Flexible Ureterorenoscopy and Laser Lithotripsy for the Treatment of Allograft Kidney Lithiasis

C. Sevinc, M. Balaban*, O. Ozkaptan, and T. Karadeniz

Medicana International Istanbul Hospital, Urology Clinic, Istanbul, Turkey

ABSTRACT

Objective. To evaluate the safety and effectiveness of flexible ureterorenoscopy (F-URS) and laser lithotripsy for the treatment of allograft kidney lithiasis.

Patients and Methods. In a retrospective analysis of 897 consecutive renal transplantations that were performed at our center between February 2008 and December 2014, 6 patients were found to have allograft lithiasis. F-URS and laser lithotripsy were performed 6 times on 5 patients (twice for 1 patient who had stone recurrence after 6 months). Percutaneous nephrolithotomy was used for the remaining patient. Patient demographics and stone characteristics (age, sex, stone size, stone analysis, location, history of shockwave lithotripsy) and perioperative measures (duration of operation, fluoroscopic imaging, success and complication rates) were reviewed. In addition, the technical difficulties of standard F-URS procedures in transplanted kidneys were reviewed and some facilitative techniques were defined to increase the success rate.

Results. A total of 5 patients underwent 6 F-URS procedures and laser lithotripsy operations for renal graft lithiasis. The mean stone size was 9.2 mm (7.5–11 mm). The mean operation and fluoroscopy times were calculated as 55 minutes (40–70 minutes) and 57.5 seconds (40–80 seconds), respectively. Treatment was successful in all patients and no severe complications or mortality occurred. One patient experienced transient hematuria and recovered within 36 hours.

Conclusion. F-URS is a safe, effective, and minimally invasive treatment modality for small- and medium-sized stones in allograft kidney lithiasis.

KIDNEY allograft lithiasis is an infrequent, difficult-to-manage complication of renal transplantation. Its incidence has been reported to be 0.23% to 0.97% of all renal transplant patients [1,2]. The management of allograft lithiasis is challenging because of the medical complexity of these cases and the unusual location of the allograft kidneys.

In the current literature, shockwave lithotripsy (SWL) and percutaneous nephrolithotomy (PNL) treatments are described for transplant kidney stone management. SWL for allograft lithiasis is associated with lower success rates secondary to impaired stone clearance and problems with localization [3]. Although PNL has higher stone-free rates compared to SWL, its invasiveness and the challenges in reaching ureteral stones may make it an insufficient technique to treat allograft lithiasis.

The technologic improvements in flexible ureteroscopy (F-URS) and the higher degree of flexion and deflexion capabilities combined with laser lithotripsy have permitted F-URS to become more widely applicable for many patients.

In this study, we aim to present the outcomes of F-URS for the treatment of allograft lithiasis and to describe the technical modifications for this special patient group. To the best of our knowledge, this study is the first report of F-URS and laser lithotripsy applied to allograft kidney lithiasis.

MATERIALS AND METHODS

Between February 2008 and December 2014, 897 renal transplantations were performed at our center, of which 6 were found to have allograft lithiasis. Of these 6 patients, 5 underwent a total of 6 F-URS and laser lithotripsy treatments, and 1 underwent a PNL

*Address correspondence to Muhsin Balaban, MD, Medicana International Istanbul Hospital, Urology Clinic, Beylikduzu Cad. No: 3 Beylikduzu/Istanbul, Turkey. E-mail: muhsinbalaban1980@yahoo.com

0041-1345/15
http://dx.doi.org/10.1016/j.transproceed.2015.06.020

Table 1. Patients Demographics and Applied Interventions

Patients No.	1	2	3	3	4	5	6
Age (year)	50	31	59	59	56	65	42
Gender (M: Male/F: Female)	M	M	F	F	F	M	F
Stone locations	Lower calix	Midureter	Proximal ureter	Proximal ureter	Distal Ureter	UPJ‡ and upper calix diverticula	Renal Pelvis
Stone size (mm)	11	8	10	9	10	9 and 7.5	22
Post-transplantation time of diagnosis (month)	48	17	22	27	24	58	0
Interventions	SWL*/F-URS	DJ stent insertions/F-URS	F-URS	UBD†/F-URS	F-URS	DJ stent insertion/F-URS	PNL
Ureteral pathology	–	Ureteral tortuosity and obstruction	–	Ureterovesical anastomosis obstruction	–	–	–
Follow-up (month)	6	4	33	33	1	6	2
Stone recurrence/interval (month)	–	–	5	24	–	–	–

