Case report

TREATMENT OF KIDNEY STONE IN A KIDNEY-AUTOTRANSPLANTED PATIENT WITH MINI-PERCUTANEOUS NEPHROLITHOTOMY

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ABSTRACT

We report a case of a 7-year-old child with urolithiasis in autotransplanted kidney treated with mini-percutaneous nephrolithotomy. The patient presented with hematuria and graft hydronephrosis. Diagnostic procedures revealed ureterolithiasis as a cause of obstruction and blood in urine. Mini-percutaneous nephrolithotomy was successfully performed and during surgery, all stone fragments were removed.

***Keywords**: Urolithiasis, percutaneous, nephrolithotomy.*

I. INTRODUCTION

Kidney autotransplantation is an effective but rare treatment for complex renal vascular diseases such as renovascular hypertension, renal vascular injury as renal artery stenosis, Takayasu arteritis... Kidney autotransplantation was first reported by J.D. Hardy in 1963 for treatment of severe high ureteral injury. The kidney is reimplanted to the iliac fossa on the same side [1]. In 1967,extracorporeal repair of anoccluded renal artery and autotransplantation of the kidney was performed by Ota K et al [2]. Since then, renal autotransplantation has become a valid alternative to in situ methods, primarily being used by renal transplant surgeons for the treatment of various renovascular or urological conditions [3].

Kidney stones are a very rare complication of kidney autotransplantation. The common causes of stones in transplanted kidney include hyperparathyroidism, ureteral obstruction, chronic urinary stasis, foreign body (specially nonabsorbable suture material), vesicoureteral reflux, metabolic diseases (gout, hyperoxaluria) and preexisting stone in a donor kidney [4]. Immunosuppressive medications, particularly cyclosporine, increase urine uric acid levels, which may promote stone formation. The treatment of these patients is challenging due to immunosuppressive drugs used, usually altered renal function, masked typical presenting symptoms, and disturbed anatomy (specially ureterovesical junction).

Management of nephrolithiasis in transplanted patients is similar to that in the general population and includes internal medicine, extracorporeal shock-wave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL), ureteroscopy and open surgery [5,6]. In this report, we describe a patient with nephrolithiasis in autotransplanted kidney treated with PCNL using smaller instruments (mini-PCNL).

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II. CASE REPORT

A 7-year-old man wasadmitted to Hue Central Hospital with symptom of hematuria.

Four years ago, because of frequent dyspnea, the child was examined and diagnosed withTakayasu arteritis and abdominal aotric stenosis. Abdominal aortic dilatation was performed. Two years ago, the child was detected left renal artery stenosis and renal artery stent was performed. Nine months ago, the child diagnosed with left renal artery restenosis andcomplete obstruction of the right renal artery had received a kidney transplant from himself and dilated the left renal artery at Nhi Dong I hospital. The kidney was transplanted in the right iliac fossa and the ureter was anastomosed on the bladder according to the Lich-Gregoir technique. After autotransplantation, immunosuppression medication was continued and the function of the autotransplanted kidney was significantly improved.

The child was examined and continued treatment at the Pediatric center of Hue central hospital. The child had no fever, humaturia,was being treated anticoagulant therapy with heparin and aspirin. Ultrasound revealed a right ureteral stone and graft hydronephrosis. Laboratory exams showed normal renal function with urea 6.24 mmol/l and creatinine 60.24 µmol/l, good coagulation function, and urinalysis detected erythrocytes (+++). Abdominalcomputed tomography imaging demonstated a rightrenal pelvis stone (9x9mm diameter) in autotransplanted kiney and anupper ureteral stone (5x15mm diameter) causingmild hydronephrosis and the right ureteral dilation of the upper poiety **(Figure 1)**. The urine culture is negativeand inflammatory markers in the context of being systemically well. The child was prepared for mini-PCNL. Anticoagulants are adjusted before surgery.

