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Perinephric Hematoma Associated with Pyelonephritis Following Ureteral Stent Placement for Ureteral Obstruction Causing Hydronephrosis

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Female, 43-year-old
Final Diagnosis: Perinephric hematoma
Symptoms: Chills • fever • flank pain
Medication: —
Clinical Procedure: —
Specialty: General and Internal Medicine

Objective: Rare co-existence of disease or pathology
Background: Perinephric hematomas are rare, especially following ureteral stent placement. Etiologies of perinephric hematomas include post-extracorporeal shockwave lithotripsy, Wunderlich syndrome, and renal cell carcinoma, none of which occurred in our patient, who underwent stent replacement. Subcapsular renal hematoma, rather than a perinephric hematoma, can occur following double-J ureteral stent placement. Also, renal parenchymal perforation leading to perinephric hematoma development are complications of double-J ureteral stent placement. Herein, we present a case of a perinephric hematoma following a double-J ureteral stent placement for a ureteral obstruction causing hydronephrosis.

Case Report: A 43-year-old woman with type 2 diabetes mellitus, hypertension, systemic lupus erythematosus, and recurrent nephrolithiasis presented to our hospital with left flank pain of a 1-day duration. The patient was found to have an obstructive kidney stone causing hydronephrosis. She underwent stent placement and then developed a perinephric hematoma days later. Typically, hematomas are treated conservatively and have spontaneous resolution. The patient received 2 weeks of intravenous antibiotics and 2 more weeks of oral antibiotics, and failed conservative treatment. She re-presented to our hospital 3 days after discharge. Upon the second admission, a perinephric drain was placed. The patient was given another course of antibiotics and was discharged 18 days later.

Conclusions: A perinephric hematoma is a rare complication after ureteral stent placement. Perinephric hematoma development can be decreased by controlling blood pressure, treating preoperative urinary tract infections, and shortening operating time during ureteroscopy. It is important to reevaluate potential causes of continued abdominal pain with laboratory testing and repeat imaging.

Keywords: Flank Pain • Hematoma • Stents • Ureteral Obstruction

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/931404>



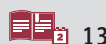
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Background

Perinephric hematomas are rare, with an incidence reported to be <1% [1]. There are currently no documented cases of an isolated perinephric hematoma after ureteral stent placement. There is 1 case of perinephric abscesses following a ureteral stent procedure [2]. Nontraumatic perinephric renal hematomas are rare, and patients usually have risk factors such as a renal cyst rupture, renal tumor invasion, and vascular abnormalities. They can also occur in patients who are on anticoagulation treatment. We present a case of a large perinephric hematoma associated with pyelonephritis, following ureteral stent placement for an obstructive stone and hydronephrosis.

Case Report

A 43-year-old woman presented to the emergency department with concerns of left back and flank pain worsening over 1 day. She was vacationing in town from out of state. The patient had associated chills, fatigue, nausea, vomiting, shortness of breath, and lightheadedness. There was no history of trauma. She had initially thought the pain was due to overactivity, but the pain did not subside with ibuprofen and started interfering with her daily activities. She denied having chest pain, fever, dysuria, and hematuria. The patient had a history of type 2 diabetes mellitus, hypertension, systemic lupus, with weekly methotrexate injections, lupus cerebritis, nephrolithiasis, and melanoma. She had a previous septic kidney stone about 10 years earlier that required an emergent ureteral stent placement, follow-up ureteroscopy, and laser lithotripsy out of town. She had not followed up with a urologist since then. Her last kidney stone was 5 years prior, which passed spontaneously. On physical examination, the patient appeared uncomfortable. Initial vital signs revealed a temperature of 36.6°C, heart rate of 106 beats per min, blood pressure of 77/54 mmHg, and oxygen saturation at 94% on room air. An abdominal examination revealed an obese, soft abdomen with moderate tenderness over the left abdomen and left flank. Laboratory examination results showed she had lymphocytosis with 16 400 cells/L and an absolute neutrophil count of 15.5 cells/L, hemoglobin of 16.7 g/dL, and hematocrit level of 49.4%. The venous blood gas had a pH of 7.33, pCO₂ of 40.2, and pO₂ of 34.2. The lactic acid level was 5.4 mg/dL, glucose was 401 mg/dL, and procalcitonin was 57 µg/L. Blood urea nitrogen (BUN) was 29 mg/dL and creatinine was 2.0 mg/dL. A computed tomography (CT) scan of the abdomen and pelvis with intravenous (i.v.) contrast showed a 6×8×5 mm stone in the proximal left ureter at the ureteropelvic junction, with mild left pelvocaliectasis and perinephric stranding (Figures 1, 2). There were 2 additional intrarenal stones measuring 4 mm and 2 mm.