*SWL: Shock Wave Lithotripsy.
†UBD: Ureteral Balloon Dilatation.
‡UPJ: Ureteropelvic junction.

operation. F-URS was applied twice for 1 patient within 6 months due to recurrence of the stone. Patient demographics and stone characteristics (age, sex, stone size, location, history of SWL, post-transplantation time of diagnosis, stone recurrence) (Table 1), perioperative measures (duration of operation, fluoroscopic imaging, success and complication rates), and serum creatinine levels before and after the operation were reviewed (Table 2).

All renal transplant patients were being followed at our center's nephrology clinic and were checked for blood biochemical indicators of renal insufficiency at 3-month intervals. In cases of increased creatinine levels or development of oliguria/anuria, renal ultrasonography was done to identify hydronephrosis or allograft lithiasis. If hydronephrosis was detected, in addition to the renal ultrasonography, kidney-ureter-bladder radiography and/or computed tomography imaging was also performed (Fig 1C and D).

Treatment modalities were planned according to renal function and stone diameter. In cases of acute renal function deterioration, a double-J (DJ) stent was inserted, and after improvement in renal function, F-URS and laser lithotripsy were performed. SWL was applied to stones measuring less than 1 cm and PNL was performed for stones larger than 2 cm.

The F-URS procedures were performed in the supine lithotomy position under general anesthesia. Cystoscopy was performed to identify the new ureteral orifice location with a 30° lens endoscope, and if it could not be found, suprapubic pressure was applied or the bladder was evaluated at different levels of filling with a 70° lens to obtain more visual area with a greater angle. In cases in which the guide wire could not be inserted into the neoureteral orifice due to challenges of angling or localization of the neoorifice, a 9.5–10 Fr semirigid URS was used to facilitate localization and insertion of the guide wire. We mostly use a Raodrunner hydrophilic PC guide wire (0.038"/145 cm) (Cook Surgical, Indianapolis, Ind., United States) to overcome the sharp angle of the neoorifice and to insert through the transplant ureter lumen. If the sharp angle of the axis of the scope and axis of the ureter can't be crossed, A 5 Fr urology torque catheter (0.038 in/65 cm) (Boston Scientific, Natick, Mass., United States) is used to redirect the guide wire (Fig 2A). Fluoroscopy was used routinely during the insertion of the guide wire and the F-URS procedure (Fig 2B). With the aid of the second guide wire, we advanced the semirigid URS through the ureter, and retrograde pyelography was simultaneously performed to map the ureter and collecting system. If any resistance was felt, the advancement of the semirigid URS was ceased and a 9.5–11 Fr Flexor Access Sheath (Cook Surgical) was placed on the second guide wire and advanced through the proximal ureter with fluoroscopic guidance. A 7.5 Fr fiberoptic (Storz FLEX-X 2, Tuttlingen, Germany) F-URS was used for these procedures. A holmium laser fiber with a size of 200 μm or 273 μm was chosen according to the stone location and composition. Holmium laser energy and frequency were determined during the operation. We used a 1.3–1.9 Fr ZeroTip basket (Boston Scientific) for stone transposition and extraction. A ureteral 16 cm DJ stent was inserted in all patients. Success was defined as complete stone fragmentation to less than 1 mm by laser probe (Fig 2D) and no stones were imaged on radiologic evaluation during the follow-up period after the surgery. The DJ stent was removed 3 weeks after each operation.

RESULTS

A total of 6 patients (3 males and 3 females) with a mean age of 50.5 years (31–65 years) with transplant kidney lithiasis were included in this study. The post-transplantation mean