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Case Report

Retroperitoneal abscess caused by dropped renal stones [☆]

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ABSTRACT

Staghorn calculi account for about 4% of presenting renal stones in developed countries, are source of recurrent urinary tract infection, and may be eventually treated by surgical stone removal. A 55-year-old female with a history of staghorn renal calculi and recurrent urinary tract infections presented with a left flank and lower abdominal pain following recent left robotic partial nephrectomy and nephrolithotomy. Contrast-enhanced computed tomography (CT) of the abdomen demonstrated a large left-sided retroperitoneal fluid collection with a few dropped renal stones in the dependent portion of the collection. The patient treated with early percutaneous drainage of the collection and antibiotic treatment and responded well clinically. The clinical and imaging presentation of a rare case of retroperitoneal abscess formation caused by dropped renal stones is described in this study. Imaging, particularly ultrasound and CT, plays a key role in detecting the dropped renal stones and can help with differential diagnosis and treatment plans.

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Introduction

Staghorn calculi account for about 4% of presenting renal stones in developed countries [1], are a source of recurrent urinary tract infection (UTI) and may eventually be treated by surgical stone removal [2]. Intra-parenchymal, para-nephric and retroperitoneal abscesses can occur as a complication

of chronic pyelonephritis due to staghorn calculi [7,8]. Although, intra-abdominal abscess formation is a known complication of dropped gallstones after laparoscopic cholecystectomy [3,4], there is a paucity of data about retroperitoneal abscess caused by dropped renal stones following percutaneous nephrolithotomy (PCNL). In this study, we described the clinical and imaging presentation of a rare case of retroperitoneal abscess caused by dropped renal stones.

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Fig. 1 – Axial (A) and coronal (B) and sagittal (C) unenhanced CT of the abdomen demonstrate gas-producing large renal calculi within the left kidney (solid arrows). Air is visualized within the included proximal left ureter (dashed arrow, A).

Case Report

A 55-year-old female with a history of staghorn renal calculi and recurrent UTIs presented to the emergency department with a left flank and lower abdominal pain and fever after left robotic partial nephrectomy and nephrolithotomy 10 days prior. The unenhanced computed tomography (CT) scan of the abdomen 6 months prior showed a 2.4 cm stone in the left lower pole and a 1.3 cm stone in the left upper pole with dilated renal calyces and multiple foci of air in the left collecting system, likely secondary to gas-forming infection (Fig. 1). Urine culture at that time was positive for *Klebsiella Pneumoniae*. The patient was treated with antibiotics and follow up renal nuclear medicine scan revealed decreased radiotracer uptake and clearance of the left kidney, suggesting decreased left renal function without signs of complete obstruction. Then, the patient was scheduled for a robotic partial left nephrectomy and nephrolithotomy to remove the staghorn calculi. Patient was discharged one day after the procedure in a stable condition. Over the next 10 days, patient developed worsening left flank and lower abdominal pain, subjective fevers, constipation, nausea, and poor appetite. On the current ED admission, patient found to have leukocytosis and positive urine culture. Contrast enhanced CT of the abdomen and pelvis showed a large left-sided retroperitoneal fluid collection with calcific densities in the dependent portion of the collection, consistent with dropped renal stones (Fig. 2). Interventional radiology was consulted to drain the retroperitoneal fluid collection which demonstrated purulent fluid and the culture was positive for *Enterococcus Faecalis*. The fluid creatinine concentration of the drained specimen was not high, ruling out urine leak.

The patient was initially started on empiric antibiotic which was targeted later based on the culture result. Patient improved clinically with resolution of the left abdominal pain, constipation, nausea and improved appetite. The patient was discharged four days after drain placement in a stable condition. The follow up CT three weeks after drain placement showed interval reduction in the size of the retroperitoneal fluid collection (Fig. 2).