After initial volume resuscitation and hemodynamic stabilization, i.v. antibiotics were administered, and the patient was

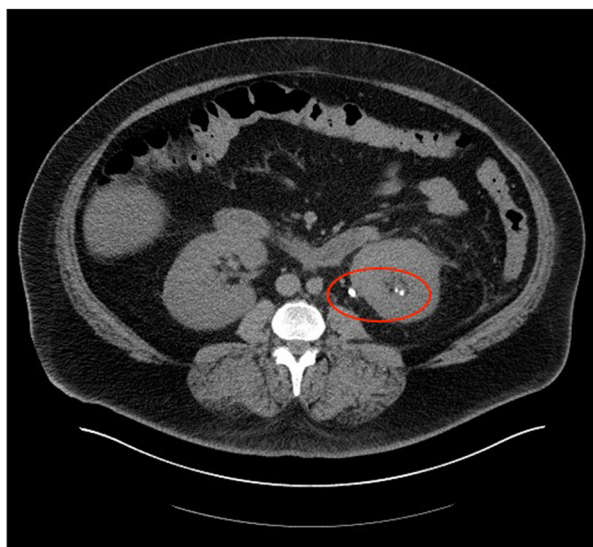


Figure 1. Computed tomography scan of abdomen and pelvis with intravenous contrast axial. Three calcifications (red circle) in the left ureteropelvic junction, with mild left hydronephrosis.

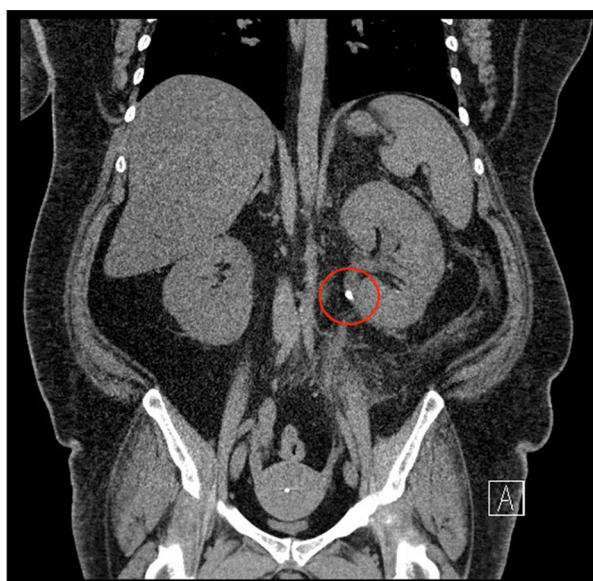


Figure 2. Computed tomography scan of the abdomen and pelvis with intravenous contrast coronal. An obstructing stone (red circle) at the left ureteropelvic junction.

taken for cystoscopy by the urologist. The urologist conducted a left retrograde pyelogram with a double-J ureteral stent placement. Upon entering the bladder, there was evidence of cystitis throughout, with no obvious bladder tumors or calculi. The urine was cloudy, and it was difficult to visualize the entire bladder because of the patient's obese body habitus. The 5-French open-ended catheter was maneuvered over the sensor wire in the left ureter, and the patient did not experience

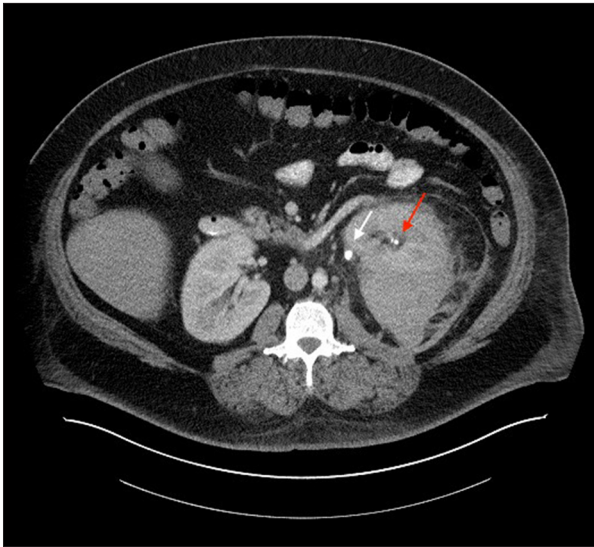


Figure 3. Computed tomography scan of the abdomen and pelvis with intravenous contrast axial. An unchanged perinephric hematoma with consistent pyelonephritis and a left-sided ureteral stent (red arrow), with ureteropelvic junction calculus (white arrow) without change.

hydronephrotic drip. A retrograde pyelogram demonstrated a filling defect, consistent with a stone, and was placed into the renal pelvis. A 6×26 cm double-J left ureteral stent was placed over the right, with good curl noted proximally on fluoroscopy and good curl noted visually distally. A marked amount of purulence draining through and around the stent was noticed and sent for culture. A 16-French Foley catheter was placed in the bladder with 10 cc in the balloon. The patient was administered cefoxitin and gentamicin for this procedure. Altogether, the duration of the procedure was about 6 min and the patient was in and out of the operating room in 20 min.

