

## CASE REPORT

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# Emphysematous Pyelonephritis with Left Renal Vein Thrombosis-Case Report Successfully Treated by Conservative Methods

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**ABSTRACT** Presently emphysematous pyelonephritis is a rare but life-threatening disease, mostly seen in patients with urinary tract obstruction and diabetes mellitus. It is characterized by the production of gas and necrosis in the renal parenchyma, collecting systems, and perinephritic tissue. Radiologically, the Huang and Tseng classification is used to categorize the severity of the disease. Our case was 49 years old female presenting with unconsciousness, fever and bilateral Grade 3 lower extremity edema one week after left percutaneous nephrolithotomy procedure because of urinary tract stone. Abdominal computerized tomography scan showed renal parenchymal and perinephritic tissue necrosis with the production of gas and renal vein thrombosis which was in accordance with Huang and Tseng classification Grade 3A. We treated our patient with the appropriate antibiotic, enoxaparin sodium, strict glycemic control, and supportive treatment without any surgical intervention or nephrectomy.

**Keywords:** Emphysematous pyelonephritis; diabetes complications; conservative treatment

Emphysematous pyelonephritis (EP) is an acute and severe necrotizing urinary tract infection (UTI) mostly seen in poorly-controlled diabetic patients and urinary tract obstruction.<sup>1</sup> EP is a sudden onset infection that causes renal parenchymal necrosis, perinephric tissue damage, and gas production.<sup>2</sup> This uncommon and life-threatening condition was firstly described by Kelly and McCullum in 1898.<sup>3</sup> We hereby present a case of EP after manipulation of the urinary tract, currently a rare but one of the most serious complications of diabetes mellitus (DM).

## CASE REPORT

A forty-nine years old woman was admitted to the hospital with unconsciousness, fever, and left-sided flank pain. Regarding her medical history, she was diagnosed 18 years before with Type 2 DM. At in-

terrogatory, the family reported that patients did not use the advised medication and was not regularly controlled despite developing nonproliferative retinopathy over the years. One week before an uneventful left percutaneous nephrolithotomy (PCNL) was performed because of a urinary tract stone. Two days after the procedure she became febrile and unconscious and was diagnosed with a UTI. The patient was hospitalized and treated with Cefuroxime Axetil 250 mg (Bilim Pharmaceuticals Industry and Commerce Inc., Turkey) was administered “per os” twice a day for 5 days in another center. Because of the lack of improvement, the patient was referred to our center. At admission, her temperature was 38 °C, blood pressure 90/50 mmHg, pulse 110/bpm, body mass index (BMI)=25.3kg/m<sup>2</sup>. The patient was pale and confused. Lung examination revealed crepitation on both basilar and middle zones; the cardiovascular

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examination was normal, pretibial Grade 3 bilateral edema was present, and left costovertebral angle tenderness was positive. Signed informed consent has been taken from the patient.

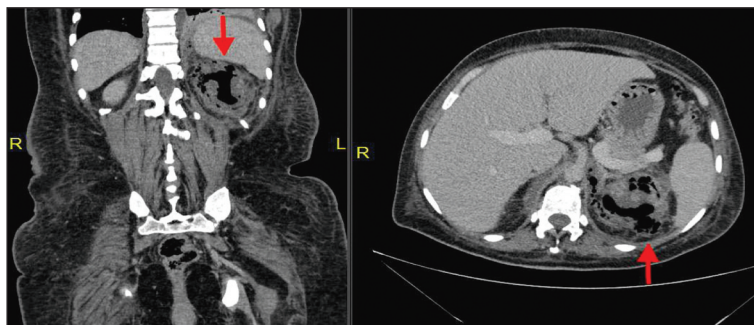
Laboratory results showed: Hemoglobin 10.5 (12-17) g/dL, mean corpuscular volume 84.4 (80-97) fl, platelet  $232 \times 10^3$  (130-400) u/L, white blood cell  $11 \times 10^3$  (4.5-11) u/L, glucose 214 (<100) mg/dL, urea 48 (14-23) mg/dL, creatinine 1.2 (0.7-1.3) mg/dL, sodium 119 (136-145) mmol/L, potassium 4.6 (3.5-5.2) mmol/L, C-reactive protein 232 (<5) mg/L, and albumin 1.7 (3.5-5.2) g/dL. In the urine analysis, 3+ glucose (negative), 15 erythrocytes (<4)/hpf, 158 leukocytes (5)/hpf. Urine culture showed with 105 cfu/mL of extended-spectrum beta-lactamases (ESBLs) producing *Escherichia coli* while blood cultures were negative.