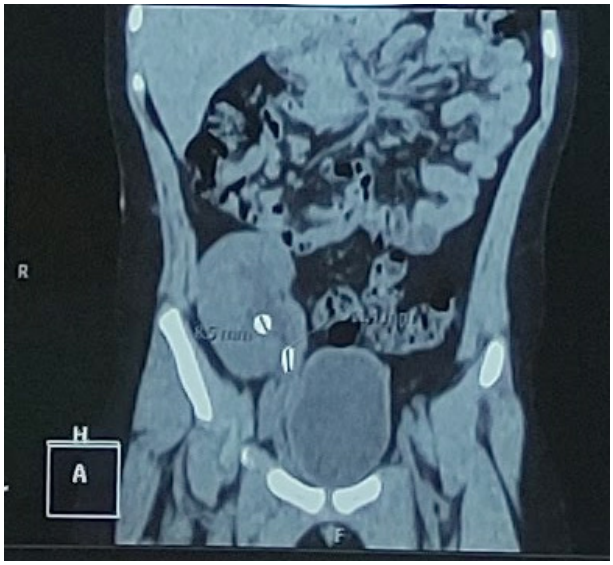

Figure 1: Pretreatment CT scanner: The coronal computed tomographic

The mini-PCNL treatment was carried out in the supine position and endotracheal anesthesia. The ureteroscope was passed through the urethra into the bladder andureteral orifice was found at the augmented part of the bladder. We tried to insert the hydrophilic guidewire with floppy tip into the ureteral orifice for ureteral catheter placement but failed. Then, we located puncture under ultrasound guidance and revealedno graft hydronephrosis. The calyx was punctured using an initial 18G puncture needleand a hydrophilic guide wire was placed into the calyxdown the ureter (confirmed the success by C-arm X-ray machine). We used plastic fascial dilators up to 15/16Fr for dilatation of the percutaneous tract and after placing a metal 16Fr Amplatz sheath (Karl Storz) in the renal pelvicalyceal system a rigid 16Fr nephroscope (Karl Storz) with opic 0^0 was introduced through the operating sheath. A stone was visualized in the middle renal calyx **(Figure 2)**. Holmium: YAG laser lithotripsy using 600µm laser fiber was performed (Accutech) using an appropriate energy level. After comfirming the success by C-arm X-ray machine **(Figure 3)** a double-J stent was inserted to the right ureter and then a drainage catheter was placed into the renal collecting system.

