



Emphysematous pyelonephritis developing in the contralateral kidney following ureteroscopy: An unusual presentation

Nitin Sharma^{a,*}, Scott Quarrier^b

^a University of Rochester Medical Center, 158 Sawgrass Drive, Second Floor, Rochester, NY 14620, USA

^b University of Medical Center, 158, Sawgrass Drive, Second Floor, Rochester, NY 14620, USA

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ABSTRACT

Emphysematous pyelonephritis (EPN) developing in the contralateral kidney after ureteroscopic laser lithotripsy is an unusual clinical presentation and has never been reported in the literature. After ensuring sterile urine culture a 73-year-old female underwent left ureteroscopy, laser lithotripsy and stent placement for 15mm lower calyceal renal calculus. She was discharged same day and stent removed after 4 days. 1 week later she was admitted with sepsis and found to have EPN in the right kidney, with no evidence of stone or infection in the operated kidney. High index of clinical suspicion and prompt management resulted in successful outcome.

1. Introduction

Emphysematous pyelonephritis (EPN) is an acute, severe, necrotizing infection of the kidney resulting in gas accumulation within the renal parenchyma and/or in the perinephric tissues.¹ EPN can be severe, and life-threatening mandating prompt treatment. Diabetes mellitus (DM) is the most common predisposing factor along with poor tissue perfusion, presence of urinary tract infection, and decreased host immunity.² Severe renal infections and pyelonephritis has also been reported after endoscopic urologic surgeries like ureteroscopy and percutaneous nephrolithotomy.³ Infectious complication rate post ureteroscopic laser lithotripsy can vary from 4 to 10%, with risk of severe complications being 0.51%.³ Severe infections post ureteroscopy like emphysematous pyelonephritis are extremely rare but can still happen in the operated kidney. EPN developing in the contralateral kidney after ureteroscopic laser lithotripsy of renal stone is very unusual and has never been reported in the literature. We are presenting one such case of EPN developing in the contralateral kidney after ureteroscopic stone treatment.

2. Case presentation

Patient is a 73-year-old female with underlying heart failure, emphysema and active smoking, obesity, and long-standing Type-2 DM

with history of lung cancer. She underwent left ureteroscopy and holmium laser lithotripsy for 15mm lower pole renal stone. Her preoperative urine culture was sterile, and labs were within normal range (Cr 0.85, WBC 7400/ μ L, HbA1c 6.3%). We used 11/13Fr/33cm ureteral access sheath (Navigator™, Boston Scientific) and used disposable ureteroscope (LithoVue™, Boston Scientific) with 200 μ disposable laser fiber. Procedure was uneventful with adequate stone fragmentation and dusting achieved within 35 minutes. Patient remained stable in the post-operative period and was discharged home same day. A 6Fr/24cm stent with string was placed which was removed by the patient after 4 days. 1–2 days after stent removal, she noticed mild discomfort in the right lower quadrant which resolved with symptomatic treatment. One week later she noticed malaise, weakness, and nausea without any fever or chills. Her condition worsened at home when she developed dyspnea, chest pain and was brought to the emergency. On presentation in emergency, she was hypotensive (BP 92/62) and hypoxic (Oxygen saturation 87%). Immediate labs revealed elevated leukocytosis (WBC, 13700/ μ L), azotemia (Cr 1.53mg/dL), positive blood and urine culture (Both growing *Klebsiella Pneumoniae*). She was admitted for post ureteroscopy urosepsis and resuscitated with intravenous fluids and broad-spectrum antibiotics. Computed tomography (CT) abdomen done revealed collections of gas in the right renal parenchyma [Fig. 1], localized to the right mid pole and lower pole with right perinephric and periureteral fat stranding. Left kidney revealed clearance of the left

Abbreviations: EPN, Emphysematous pyelonephritis; DM, Diabetes mellitus; WBC, White blood cells; Cr, Creatinine; CT, Computed tomography; HbA1c, Glycosylated hemoglobin.

* Corresponding author.

E-mail addresses: Nitin_Sharma@URMC.Rochester.edu, drsharmanitin@gmail.com (N. Sharma), Scott_Quarrier@URMC.Rochester.edu (S. Quarrier).

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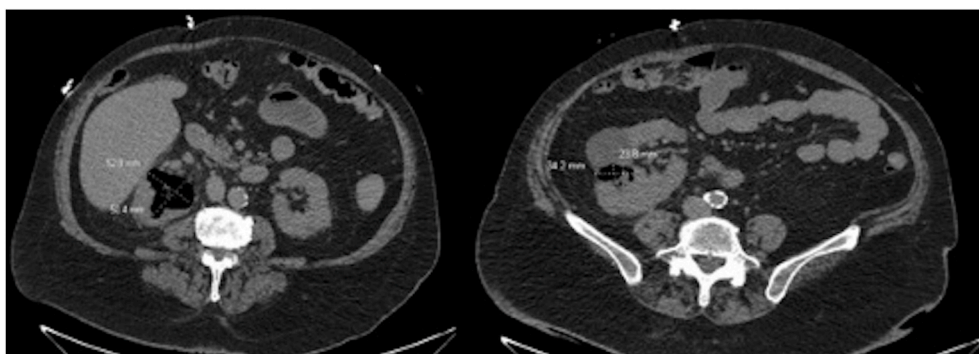


Fig. 1. CT scan showing 5cm right upper pole and 3cm right mid pole renal abscess with parenchymal air appearing as hypodense area.