The patient was admitted to the hospitalist service for medical management and monitoring. She was switched to i.v. ceftriaxone for 2 weeks. Blood and urine cultures grew *Escherichia coli*, which were susceptible to ceftriaxone. Methicillin-resistant *Staphylococcus aureus* (MRSA) DNA was also detected on nasal screening, and 10 doses of mupirocin ointment were administered. The patient's BUN and creatinine returned to normal after stent placement.

On day 9 of hospitalization, the patient continued to have persistent leukocytosis but remained febrile. The patient complained of bilateral lower abdominal pain, which had worsened over a couple of days. She had 2 bowel movements, which did not relieve the pain. A chest X-ray showed a small area of atelectasis and/or pneumonia in the left lower lobe. Vancomycin was administered owing to the chest X-ray findings and the positive MRSA screen. A repeat CT scan of the abdomen and

pelvis revealed left pyelonephritis and left subcapsular hematoma, inferior and posterior to the left kidney measuring approximately 6×8.5×8.3 cm in anteroposterior, transverse, and craniocaudal dimensions, respectively, with surrounding fat stranding (Figure 3). Small inferior pole, left renal stones, with the largest measuring 3 mm, were seen. The left internal ureteral stent, extending from the pelvis to the bladder, was in the appropriate position. The abdomen showed subcutaneous edema and injection sites at the lower subcutaneous anterior abdominal wall. Mild facet arthropathy at the lower lumbar spine was noted. Because the CT scan of the abdomen provided a better view of the lower lung segments, with no infectious processes seen, the vancomycin was stopped. The urology department was consulted and recommended conservative management of the hematoma with continued antibiotic therapy. Repeat urine cultures grew *Candida glabrata* at 2.0 CFU/mL, for which she was not started on any antifungal therapy.

On day 12 of hospitalization, the patient developed anemia, with a hemoglobin value of 8.6 g/dL. A CT scan of the abdomen and pelvis with i.v. contrast was obtained once more, showing a hematoma measuring 8.7×6.0×7.4 cm, compared with the 8.8×5.6×7.4 cm on prior examination; the size was relatively unchanged. By this time, the patient had a total of 3 abdominal scans. The leukocytosis was slowly resolving, decreasing to a white blood cell count of 14.6 k/uL. The infectious disease department was consulted and advised another 2 weeks of oral antibiotics, owing to the unchanged size of the hematoma.

On day 14 of hospitalization, the patient had finished her course of i.v. ceftriaxone and was discharged with twice daily oral trimethoprim-sulfamethoxazole 800/160 mg. At discharge, her white blood cell count was 11.9 k/uL and hemoglobin was 9.1 g/dL.

Three days later, the patient presented again to the emergency department with a gradual onset of nausea, vomiting, diarrhea, fever up to 38.0°C, and severe generalized abdominal pain and left flank pain over the course of 24 h. There was no history of trauma between discharge from the previous hospitalization and second presentation. At this time, the flank pain radiated to the left groin. The patient had denied cough, shortness of breath, hematuria, hematemesis, or bloody stools during this time. Another CT scan of the abdomen and pelvis revealed stable pyelonephritis with a perinephric hematoma appearing similar to prior imaging, but was unmeasured on this scan, and the left ureteral stent was in the appropriate position, with an unknown duration of inflammation around the Gerota's fascia. Laboratory examination results on admission showed worsening leukocytosis at 14 100 cells/L, lactic acid level of 3.4, and hemoglobin level of 11.5 g/dL. The urinalysis revealed the presence of 138 red blood cells and 27 white blood cells. Because of continued symptoms of pyelonephritis

and failure on outpatient treatment, the patient was admitted again. The urology department was consulted and recommended conservative treatment. Given the patient's history of MRSA and previous urine cultures, she was administered i.v. ceftriaxone and vancomycin.

After 3 days of conservative treatment, the patient was still having left flank pain with moderate tenderness over the left abdomen and groin. Blood cultures were negative at this point. Because the patient was not improving, the interventional radiology department placed a perinephric drain and aspirated fluid from the hematoma, which was sent for cultures. The infectious disease department was consulted again, and micafungin 100 mg i.v. daily was administered, on the chance the infection was due to the *Candida glabrata*, as well as cefepime 2 mg i.v. twice per day. A repeat CT scan of the abdomen and pelvis without contrast was done, owing to some leukocytosis on daily laboratory results of 14 900 cells/L, and showed no change in size of the hematoma. At this time, the hematoma was draining about 25 mL of dark red blood daily.