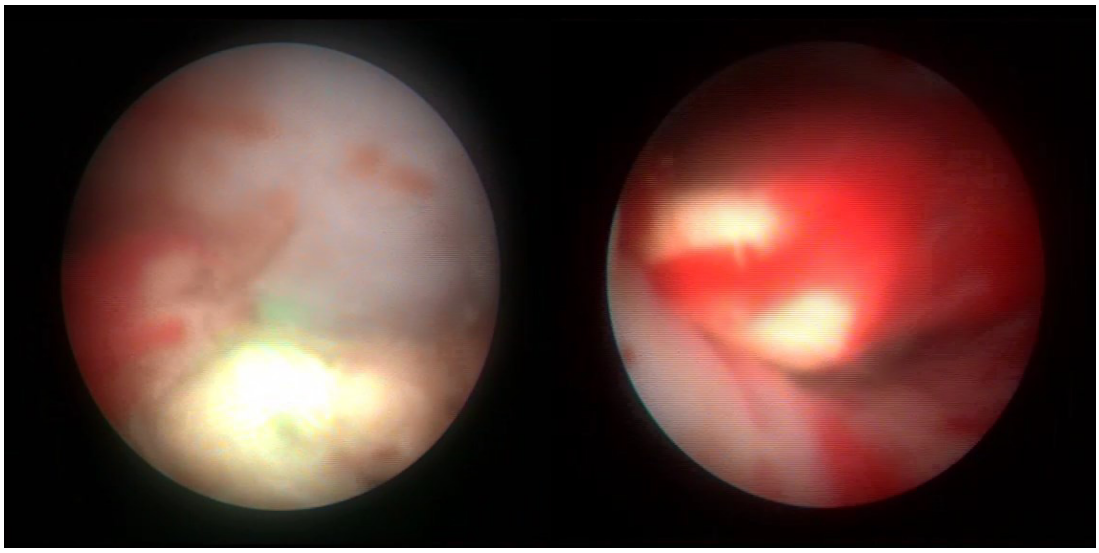

Figure 2: C-arm showed the guidewire was placed into the calyx down the ureter

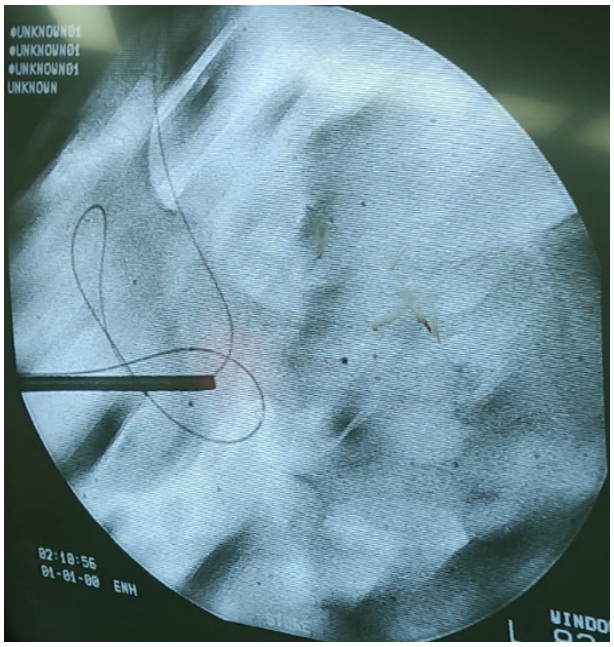

Figure 3: Nephroscopic view of renal middle renal calyx stone (left) and ureteral stone before starting the lithotripsy.

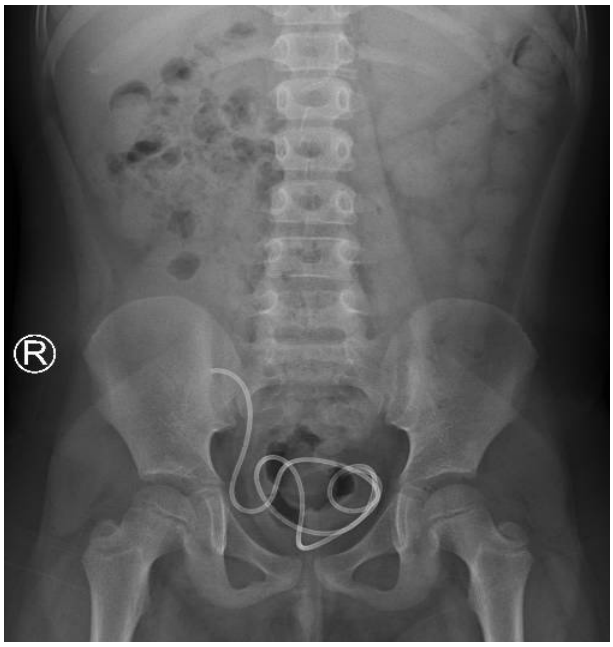

Figure 4: Postoperative X-ray revealed stone-free graft.

The hematuria gradually faded, the drainage catheter was clamped and withdrawn on the third day, the urinary catheter was removed on the fifth day after the surgery. The plain abdominal film on the seventh day after surgery showed the graft is stone-free **(Figure 4)**. The double-J stent was removed by cystoscopy on the fourteenth after surgery.

III. DISCUSSION

The renal colic is a typical symptom of urolithiasis. Because the renal transplantation damaged the nerves of the kidney anh ureter, the patients can not pain. The kidney stone is often found incidentally during routine ultrasound or in complications such as fever, injection, hematuria and renal dysfunction [5]. In our case report, the child was admitted to the hospital

with the symptom of hematuria and found the graft hydronephrosisby ultrasound.

In case of urinary tract obstruction, the surgical treatment is indicated with the primary aim is to resolve the obstruction. The surgical methods for the treatment of nephrolithiasis include open surgery, extracorporeal shock-wave lithotripsy, percutaneous nephrolithotomy and ureteroscopy [7]. Treatment with open surgery for kidney stone is the traditional method however has many disadvantages: the infection, the postoperative pain is increased, the patient's recovery is slow ect. To overcome these negative sides of open treatment, minimally invasive methods have been standardized and gradually replacing in most patients with urolithiasis both general patients and transplanted patients [5].