Discussion

Staghorn stones are predominantly seen in adult females and are composed of magnesium ammonium phosphate (also called Struvite) and/or calcium carbonate [1,5]. Struvite stones are notoriously associated with recurrent UTIs by urease-producing bacteria like *Proteus Mirabilis*, *Klebsiella Pneumoniae*, *Pseudomonas Aeruginosa* and *Escherichia Coli* [5]. These infectious stones can lead to sepsis, hydronephrosis, reduced kidney function, or pyelonephritis due to the collecting system being substantially obstructed [6]. Intra-parenchymal, para-nephric and retroperitoneal abscesses can occur as a complication of chronic pyelonephritis due to staghorn calculi [7,8]. Stone removal by percutaneous nephrolithotomy with antibiotics is the ideal treatment for patients with staghorn calculi alone [2,9]. In cases with prolonged inflammation associated with residual renal stone, open surgery may be required to remove the stones and prevent the abscess recurrence.

In this study we presented a case of retroperitoneal abscess likely caused by dropped renal stones after PCNL. There is a paucity of data on retroperitoneal abscess formation secondary to dropped renal stones. Several studies, however, have documented abscess formation from dropped gallstones including retroperitoneal abscesses [3,4]. Dropped renal stones in our patient may have caused retroperitoneal abscess similar to what has been reported in intra-abdominal abscess formation due to dropped gallstones. Potential causes for peritoneal abscesses due to dropped gallstones include reaction to foreign bodies, stimulation of bile, mechanical pressure by the stone, and infection of bacterial species present in the gallstone [3,4,10]. *Pseudomonas Aeruginosa* and *Escherichia Coli* have been reported as the cause of retroperitoneal abscess from dropped gallstone after cholecystectomy [11]. The culture of drainage specimen in our case was positive for *Enterococcus Faecalis*. Our patient responded clinically to antibiotic treatment and percutaneous drainage. In cases refractory to drainage and antibiotic, surgical removal of the stones may be considered, similar to reported patients with dropped gallstones [3].