Abdominal computerized tomography (CT) scan showed left renal vein thrombosis and an increase in the size of the left kidney. Cortex and medulla border could not be differentiated, the parenchyma presented a rupture at the upper pole cortex and next to it, in the perirenal and adrenal area, images of air were seen compatible with EP. There were also focal areas of necrosis in the left kidney and several collections of contrast lack urinomas and abscesses were seen be-

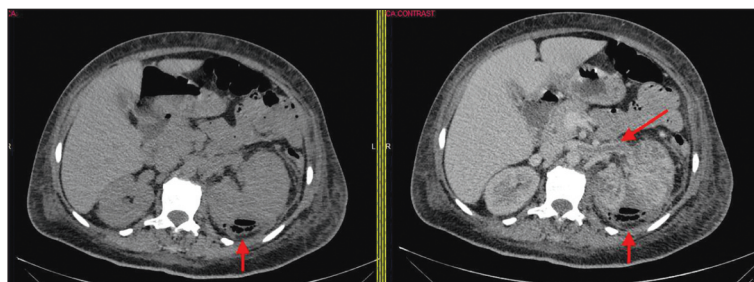
tween subcapsular and perirenal areas extending/infiltrating the left psoas muscle (Figure 1, Figure 2, Figure 3).

The patient was diagnosed with EP and intravenous (IV) treatment was started with 1 g/day of er-tapenem for 14 days. Enoxaparin sodium 4000 anti-Xa IU twice a day was also given for the treatment of renal vein thrombosis. In early consultation with the department of urology, percutaneous drainage was postponed at the initiation of the antibiotic treatment but close monitoring of infectious parameters and general status was advised to timely drainage of the collecting systems and the kidney or abscesses if necessary.

During the follow-up period; the patient responded well to the antibiotic treatment and no renal or collecting system drainage was necessary. After 14 days of treatment without any significant side effects, glycemic control was achieved and the antibiotic was switched to oral ciprofloxacin (500 mg PO q12h/day for 14 days). Because ciprofloxacin was sensitive as a result of urine culture antibiotic susceptibility test. Thereafter, the patient was discharged with recommendations and prescriptions.



**FIGURE 1:** Contrast abdominal computerized tomography-scan in axial and coronal plane. Red arrows demonstrating of necrotic, inflamed, gas-filled renal parenchyma.



**FIGURE 2:** Noncontrast/contrast abdominal computerized tomography-scan in transverse plane. Red arrows demonstrating renal vein thrombosis and necrotic, inflamed, gas-filled renal parenchyma.

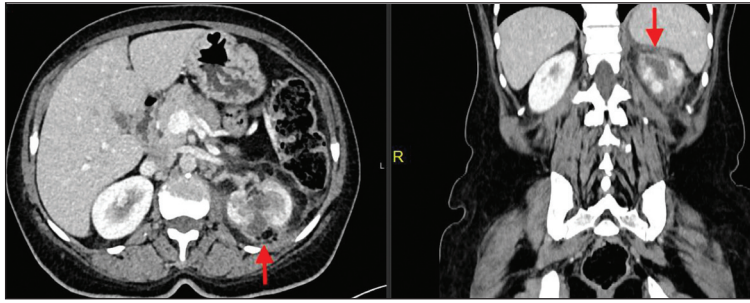


FIGURE 3: Noncontrast/contrast abdominal computerized tomography-scan in axial and coronal plane. Red arrows demonstrating upper pole ruptere of necrotic, inflamed, gas-filled renal parenchyma.

