Subcapsular hematoma after ureteroscopy and laser lithotripsy

Matheus Miranda Paiva, MD, Rodrigo Donalisio da Silva, MD, Paulo Jaworski, MD, Fernando J. Kim, MD, Wilson R. Molina, MD
Division of Urology, Department of Surgery, Denver Health Medical Center, University of Colorado School of Medicine, Denver, Colorado, USA

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Subcapsular hematoma is an uncommon complication after ureteroscopy and laser lithotripsy. We report on a 38-year-old male with an 8 mm lower pole stone who underwent a left ureteroscopy and laser lithotripsy. The stone was successfully fragmented. Several hours after being discharged home, the patient returned complaining of back pain and hematuria. He was hemodynamically stable. Laboratory exams were normal. A CT study showed a crescent renal subcapsular hematoma surrounding the left kidney. The patient was admitted to the ward for conservative treatment. No additional intervention was necessary. Most subcapsular hematomas tend to resolve spontaneously.

Key Words: endourology, ureteroscopy, lithotripsy, subcapsular, hematoma

Introduction

Lately, endoscopic management of ureteral stones has improved dramatically. In recent years, with the development of small caliber flexible ureteroscopes, ureteroscopy using holmium:yttrium-aluminum-garnet (Ho:YAG) laser lithotripsy has become the choice of care in most cases of ureteral stones due to its well-reported safety and efficacy.[1,2] Complication rates for this procedure are low and include infection, pain, ureteral trauma, and urinary retention.[3,4]

Subcapsular hematoma is a known complication in shock wave lithotripsy (SWL), trauma, renal angiographic procedures,[5] renal masses, and in patients receiving anticoagulation therapy.[6] Subcapsular renal hematoma (SRH) is a rather uncommon complication after ureteroscopy.

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Address correspondence to Dr. Wilson Molina, Division of Urology, Denver Health Hospital Authority, 777 Bannock Street, Denver, CO 80204 USA

Major complications occur in less than 0.1 % of cases. Tao et al[7] had three cases of subcapsular hematoma of the 2059 patients treated with the same technology; the median age was 60 years old. All cases received the JJ ureteral stents, had thin renal cortices, and had loin pain on the surgical site and fever. In the same way, Nuttall et al[3] had only one case of perinephric hematoma occur out of 4454 patients. On the other hand, the incidence of SRHs after ureteroscopic lithotripsy (URSL) in the Bai et al[8] paper was 0.4%, significantly higher than in those reported in the review by Nuttall et al.[3] Bai et al[8] associates the increased incidence to more rigorous technical investigations when the patient feels pain, usually related to the JJ stent.

According Ninomiya et al, the probable etiology of subcapsular renal hematoma is the hydronephrosis associated with intrarenal pressure. The theory justifies that in a hydronephrotic kidney, increased intrarenal pressure causes kinking, stretching and/or obstruction of the major vessels.[9] After ureteroscopic lithotripsy (URSL), ureteric recanalization induces the sudden expansion and rupture of the attenuated compressed parenchyma and/or capsular vessels.

Blood and fluid accumulates in the subcapsular area of the kidney. Some studies claim that the renal capsule then gradually separates from the parenchyma and the hematoma is formed.[10-11]

A univariate analysis showed that stone laterality ($p = 0.037$) and degree of hydronephrosis ($p < 0.001$) were significantly different. On the other hand: age, sex, body mass index, history of urolithiasis, diabetes mellitus, multiple stones, stone location and flow rate of hydraulic irrigation were not statistically associated with an increased risk of developing a subcapsular hematoma.[8]

We present a case report on a patient who developed a subcapsular hematoma after ureteroscopy and laser lithotripsy in our facility.

Case report

A 38-year-old Caucasian male patient was admitted in our hospital with acute onset left flank pain due to a stone at the left ureteropelvic junction. He had a ureteral stent placed at that time which pushed the stone up to the lower pole of the kidney. It was noted in his preoperative image studies that he had a right pelvic contracted kidney.

Surgery was carried out with no apparent complications. First, cystoscopy and stent removal was performed. A safety guide wire was placed. As part of our routine, a semi-rigid ureteroscope was advanced to the UPJ in order to inspect the ureter and promote dilation. At this time, a second super-stiff guide wire was passed and a 12/14 access sheath was advanced through this guide wire without difficulty. Flexible ureteroscopy was performed and all calyces were inspected after a retrograde pyelogram was acquired. An 8 mm stone in the lower left pole was found and laser lithotripsy was performed using a 270 micron laser fiber with high energy. The stone was fragmented into two pieces that were removed using a tip-less nitinol basket. The kidney was systematically surveyed for other stones and only dust from stone fragmentation was found. The removal of the access sheath was conducted under direct vision with no lesions to the ureter. A ureteral stent was placed and the bladder was emptied. The patient woke up from anesthesia and was sent to the Post Anesthetic Care Unit. After careful and uneventful postoperative observation, he received instructions and was discharged home.

Four hours after he was discharged, the patient checked in at the emergency department complaining of terrible left flank pain associated with chills and nausea. He also reported having had hematuria at home. During the initial evaluation they found that blood pressure was 138/86 mmHg, pulse was 100 beats per minute, respiratory rate was 26 respiratory incursions per minute, oral temperature was 36° C, and oxygen saturation in the room air was 98%. Laboratory exams showed hematocrit at 49.7%, hemoglobin of 16.6g/dL, and a blood leukocyte count of 11,000/L. Creatinine was 1.05 and electrolytes were normal. Urinary analysis showed abundant red blood cells in urine. CT images revealed no residual stones in the kidney, and a crescentic left renal subcapsular hematoma extending from the upper to the lower pole with a little compression to the kidney, Figure 1.

