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Case Report

Ureterolithotripsy for a Ureteral Calculus at the Ureteroureterostomy of a Renal-transplant Recipient

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We describe a 40-year-old living-donor renal-transplant recipient who underwent successful ureterolithotripsy. He had been on hemodialysis for >15 years pre-transplant and underwent ureteroureterostomy along with the surgery. One year post-transplant, ultrasound examination demonstrated hydronephrosis, and CT showed a 6-mm ureteral calculus at the ureteroureterostomy site. No pain and no elevated serum creatinine were present. As the ureter was easily accessed, we performed a ureterolithotripsy, which would confirm whether a suture caused the calculus. Despite ureteral tortuosity, laser stone fragmentation succeeded. The calculus was completely removed with an antegrade guidewire. Mild postoperative ureteral stenosis resolved with a temporary ureteral stent without balloon dilation. Ureterolithotripsy is effective even in renal transplant recipients with ureteroureterostomy.

Key words: lithotripsy, recipient, renal transplant, ureteroscopy, ureteral stone

Renal transplantation is the ideal treatment for end-stage renal failure. Approximately 1,500 living- or diseased-donor renal transplantations are performed each year in Japan [1]. The incidence of urinary-tract calculus after renal transplantation is very low; the frequency is described as 0.17-1.8% in the literature [2,3]. The surgical management of a urinary-tract calculus after renal transplantation is as safe as in a nontransplant patient [4]; however, previous reports have only described patients with ureteroneocystostomy. We report a renal-transplant recipient with a ureteroureterostomy who underwent a successful ureterolithotripsy (URS).

Case Report

The recipient was a 40-year-old Japanese male with the blood type AB (Rh+) who had been on hemodialysis for >15 years for end-stage renal disease secondary to immunoglobulin A nephropathy. He was anuric for that entire period. His related donor was his 61-year-old mother, who had the blood type B (Rh+). The donor had a history of a left ureteral stone that had passed spontaneously. The preoperative screening computed tomography (CT) demonstrated a 3-mm left renal calculus (Fig. 1). At the time of the renal donation, the donor underwent a URS, followed by a left laparoscopic nephrectomy.

During the transplantation, we anastomosed the patient's left renal vein and artery to the right external

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iliac vein and artery, using 5-0 polypropylene (Prolene®, Ethicon, Somerville, NJ, USA) in an end-to-side running anastomosis. The bladder had a low capacity because the patient had been anuric for > 15 years. When we injected 30 mL of saline into the bladder, leakage through the fragile bladder wall was apparent. We thus decided to perform an end-to-end ureteroureterostomy to reconstruct the urinary tract, using 4-0 polyglactin (Vicryl®, Ethicon) interrupted suture. We subsequently placed a 6-Fr 10-cm double-J stent (Polaris™ Ultra Ureteral Stent, Boston Scientific/Microvasive, Natick, MA, USA) (Fig. 2). The postoperative immunosuppression regimen consisted of tacrolimus, mycophenolate mofetil, prednisolone and basiliximab. Four weeks after the transplantation, a cystoscopic removal of the stent failed because of stone formation around the ureteral stent. On the following day, the patient underwent ureteroscopic removal of the stent under general anesthesia. His stent-free serum creatinine (s-CR) level was 1.55 mg/dL.

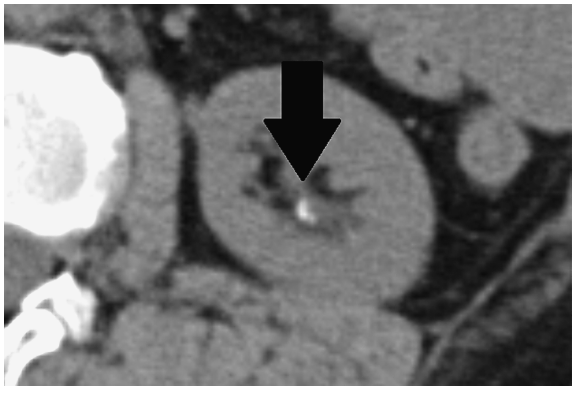

Fig. 1 Preoperative CT of the donor, demonstrating the 3-mm left renal calculus (*arrows*).