## DISCUSSION

PCNL is an effective and safe treatment option for complex or large volume nephrolithiasis.<sup>4,5</sup> However, PCNL carries some considerable risks, like UTI and post-PCNL sepsis.<sup>6,7</sup> Systemic inflammatory response syndrome can cause fever because of the released inflammatory mediators during surgical manipulation.<sup>8,9</sup> Several studies showed that post-PCNL urosepsis occurs in 0.3%-9.3% of patients, it is a potentially life-threatening and common cause of death.<sup>7,8</sup> Female sex, DM, BMI, and pelvicalyceal system dilatation have to increase the risk of urosepsis.<sup>9</sup> Pelvic urine culture is better than bladder urine culture for predicting the potential of post-PCNL sepsis. The most important is the management of complications of PCNL is the use of prophylactic antibiotics for the prevention of sepsis.

Currently, EP is one of the rare urological emergencies that even with high morbidity and mortality rates. The most frequently isolated agents are Enterobacteriaceae such as *E. coli* and *Klebsiella pneumoniae*.<sup>10</sup> If low prevalence region of ESBL producing gram-negative bacteria, ceftriaxone or ciprofloxacin or levofloxacin are preferred as empiric therapy, with the switch to the appropriate antibiotic according to culture and antibiogram results.<sup>10</sup> The condition is mainly driven by patient risk factors especially poor glycemic control in DM individuals.

On the other hand, IV ertapenem was started as empirical treatment in our patient. If carbapenem is to be preferred in sepsis patients, there are conflicting studies about the efficacy of ertapenem.<sup>11,12</sup> However, as in our case, some studies are showing the efficacy

of ertapenem.<sup>13,14</sup> In addition, in our case, oral ciprofloxacin was used for maintenance after ertapenem treatment was completed. Although there are publications reporting treatment failures in ESBL-positive *E. coli* infections despite in vitro susceptibility, our patient was also successful in ciprofloxacin oral treatment.<sup>15</sup>

In our case, we hereby presented a typical EP after the PCNL procedure in an uncontrolled diabetic patient. The patient was administered with unconsciousness, fever, left flank pain, generalized edema. The renal image showed that ipsilateral renal vein thrombosis was evaluated secondary to local renal inflammation. Anticoagulation is planned and the proper antibiotic is chosen for the patient. Before our hospital administration, the patient was given antibiotics that were not covered patient's urine culture antibiogram result. In our clinic, we modify antibiotic therapy based on the identification of the specific pathogen and follow up with the patient without any surgical interventions. After 1 week of the treatment clinical and laboratory, improvements were achieved without any percutaneous intervention or nephrectomy.

Three months of anticoagulation treatment were completed and a control abdominal CT scan with contrast showed a lack of thrombosis in the left renal vein and during follow up period patient's creatinine level was within the normal limit (creatinine: 0.8 mg/dL).

In conclusion, DM affects the host immune system and predisposition to infections. Especially in recent times, EP is a rare but one of the most serious complications of DM. It's a necrotizing, severe infection of the kidney, and mortality rates are very high. The infection is most commonly caused by *E. coli* and when diagnosed appropriate antibiotics

should immediately begin. EP can be diagnosed by abdominal CT-scan and radiologically Huang-Tseng CT-based classification is used to categorize the patients. Conservative management can be considered as the treatment of choice in possible cases and overall long-term outcome isn't worse than surgical interventions.

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### Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

### Authorship Contributions

**Idea/Concept:** Esra Demir; **Design:** Vedat Buğra Erol; **Control/Supervision:** Ali Mert; **Data Collection and/or Processing:** Cem İdrisoğlu; **Analysis and/or Interpretation:** Mustafa Yücel Boz; **Literature Review:** Zeliha Arslan Taşkın; **Writing the Article:** Esra Demir; **Critical Review:** Ali Mert; **References and Fundings:** Vedat Buğra Erol; **Materials:** Cem İdrisoğlu.

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