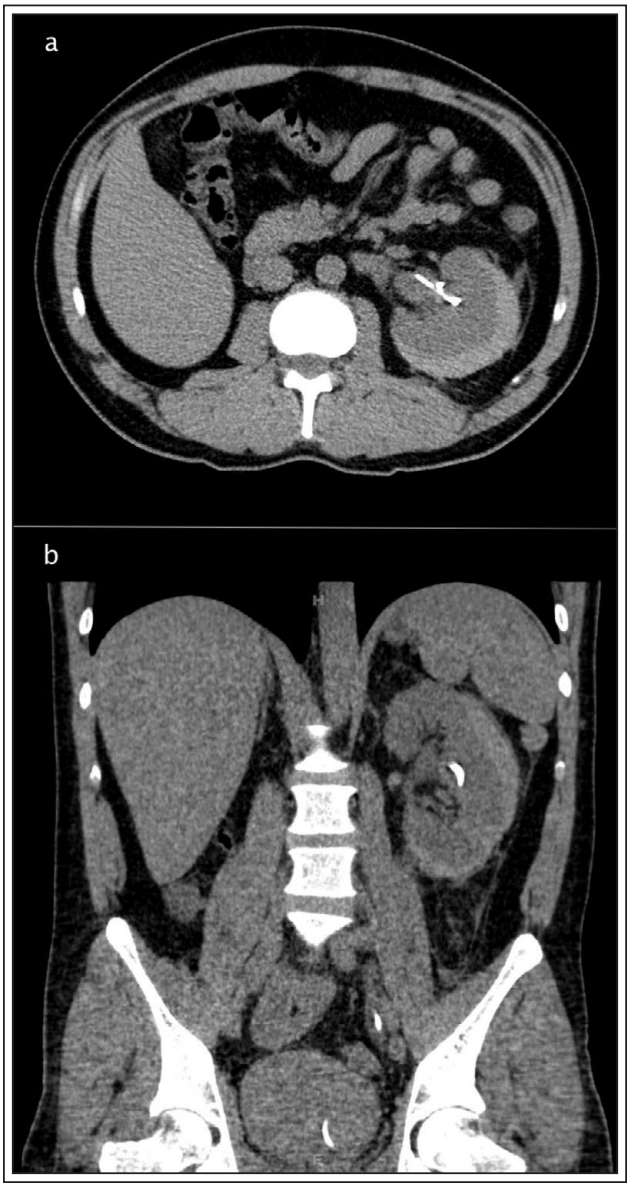

Figure 1. **(a)** Left subcapsular hematoma found in CT images. Pelvic right kidney lower pole can be visualized in **(b)** right above the bladder.

The patient's pain was well controlled with opioids. During observation, he remained stable for 10 hours and was discharged home. Instruction of bed rest for the first 24 hours and relative rest for 5 days was given. The patient was prescribed oral narcotics for pain control at home. During routine follow up, the patient showed up on the 7th postoperative day without any complaints and had his stent pulled. On the 30th postoperative day, the patient was asymptomatic. No further image studies were acquired.

Discussion

A subcapsular hematoma is a complication that is more likely to occur as a result of direct or indirect renal trauma. It has been well-reported in the literature to occur after extracorporeal shock wave lithotripsy.[12] Although it is treated conservatively in most of these cases, this complication can sometimes require more invasive management. In previously healthy patients, subcapsular hematoma after ureteroscopy and laser lithotripsy is an unusual condition with only a few reports in the literature.[10-13]

Clinical presentation doesn't reveal any remarkable symptoms since they can vary depending on duration of bleeding, size of the hematoma, and other associated morbidities such as infection. Subcapsular hematoma symptoms tend to present as acute flank or abdominal pain that persist despite the use of regular analgesics and/or persistent hematuria. Hemodynamic instability, a palpable flank mass, and a substantial decrease in hematocrit are found in more severe cases and require immediate investigation and intervention.

Most cases of small subcapsular hematomas can be treated conservatively, considering it resolves quickly and spontaneously. Treatment follows the standards of care for renal trauma which includes broad-spectrum antibiotics, monitoring of vital signs, creatinine and hematocrit testing, and bed rest.[8] When conservative management during hospital stay is successful (clinical improvement of symptoms, stable laboratory parameters, and no growth in size or volume of the hematoma), the patient can be discharged home and return later for a follow up. Approximately 4 weeks after the procedure, cases where the hematoma is stable but didn't reabsorb and the patient has persistent flank pain, a percutaneous drain can be placed in order to decompress the perirenal space.[13]

When conservative treatment fails in cases with large hematoma and hemodynamically unstable patients, more invasive treatments should be considered to control bleeding. Minimally invasive superselective renal arterial embolization has been described as a treatment option for extensive and life-threatening hematomas[14] and is a considerable approach when a patient's condition allows for it.

In summary, subcapsular hematoma is a rare complication of ureteroscopy and laser lithotripsy. During the postoperative period, an acute onset of flank pain that may be associated with persistent hematuria should consider this diagnosis, although most hematomas tend to be small and they usually resolve spontaneously. □

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