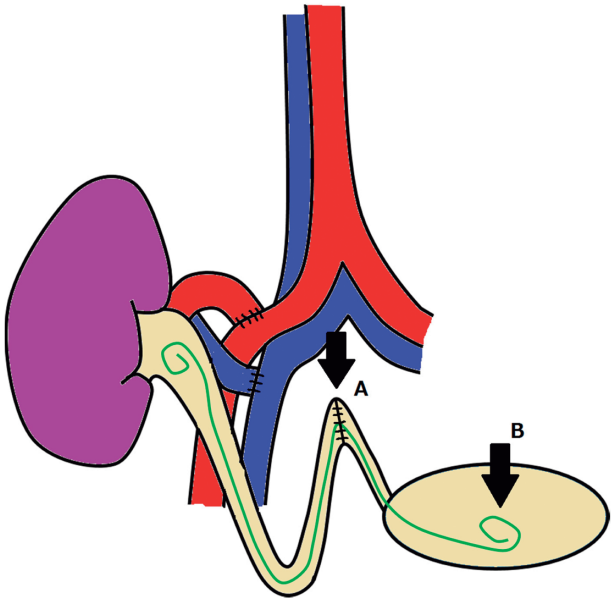

Fig. 2 The patient's left renal vein and artery were connected to the right external iliac vein and artery in an end-to-side running anastomosis. After the ureteroureterostomy (*arrow* A), a 6-Fr 10-cm double-J ureteral stent (*arrow* B) was placed.

One year post-transplantation, ultrasound for the kidney graft demonstrated grade 3 hydronephrosis. Although the patient had no pain and his s-CR was not elevated, CT demonstrated a 6-mm calculus at the site of the ureteroureterostomy (Fig. 3A, B). We decided to induce a URS to remove the anastomotic calculus, because a lithotomy device easily passed thorough the right ureteral orifice. However, we could not reach the calculus because of a loss of torque by the winding of the kidney graft ureter.

We therefore created a percutaneous nephrostomy to the superior calyx using a 20-G "all-seeing" needle (High definition Image Guide®, Hakko, Chikuma, Japan). Two antegrade guidewires were inserted into the urethra, using the through-and-through technique. The retrograde ureteroscope reached the calculus with the aid of the guidewires. Holmium-yttrium aluminum garnet (Ho-YAG) laser lithotripsy was performed (VersaPulse® PowerSuite™ 100W, Lumenis Surgical, San Jose, CA, USA) and fragments of the calculus were completely removed using a stone basket (NCircle® Nitinol Tipless Stone Extractor; Cook Urological, Spencer, IN, USA). No suture material was identified around the anastomosis. An 8.3-Fr pigtail tube nephrostomy was placed. An internal ureteral stent was not placed, because the previous stent removal was complicated by stone formation.

The main component of the stone is calcium oxalate (> 98%). After lithotripsy, the patient had mild postoperative ureteral stenosis. Because the stenosis persisted for 3 months, an internal ureteral stent was placed for 11 days to gently dilate the ureter. Dilation by the internal stent was successful. After the ureteral stent removal, hydronephrosis improved. The patient's serum-Cr level was maintained at < 2.0 mg/dl over 18 months of follow-up after the URS.

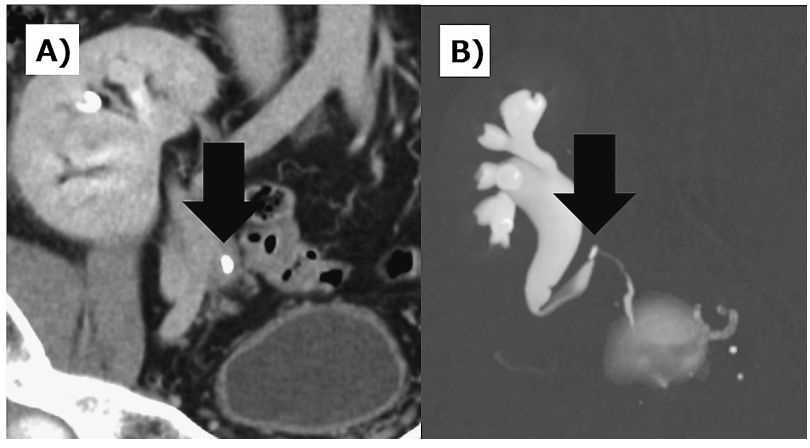

Fig. 3 CT demonstrating a 6-mm calculus (*arrows*) at the ureteroureterostomy site.

Discussion

In this patient's case, we had to choose ureteroureterostomy at his kidney transplantation because of the extremely low capacity and fragility of his bladder after a long-term history of hemodialysis. One year after the transplantation, we identified a calculus and stenosis at the site of the uretero-ureteral anastomosis. The calculus was successfully removed by a URS.

