Iatrogenic Rupture of the Ureter During Kidney Biopsy

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Perirenal hematoma, hematuria, and abdominal pain are common complications of kidney biopsy, but ureter rupture is relatively less frequent. Here we report a patient who experienced severe abdominal pain and gross hematuria following a non-smooth procedure of ultrasound-guided kidney biopsy. Computed tomography showed rupture of the left upper third of the ureter. We implanted a curled double-J catheter between the renal pelvis and urinary bladder. Abdominal pain and gross hematuria improved. After 2 months, the double-J catheter was removed and the patient had no further clinical symptoms. The possibility of ureter rupture, although rare, should be considered in the presence of abdominal pain and gross hematuria in patients after receiving a kidney biopsy.

Key Words: ureter rupture, kidney biopsy
(*Kaohsiung J Med Sci* 2010;26:502–5)

A percutaneous kidney biopsy is the most accepted method of diagnosing and evaluating the degree of acute and chronic changes in kidney disease [1]. However, this invasive procedure can result in complications such as pain, hematuria, arteriovenous fistula formation, obstruction by clots, and perirenal or subcapsular hematoma [1]. Complication rates have been reported to be as high as 30% [2]. As far as we know, ureter rupture has never been reported as a complication of kidney biopsy. Here, we report the case of a patient whose ureter was ruptured during kidney biopsy. One hour post-procedure, she suffered from severe abdominal pain and gross hematuria. Successful treatment of her symptoms, which involved implanting a temporary double-J catheter between the renal pelvis and urinary bladder resolved her other symptoms.

Received: Nov 30, 2009 Accepted: Feb 2, 2010
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Case Presentation

A 31-year-old woman visited our hospital and reported progressive generalized edema that had persisted for 1 month. The patient was suspected of having nephrotic syndrome and was admitted to our hospital to receive a kidney biopsy to confirm the diagnosis. Laboratory results showed a serum albumin level of 2.3 g/dL, triglyceride of 201 mg/dL, and a raised total cholesterol level of 392 mg/dL. Blood urea nitrogen and serum creatinine were normal. The daily protein loss was calculated at 4.2 g. Ultrasonography showed normal-sized kidneys, with increased two-sided cortical echogenicity.

The patient's coagulation tests, including platelet count, prothrombin time, partial thromboplastin time, and bleeding time, showed normal results. Immediately before the biopsy, her blood pressure was

Figure. *Coronal computed tomography image shows rupture of the left upper third of the ureter (arrow), with contrast extravasation.*

100/70 mmHg. The kidney biopsy was performed using a 16-gauge biopsy gun under the guidance of direct visualization by sonography. The first two attempted biopsies failed. By the end of the procedure, we had collected four core biopsies from the lower pole of the left kidney. However, 1 hour after the procedure, the patient had severe left abdominal pain and gross hematuria.

Sonography found no distended bladder or hydronephrotic kidney. Only a 1-cm perirenal hematoma was noted. Ultrasonography did not provide any further insight into the cause of the patient's acute abdominal symptoms. Later, abdominal computed tomography (CT) with extravasated contrast agent revealed the presence of rupture of the left upper third of the ureter (Figure), left retroperitoneal urinoma, and perirenal hematoma over the left lower pole of the kidney. Ureteroscopic survey revealed laceration over the left upper third of the ureter. A double-J catheter was implanted between the renal pelvis and urinary bladder. After the ureter was stented, the patient experienced rapid improvement of abdominal pain and gross hematuria.

Histological analysis of the kidney tissue showed a grossly normal glomerulus. There was no electron-dense deposition, and electron microscopy showed effaced foot processes. The above findings were compatible with the diagnosis of minimal change disease. After 2 months, follow-up ultrasonography did not show perirenal urinoma or hydronephrosis. The double-J catheter was then removed and no further clinical signs or symptoms were observed.

Discussion

A percutaneous kidney biopsy is needed to diagnose accurately, evaluate activity, follow up changes, and make appropriate decisions regarding the treatment of kidney diseases, such as adult nephrotic syndrome, acute nephritic syndrome, and unexplained acute renal failure [1]. However, there are several complications associated with the performance of kidney biopsies, including bleeding, pain, renal arteriovenous fistula, and puncture of the liver, pancreas, or spleen [1]. As far as we know, this is the first case report of procedure-related ureter rupture, abdominal pain and hematuria in a patient receiving a kidney biopsy.

The abdominal pain associated with kidney biopsies is usually attributed to stretching of the renal capsule by a subcapsular hematoma or obstruction of the ureter by a blood clot [1,3]. Our patient presented with persistent severe abdominal pain and gross hematuria 1 hour after ultrasound-guided kidney biopsies were collected. The procedure was not carried out smoothly, and the first two biopsy attempts failed. One hour after the procedure, the first signs of complications were noted. We immediately suspected blood clot obstruction of the ureter or by retroperitoneal hematoma irritation. However, using echo examination, we found no obvious large hematoma, hydronephrosis, or clear decrease in hemoglobin level. Abdominal CT revealed rupture of the left upper third of the ureter and extravasation of contrast agent. The leakage of urine into the abdominal cavity, which can occur unnoticed and can cause acute abdominal symptoms, is a rare complication of kidney biopsy [4]. Percutaneous kidney biopsies are usually performed using local anesthesia and ultrasonic guidance [1,5]. Ultrasonography is used to locate the desired lower pole site and guide the biopsy needle to that location for collection [5]. Attention must be paid to how much force and which direction should be adopted to advance the needle to that site, to prevent damage to the surrounding tissues. In the present case, two of six biopsies failed, and the patient also had acute abdominal pain and gross hematuria 1 hour after the procedure. The ureter was ruptured during the procedure.

Rupture of the ureter is a rare, but serious event. The most frequent causes of ureter rupture are surgical iatrogenic ureter disease, urological procedures, and urographic studies [6]. To avoid complications

and improve prognosis for ruptured ureter, immediate diagnosis by imaging, particularly pyelography and CT, as soon as there is suspicion of such a complication should be made, followed by emergency treatment [7]. The treatment depends on the severity and location of the rupture in the ureter. For small lesions of the ureter, stenting is preferred, and open reconstructive techniques are reserved for large injuries [8]. In our case, rupture of the left upper third of the ureter was diagnosed by abdominal CT and treated successfully by temporary insertion of a double-J catheter between the renal pelvis and urinary bladder. It was removed 2 months later.

In conclusion, there is a risk of ureter rupture when performing kidney biopsies. To optimize safety and adequacy, the strength and direction of the biopsy needle are important. Our patient presented with acute abdominal pain and gross hematuria. Awareness of the possible complication of ureter rupture is important. It can be diagnosed using abdominal CT and treated by ureteral catheterization.

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因腎臟切片造成的醫源性輸尿管破裂

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腎臟周圍血腫、血尿及腹痛是腎臟切片的常見併發症，但輸尿管破裂則為少見的併發症。本篇文章我們報告一位病人在一次不平順的超音波導引下腎臟切片之後發生嚴重腹痛及巨觀血尿。電腦斷層顯示左側上三分之一的輸尿管破裂。腹痛及巨觀血尿在放置了一條雙J導管於腎盂及膀胱之間後改善。兩個月後拔除雙J導管且病人無任何臨床症狀。輸尿管破裂的可能性雖小，但若病人在接受腎臟切片後有腹痛及血尿情形需考慮輸尿管破裂的可能性。

關鍵詞：輸尿管破裂，腎臟切片

（高雄醫誌 2010;26:502–5）

收文日期：98 年 11 月 30 日

接受刊載：99 年 2 月 2 日

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