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CASE REPORT

Specific management of acute renal failure caused by an upper ureteral stone in a solitary pelvic kidney

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Abstract A 36-year-old man presented with left lumbosacral region pain and 2 days of oliguria. Acute renal failure of a solitary pelvic kidney was diagnosed after a blood creatinine test, color Doppler ultrasonography, and magnetic resonance imaging. The cause of the acute renal failure was not clear; however, acute ureteral obstruction was presumed and emergency surgery was performed. The unusual anatomy of the kidney required specific management to find and relieve the cause of the obstruction. We found and cleared an upper ureteral stone by endoscopic surgery after exploring the kidney through open surgery.

Keywords Solitary pelvic kidney · Acute renal failure · Ureteral stone

Case report

A 36-year-old man presented with left lumbosacral region pain and 2 days of oliguria with blood pressure of 180/110 mmHg. He denied high blood pressure history or taking medicine before the pain appeared. His family history was non-contributory. Color Doppler ultrasonography and magnetic resonance imaging (MRI) revealed a solitary pelvic kidney (SPK) with slight hydronephrosis (Fig. 1); serum creatinine was 551.4 μmol/L. Acute renal failure of a solitary ectopic pelvic was diagnosed. Ureteroscopy was performed under urethra anesthesia: a unique ureter orifice was found in the middle of the bladder fundus. Both semirigid ureteroscope and ureter catheter (4F) were able to be introduced into the ureter orifice, but could not proceed due to the almost perpendicularly running ureter, therefore, a retrograde pyelography for the preoperative diagnosis could not be performed. The cause of the acute renal failure was not clear, but acute urinary obstruction was presumed.

Emergency operation was performed under general anesthesia to determine the cause and to relieve the obstruction. A ureterscopy was re-performed under general anesthesia, but also failed. A ureter catheter (4F) could enter the ureter orifice, but also could not proceed. The fluoroscopy did not show any enhanced medium after injection of 10 ml 60% memeglumine diatrizoate through the catheter. Exploratory laparotomy was then performed. After exposure of the pelvic kidney (Fig. 2), we found the renal artery originating from the left internal iliac artery. The kidney pedicle was nearly 1 cm long, and neither the renal pedicle nor the ureter could be exposed. Finally, we decided to perform a nephrostomy after communication with the patient's wife.

We created a channel to the pelvic with the puncture needle and fascial dilator which are usually used in the percutaneous nephrostolithotomy. A 0.7–0.8 cm stone was identified in the pelvic–ureteric junction with the ureteroscope. The stone was removed completely by pneumatic ballistic lithotripsy. On the fifth day postoperatively, the serum creatinine was decreased to 113.6 μmol/L. The patient was discharged on the seventh day. The main element of the stone was determined to be calcium oxalate, and the patient was given advice to prevent recurrence.

W. Shen, W. Li and J. Pan contributed equally to this work.

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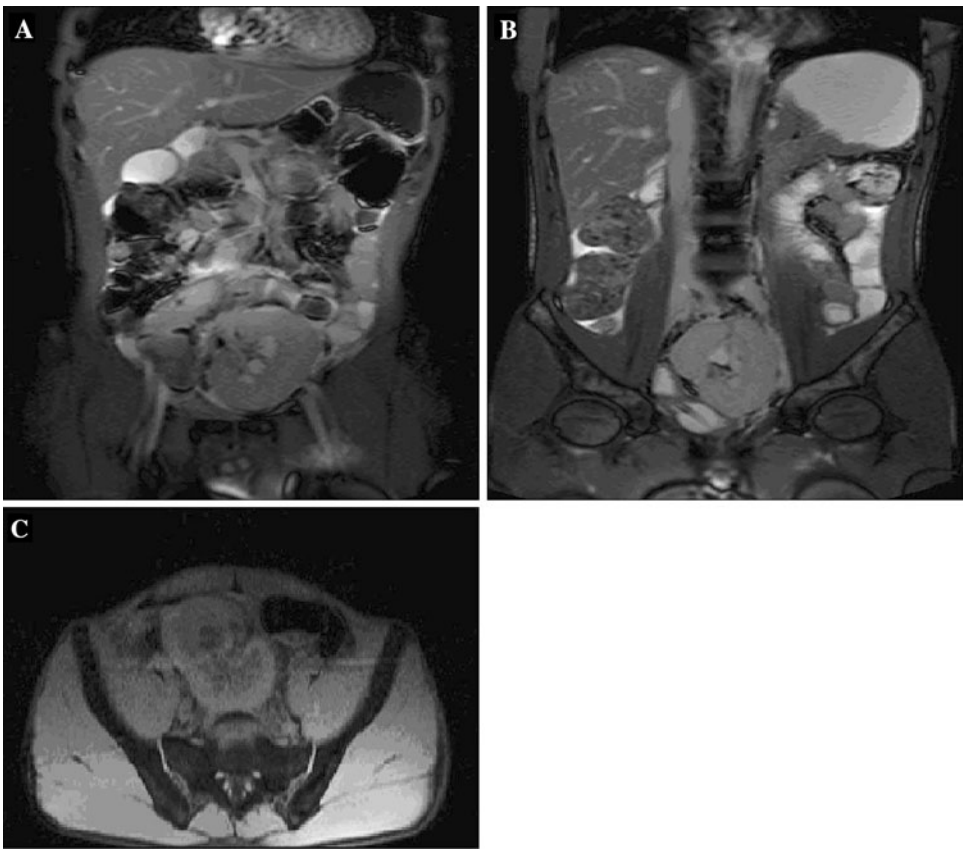