Extracorporeal shock-wave lithotripsy (ESWL) is the valuable noninvasive method for nephrolithiasis treatment, but has many limitations in kidney-transplanted patients such as the difficult localization of the stone due to overlying pelvic bone, the shock wave can be blocked by pelvic bone. Moreover, the stone fragments passing through ureterovesical junction can damage this location. ESWL is usually indicated for kidney stones smaller than 1,5cm.

Ureteroscopy (URS) is a surgical method that approaches the stones easily, however, is difficult for the transplanted kidney because the ureterovesical anastomosis is usually located at the bladder apex, which makes it very difficult to insert the ureteral catheter into the ureteral orifice.In the study of the treatment of upper urinary tract calculi in transplanted kidneys (He ZH et al. 2011), the insertion was perfromed successfully in only 37,5% patients [8]. Flexible ureteroscopy is recommended for adequate access to calculi and the calculi can be disintigrated by electrohydraulic lithotripsy, ultrasonic lithotripsy or holmium laser with a success rate of 67-100% [5].

Percutaneous nephrolithotomy (PCNL) is recommended as a therapy of choice for the large kidney stones (>2cm) and also for small stones (1-2cm) failure or contraindication for ESWL. The stone-free rate after PCNL is about 76-98%. However, PCNL has still many restrictions due to the inexperience of the surgeon and the possible complications [9]. In order to decrease the possible complications like blood loss, postoperative pain, and potetial renal damage, a miniature endoscope via a small percutaneous tract (11-20Fr) was developed and named as minimally invasive PCNL or mini-PCNL [9,10].

Because of the relative superficial position of transplanted kidneys, percutaneous management is favored [11]. Percutaneous removal of stones in a transplanted kidney has the high success rate, but it is an invasive method that can affect the renal function. Standard-PCNL is usually indicated for the kidney stones larger than 2cm in diameter whereas mini-PCNL is indicated for the kidney stones less than 2cm in diameter [12]. Up to now the size of kidney stones to choose standard-PCNL or mini-PCNLstill has many opinions: G. Giusti (2007) comparing standard PCNL and mini-PCNL in the treatment of kidney stone less than 2cm in diameter showeddetrimental results for mini-PCNL [13]; Z. Gouhua (2007) reported that mini-PCNL can treat the most of largestaghorn calculi via multiple percutaneous tracts with the stone-free rate of 72% - 93% [14].

Compared to PCNL in the general population, transplanted kidney puncture under ultrasound guidance is a relatively simple procedure because the transplanted kidney is located below the muscles of the anterior abdominal wall. Besides, the distance from skin to the graft is closer than normal and the dilatation is aslo easier than normal. In this patient, the ureteral catheter placement could not be done because the ureteral was anastomosed on the augmented part of the bladder whereas ultrasound showed no graft hydronephrosis, which caused a lot of impediments to the transplanted kidney puncture.

The effectiveness of mini-PCNL is still under debate. Proponents of the method mention limited blood loss, increased maneuverability, decreased postoperative pain and limited hospital stay.

Limitations of the procedure include the necessity to disintegrate stones into small enough fragments to fit through a reduced-size sheath which results in longer operative times.

For the kidney-transplanted patients, the extent of kidney damage with a miniature endoscope in mini-PCNL is less then with a standard one in standard PCNL. The advantages of mini-PCNL are limited blood loss, increased maneuverability, decreased postoperative pain and limited hospital stay. However, the limitations of this procedure include the necessity to disintegrate stones into small enough fragments to fit through a reduced-size sheath which results in longer operative times [9]. Obviously mini-PCNL is a less invasive method and effective for the treament of calculi in the kidney and upper ureter.

The first PCNL in the kidney-transplanted patient was performed in 1982 [15]. According to our knowledge, this is the first case report of nephrolithiasis treatment in a kidney-autotransplanted patient with mini-PCNL in the world. Based on our limited experience and the documents we collected, we believe that mini-PCNL can become the method chosen in the kidney-autotransplanted patients with obstructive stones in the kidney anh upper ureter.

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