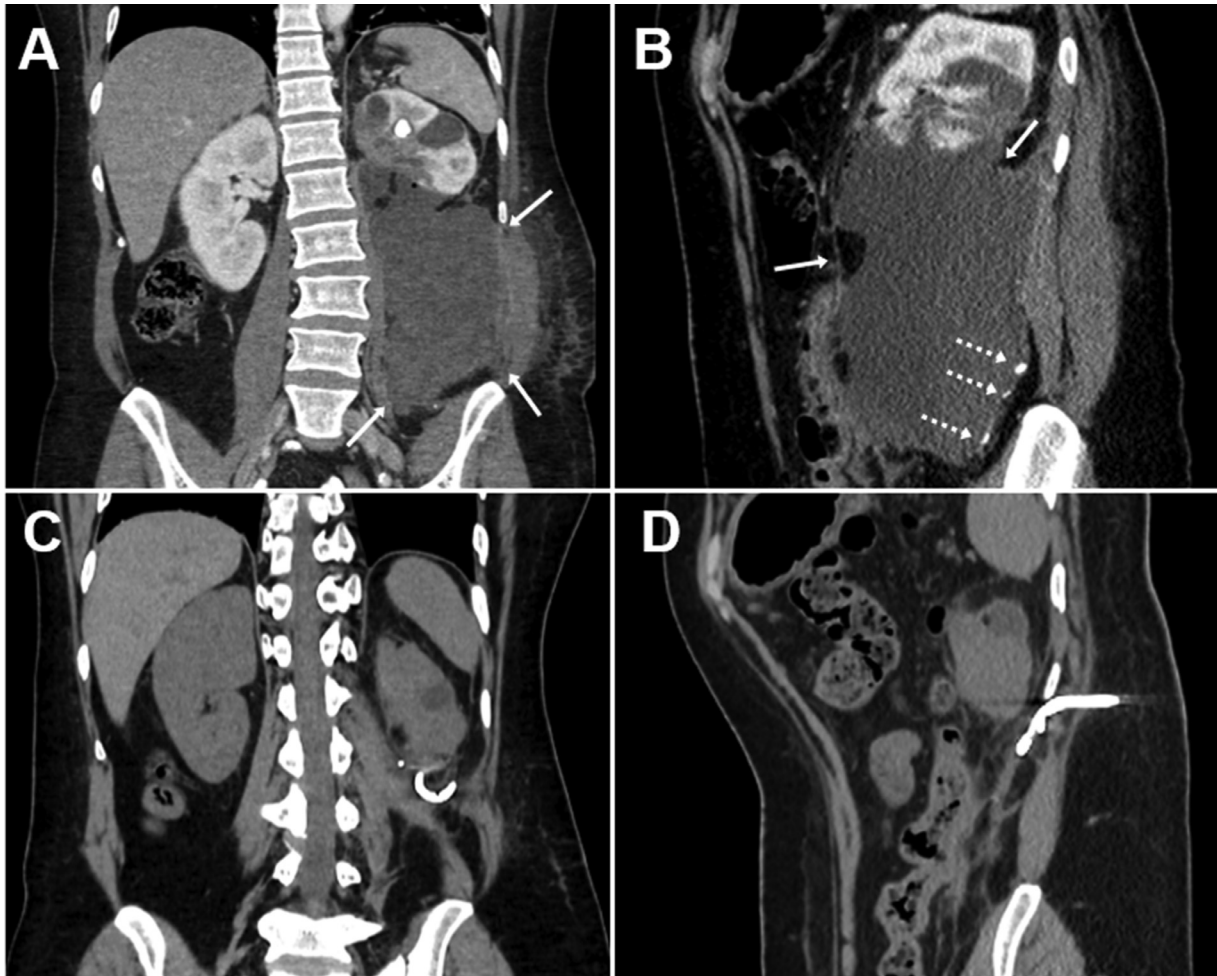


Fig. 2 – Coronal (A) and sagittal (B) contrast-enhanced CT of the abdomen demonstrate a large left retroperitoneal collection inferior to the left kidney (solid arrows, A and B) with a few dropped renal stones in the dependent portion of the collection (dotted arrows, B). The follow up coronal (C) and sagittal (D) unenhanced CT of the abdomen showed a pigtail drain in place with almost complete resolution of the fluid collection.

The visualization and retrieval of the dropped renal stone during PCNL may be difficult because of limited field view of the operator. The granulomas around the renal stones, like gallstones, may present as soft tissue masses, can obscure the visualization of stones and may mimic primary or secondary retroperitoneal malignancies, necrotizing tumors, and can be confused with simple abscesses, tuberculosis and actinomycosis [12]. A past medical history of nephrolithotomy and the identification of dropped renal stones with abscesses on imaging are crucial for the diagnosis. The patient in our study presented with a large retroperitoneal abscess on CT 10 days after PCNL, although there is no clear data on how soon after the PCNL the abscesses may develop. Imaging, particularly ultrasound (US) and CT, are useful to identify the abscess and the dropped stone in the fluid collection, similar to dropped gallstones [13]. US can identify dropped renal stone as dependent hyperechoic material with posterior shadowing within the anechoic fluid collection. As seen in our patient, dropped renal stones in CT can be seen as dependent hyperdensities in the low-density fluid collection. In patients with

dropped gallstones, older age, stone size > 1.5 cm and more than 15 dropped gallstones have been reported as risk factors for abscess formation [4,14], although no such information is available for abscesses caused by dropped renal stones. Future studies including case reports and case series are required to collect more information about the prevalence, clinical and imaging presentation, and pathogenesis of perinephric granulomas and/or abscesses due to dropped renal stones after nephrolithotomy.

Conclusion

In summary, the clinical and imaging presentation of a rare case of retroperitoneal abscess caused by dropped renal stones is described in this study. Imaging, particularly US and CT, plays a key role in detecting the dropped stones and can help with differential diagnosis and treatment plans.

Patient Consent

The authors confirm that written, informed consent for publication of the case was obtained from the patient.

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