Fig. 2. CT guided percutaneous drain placed in the right upper pole and mid pole renal abscess by interventional radiologist.

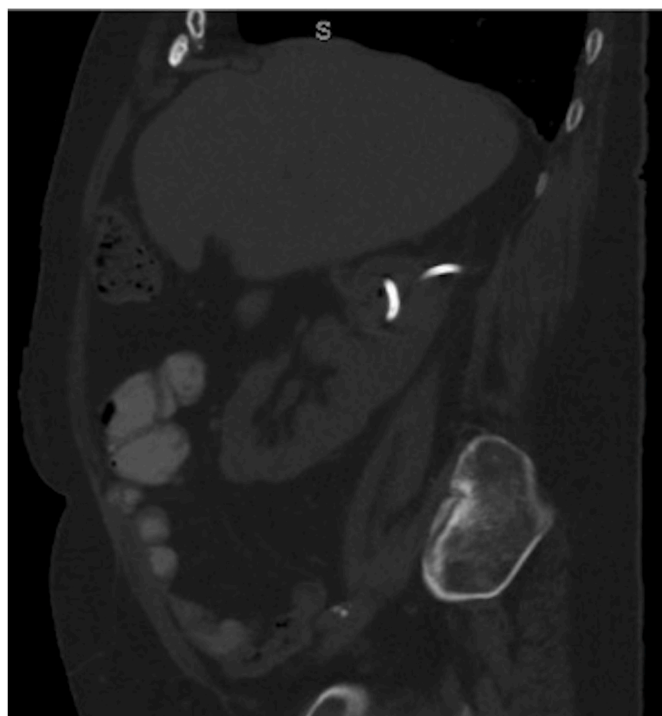


Fig. 3. CT showing complete resolution of the right mid pole abscess with drain still present in the upper pole with minimal residual abscess.

lower partial staghorn calculus. She was diagnosed with right emphysematous pyelonephritis with urosepsis. After stabilization, she underwent right percutaneous drain placement by interventional radiologists. Drains were placed in both the mid pole and lower pole collection [Fig. 2]. Patient's condition gradually improved with conservative treatment, and she was discharged after 3 days on oral antibiotics with percutaneous drains in place. Drains were draining 20–30 cc serosanguinous fluids and follow-up CT scan revealed interval decrease in the size of the upper pole renal parenchymal collection and near complete resolution of mid pole collection [Fig. 3]. Drains were sequentially withdrawn after confirming resolution of abscess and improvement in patient's condition.

3. Discussion

EPN is an uncommon severe kidney infection, with very few case series published in the literature. The most common causative organisms are *Escherichia coli*, followed by *Klebsiella pneumonia*, *proteus mirabilis* and group D streptococcus. Diabetic patients with high levels of tissue sugar levels along with impaired perfusion facilitates anaerobic metabolism by these organisms leading to gas formation. Most patients present with signs and symptoms of acute pyelonephritis with flank pain, fever, rigors. More than 50% of patients present with bacteremia and sepsis, acute renal dysfunction, acid-base and electrolyte disturbance, and impaired consciousness.² These patients can deteriorate very rapidly to septic shock with mortality as high as 60–65% in untreated cases.² Diagnosis typically requires very high suspicion with CT scan showing intraparenchymal gas. Based on CT scan EPN has been classified into type 1 EPN (renal necrosis with streaky or mottled gas pattern)

and type 2 EPN (Loculated gas pattern or gas in the collecting system).⁴ Type 1 EPN has fulminant clinical course and hence very poor prognosis. Type 2 EPN can be managed with CT guided drain placement as in our case and has a favorable prognosis.

Post ureteroscopy infectious complication can occur in 3.4–8.5% of cases.³ Most common predisposing factors are infected preop urinalysis, large, infected stone burden, prolonged procedure, and underlying diabetes. Of all infectious cases post ureteroscopy, risk of severe infections is around 4.41%.³ Most of these severe infections are sepsis happening within 24 hours after the procedure or pyelonephritis. The typical hypothesis behind this is release of trapped bacteria in the stone along with high intrarenal pressures, leading to transient bacteremia.⁵ This transient bacteremia in immunocompromised or diabetic patients can be fatal leading to sepsis and typical happens within 24 hours after the procedure. Post ureteroscopy EPN is a very rare infectious complication but has develop due to trapped bacteria released in the blood stream after lithotripsy. Post ureteroscopy EPN in the contralateral kidney as in our case is extremely rare and has never been reported in the literature. In our case, even though preop urine culture was sterile, most likely trapped bacteria in the stone were released which during pulse irrigation were released in the blood stream. Seeding of these bacteria in the contralateral kidney is likely underlying pathogenetic mechanism in our case. Along with underlying diabetes could have led to conditions favorable for facultative anaerobic mechanism in the opposite kidney leading to development of EPN. As this patient has type 2 EPN (Localized collection of infected material), it was well managed with fluid resuscitation, CT guided drain placement, and antibiotics.

4. Conclusion

EPN in the contralateral kidney post ureteroscopy has never been

reported in the literature but is possible. Patients with underlying diabetes and comorbidities should be closely watched post ureteroscopy. High index of suspicion and prompt drainage can be helpful in selected cases.

Consent

Written informed consent obtained from the patient regarding publication of case history and use of radiological images. All the patient identifiers were removed from the case report and images to maintain patient confidentiality.

Declaration of competing interest

No conflicts of interest or disclosures.

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