreased to 2 mg/dl and blood urea of 62 mg/dl in a week’s time.

The patient improved symptomatically and repeat USG color Doppler showed complete recanalization of the IVC thrombus and partial recanalization of the right renal vein thrombus. As she was considered high risk for any other surgical procedure, cystoscopy and right sided double J stenting was performed under local anesthesia and her urine output improved to 3L/day. A DTPA scan showed right differential function of 33% and total glomerular filtration rate (GFR) was 59 ml/min [Figure 2a].

The patient became symptom free and was discharged. She is on regular follow up now and a repeat CECT and magnetic resonance imaging (MRI) showed the right kidney with improved function even after 3 months [Figure 2b and c].

Figure 2: (a) TC-99 DTPA diuretic renogram: Right kidney functioning 33%, (b) Repeat CECT KUB: Better functioning right kidney, (c) Magnetic resonance imaging: Right kidney in normal state.
a few days of therapy and if the affected kidney is nonfunctioning, because medical treatment alone may not suffice. At the time of initial presentation in our patient, we did not contemplate nephrectomy due to her poor general condition and the likelihood of dislodgement of the thrombus during surgery. As she showed marked improvement in general condition and renal function with conservative management, a DTPA study was obtained which showed 33% split function in the affected kidney. Subsequently, repeat CT showed marked improvement and resolution of the renal parenchymal infection. Our patient benefited from medical management without any major surgical intervention.

CONCLUSION

EPN complicated by thrombus in the renal vein and IVC is a rare presentation. In our patient, conservative management alone was sufficient to salvage the kidneys.

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