There are some reports of the frequency of calculi and their management, before and after kidney transplantation. The frequency of a preoperative renal calculus in the donor is reportedly 3.2-5.0% [5,6]. The presence of a calculus in the donor is a risk factor for renal failure and sepsis, and calculi should thus be removed before transplantation. In our patient's case, the donor had a 3-mm renal calculus. The donor was treated with a URS prior to the nephrectomy to decrease the risk of renal failure after transplantation.

As noted in the Introduction, calculi after kidney transplantation are very rare. Ureteral calculi usually cause severe pain, but this ordinary symptom does not occur in transplantation recipients because the transplanted kidney is denervated. A symptomatic calculus of the recipient may delay the diagnosis and cause a serious infection that can lead to graft loss [7]. It is therefore important to treat every detected calculus of the recipient after transplantation [4]. Our patient had no pain, and his s-Cr was not elevated. Grade 3 hydronephrosis was an incidental finding on his scheduled 1-year follow-up biopsy.

There are various treatments for calculi after transplantation, including extracorporeal shock-wave lithotripsy, percutaneous nephrolithotomy, and URS [8]. Performing a URS is difficult in patients with a ureteroneocystostomy because accessing the new ureteral orifice is challenging. The present report is the first of URS treatment of a calculus for a kidney transplant recipient with ureteroureterostomy.

In 2002, Gallentine *et al.* reported that the incidence of ureteroureterostomy in renal transplantation was 22%; these patients had typically been on dialysis for a long time (>10 years), and their bladder capacity was very low [9]. Our recipient had been on dialysis for over 15 years and had a low bladder capacity and a very fragile bladder wall. We therefore chose a ureteroureterostomy as the urinary tract reconstruction method. When the patient's ureteral calculus was diagnosed, we selected a URS for treatment because the native right ureteral orifice of his bladder led to the calculus. Although the lithotomy device was able to pass the right ureteral orifice easily, we could not reach the calculus due to the tortuous course of the ureter. The insertion of 2 antegrade guidewires helped us perform the retrograde URS.

Our patient experienced mild postoperative ureteral stenosis, thought to be postoperative edematous change. Gentle dilation using an external stent was selected for treatment. Balloon dilation was not chosen because of the risk of causing an iatrogenic ureteral stenosis.

In conclusion, URS is effective for patients with a ureteroureterostomy. However, clinicians should be aware that the procedure is not as easy as in a

non-transplant patient. Ureteral tortuosity may require antegrade guidewire placement.

References

1. The Japan Society for Transplantation, Japanese Society for Clinical Renal Transplantation. Annual progress report from the Japanese Renal Transplant Registry: number of renal transplantation in 2014 and follow-up survey: Japanese Journal of Transplantation (2015) 50: 138–155 (in Japanese).
2. Mamarelis G, Vernadakis S, Moris D, Altanis N, Perdikouli M, Stravodimos K, Pappas P and Zavos G: Lithiasis of the renal allograft, a rare urological complication following renal transplantation: a single-center experience of 2,045 renal transplantations. Transplant Proc (2014) 46: 3203–3205.
3. Sevinc C, Balaban M, Ozkaptan O and Karadeniz T: Flexible ureterorenoscopy and laser lithotripsy for the treatment of allograft kidney lithiasis. Transplant Proc (2015) 47: 1766–1771.
4. Verrier C, Bessede T, Hajj P, Aoubid L, Eschwege P and Benoit G: Decrease in and management of urolithiasis after kidney transplantation. J Urol (2012) 187: 1651–1655.
5. Olsburgh J, Thomas K, Wong K, Bultitude M, Glass J, Rottenberg G, Silas L, Hilton R and Koffman G: Incidental renal stones in potential live kidney donors: prevalence, assessment and donation, including role of ex vivo ureteroscopy. BJU Int (2013) 111: 784–792.
6. Tonyali S, Erdem Y, Yilmaz SR, Erkan I and Aki FT: Urologic disorders in living renal donors and outcomes of their recipients. Transplant Proc (2015) 47: 1306–1308.
7. Martin G, Sundaram CP, Sharfuddin A and Govani M: Asymptomatic urolithiasis in living donor transplant kidneys: initial results. Urology (2007) 70: 2–5.
8. Shimizu T, Nozaki D, Omoto K, Ishida H, Tanabe K and Hashimoto Y: Experience of treatment for nephroureterolithiasis in allograft kidney and ureter after kidney transplantation. J Jpn Soc Clin Renal Transplant (2013) 1: 61–68 (in Japanese).
9. Gallentine ML and Wright FH Jr.: Ligation of the native ureter in renal transplantation. J Urol (2002) 167: 29–30.