On day 17 of this hospitalization, the patient had the drain removed because less than 10 mL were draining. The patient was discharged the next day, as she was having minimal pain, and she was advised to follow up with the urology department.

Discussion

Perinephric hematomas are relatively uncommon and are usually seen as a rare complication after an extracorporeal shock wave lithotripsy, with a higher incidence rate than after a ureteral stent placement [3,4]. In a study of a hospital's clinical experience with percutaneous antegrade ureteral stent placements, 5 of the 727 patients who underwent the procedure developed a perinephric hematoma, and none required hospitalization, as most hematomas resorb spontaneously [5]. Guidelines from the World Society of Emergency Surgery state that nonoperative management is an appropriate first-line management option in hemodynamically stable patients without indications for open surgical exploration following penetrating trauma. Perirenal hematoma is not an absolute indication for acute operative management [6]. Complications of ureteral stents include stone formation or fragmentation, hematuria, and perirenal abscesses. Mechanical complications include stent occlusion, stent migration, or encrustation. Some reports note the development of a subcapsular hematoma developing after a double-J stent placement [7,8]. Other reports noted the development of a perinephric hematoma following renal parenchyma perforation or forniceal rupture from an obstructive ureteral calculus [9,10]. To our knowledge, there are no cases of isolated perinephric hematomas developing after double-J ureteral stent placements.

Isolated or spontaneous causes of perinephric hematomas include renal tumors such as renal cell carcinoma, infectious processes such as human immunodeficiency virus, and vascular and inflammatory diseases such as polyarteritis nodosa; these are rare. Many perinephric hematomas occur secondary to obstructive stones or after ureteroscopy procedures. A systematic review on the incidence of perirenal hematomas after ureteroscopy showed that these hematomas can be curtailed by blood pressure control, preoperative urinary tract infections treatment, and decreasing intrarenal pressures and operative time to limit the chance of injury to the kidney [11]. Our patient presented with sepsis from an obstructive stone that needed emergent double-J stent placement. She underwent a ureteroscopy with double-J stent placement in 6 min and was in the operating room for a total of 20 min. The patient was also taking her medications as prescribed. Despite these efforts, the patient still developed a hematoma that was not present on initial presentation.

In this study, the clinical presentation and treatment of the perinephric hematoma following a ureteral stent placement were discussed. The constant pain the patient continued to have after the stent placement and resolution of hydronephrosis appeared to be associated with the development of the perinephric hematoma. On the initial CT scan of the abdomen, there was no sign of the hematoma. Treatment of perinephric hematomas is usually managed conservatively, as most of these hematomas resolve spontaneously. However, our patient was in considerable pain despite conservative treatment.

Indications for placing an acute percutaneous include patients with unbearable pain, an infective hematoma, renal ischemia, or renal compression [12]. Percutaneous drainage was considered on the first hospitalization because of our patient's constant pain; however, with the knowledge that hematomas typically resolve on their own, we decided to not place a drain because of the risk of introducing infection. When the patient was re-hospitalized with continuous pain over the left flank radiating to the left groin, and conservative treatment failed once more, the interventional radiology department placed a percutaneous drain. The patient had a significant decrease in pain after drain placement. The somatic pain that developed from the large hematoma will most likely take time to resolve. We advise that patient blood typing and crossmatching should be done ahead of time if signs of hypovolemic shock or acute hemoglobin loss are observed after drainage placement and transfusions are needed.

Micafungin was prescribed on the patient's second hospital admission due to previous urine cultures growing *Candida glabrata*, an organism that is resistant to fluconazole and a normal part of respiratory flora. Due to the patient's history of diabetes mellitus and recurrent nephrolithiasis, this agent could have been administered on the first hospital admission.

Conclusions

Patients with continued flank and abdominal pain following a ureteral stent placement should be re-evaluated with repeat imaging and laboratory examination. While most hematomas resolve within 1 to 2 years, without adverse effects on blood pressure and renal function, patients should still be observed for complications despite the commonality of ureteral stent

placements [13]. One complication that was elucidated in this report was the development of a perinephric hematoma. The chance of developing these perinephric hematomas can be curtailed by controlling blood pressure, treating urinary tract infections preoperatively, and reducing operating time. It is also reasonable to consider administering an antifungal earlier in the treatment course when there is a patient history of diabetes mellitus and recurrent nephrolithiasis.

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