Fig. 1 Coronal (**a**, **b**) and axial (**c**) images of the solitary pelvic kidney by magnetic resonance imaging

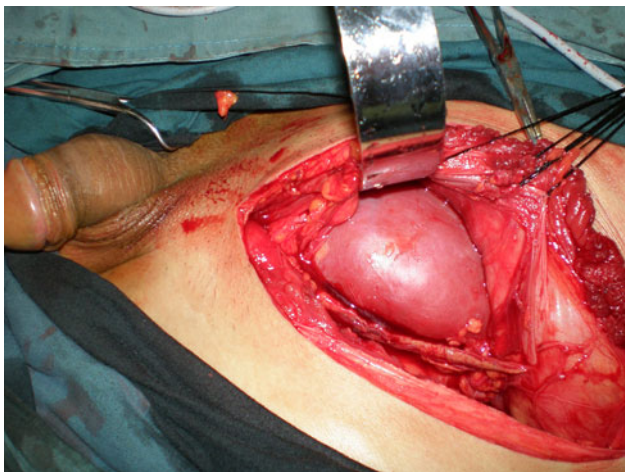

Fig. 2 Exposure of the solitary pelvic kidney by exploratory laparotomy

Discussion

The SPK is a type of congenital renal abnormality that combines renal abnormalities of both number and location. It has been estimated to occur in 1 of 22,000 autopsies [1]. Causes of this abnormality may include faulty development of the ureteric buds, vascular obstruction to the ascent of the kidneys, and environmental factors. There is frequent association of congenital extragenitourinary anomalies with SPK [2], including aplasia of the vagina and uterus, ectopic testicles, and absence of the vagina.

SPK may be asymptomatic, and diagnosis is often made coincidentally during imaging for other purposes. Only 165 cases of SPK had been reported previous to 1973 [2]. Since 1973, several clinical case reports [3–9] have been published describing various symptoms in patients with a SPK. The most common presenting symptoms include urinary tract infections, abdominal pain, and fever; a palpable abdominal mass, hematuria, incontinence, renal insufficiency and hypertension are other presentations of SPK. SPK is typically associated with an anomalous blood supply and malrotation; this is different from renal ptosis, in which the kidney is originally located in its proper place and has normal vascularity, but moves downward in relation to its primary site.

Acute renal failure may be pre-renal, renal or post-renal origin. In this case, the pre-renal factor may be mostly excluded according to the high blood pressure and normal blood supply of the kidney indicated by color Doppler ultrasonography. We also ruled out the renal origin, because the patient denied the use of medicine which may cause acute renal failure. With the indication of slight hydronephrosis by ultrasonography and MRI, acute renal failure post-renal caused by acute urinary obstruction was

presumed. A urinary stone may be the reason of the obstruction. CT is the gold standard for demonstration of urinary stones. However, this case came to us with the photos of MRI. We have discussed with the radiologists, and we believe MRI can release almost the same information to us versus plain CT in this case. Because enhanced CT is somewhat harmful for this patient, we ultimately give up the CT scan.

Obstruction of a solitary kidney is a serious problem because it usually leads to rapid deterioration in renal function with the progressive elevation of serum creatinine. If the solitary kidney is ectopic, it increases the difficulty of both diagnosis and treatment. The SPK was associated with a short renal pedicle and ectopic ureter orifice in this case. We could not examine the entire ureter by semi-rigid ureteroscopy or place a ureter stent retrogradely to relieve the obstruction; and we also could not explore the renal pelvis through open surgery or laparoscopic surgery. Acute renal failure caused by acute obstruction is a severe condition that warrants urgent treatment. The combination of open surgery to explore the kidney and endoscopic surgery to find and resolve with the obstruction was the unique method of treatment this case.

Conflict of interest statement None.

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