

Native ureteroureterostomy in renal allograft recipient surgery: A single-center 5-year experience

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ABSTRACT

Introduction: In renal transplant, surgeons use a myriad of ureteral anastomotic techniques. Although ureteroneocystostomy (UNC) using Lich-Gregoir extravesical anastomosis is used most commonly, ureteroureterostomy with native ureter has its own importance in certain situations.

Materials and Methods: We retrospectively reviewed records of patients who underwent renal transplantation at our center from March 2011 to February 2016. Records of patients who underwent ureteroureterostomy with the native ureter were reviewed for the indications and complications of the procedure.

Results: Of 1050 renal transplants during the study period, 32 patients underwent native ureteroureterostomy. Among these 32 patients, 20 patients were planned preoperatively for native ureteroureterostomy (elective), and intraoperative decision was made in 12 patients (emergency). On follow-up, only one patient had ureteral obstruction due to kink just distal to ureteroureterostomy and was managed by double-J stenting. Other patients had an expected postoperative course.

Conclusion: In our experience, ureteroureterostomy with native ureter is technically and functionally good option for ureteric reimplantation in kidney transplant patients. It can be used selectively for elective and emergency situations where UNC is not possible. Hence, the kidney transplant surgeon should be well versed with both techniques.


INTRODUCTION

Renal transplant is a major surgery in which arterial anastomosis, venous anastomosis, and reconstruction of urinary tract are performed. After renal transplant, urological complications have serious effects and may result in graft failure or multiple interventions. Urinary bladder is the preferred organ for anastomosis of transplant ureter (ureteroneocystostomy [UNC]). Modified Lich-Gregoir is the standard UNC technique due to its low complication rates and shorter operative times.^[1,2]

Occasionally, the urinary bladder is either not suitable for UNC or not available for anastomosis. The bladder might not be suitable for UNC in case

of small, fibrosed, or inaccessible bladder in patients with previous pelvic surgery. The bladder might also not be available in case of ileal conduit, neobladder, and augmentation cystoplasty. Thus, other techniques such as ureteroureterostomy, pyeloureterostomy, pyelopyelostomy, and ureteroenterostomy may also be required for urinary reconstruction. Ureteroureterostomy with native ureter is most commonly performed as a primary transplant procedure in such situations.

At our center, we have done ureteroureterostomy as an option for urinary reconstruction in specific situations. In this article we retrospectively review our experience of ureteroureterostomy in renal transplant along with its indications, outcome, and complications.

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MATERIALS AND METHODS

We performed 1050 renal transplant cases over the span of 5 years, from March 2011 to February 2016. Of these 1050 cases, 32 patients underwent primary native ureteroureterostomy for different indications. All renal transplants were from living donors. Demographic data including recipient and donor age, gender, indications, surgical technique, outcome, and complications were collected. Preoperative ultrasonography of kidney, ureter, and bladder was done routinely in all the cases to assess native kidneys and ureters. Vessel anastomosis was done with either external iliac vessels or common iliac vessels.

Urine output and serum creatinine were used to monitor renal function. Doppler ultrasound was used to monitor patency of vessels and to check for perigraft collection. Tc-99m Diethylene triamine pentaacetic acid (DTPA) scan was done to assess function and drainage of graft kidney, if needed.

Surgical technique

Donor nephrectomies were performed by either laparoscopic or open approach. The length of donor ureter was assessed and adequately shortened to get nonredundant, tension-free anastomosis except when the donor ureter was itself short. We spatulated the donor ureter adequately and ensured that there was adequate hemostasis. An end-to-side or end-to-end ureteroureteric anastomosis was performed with running 4-0 PDS suture over double-J (DJ) stent. In end-to-end anastomosis, proximal end of native ureter was ligated without native nephrectomy. Foley's catheter was removed on 7th postoperative day once urine output was <5 l/day and double-J stent removal was done after 4 weeks.

Maintenance immunosuppression was done mainly with tacrolimus or cyclosporine with mycophenolate mofetil and prednisolone.

RESULTS

In all renal transplant cases ($n = 32$), kidney graft was taken from living donors. The mean follow-up was 11.7 months. Among 32 patients, 21 patients were male and 11 were female. The mean age of recipients was 37.6 years ranging between 3 years and 59 years. The cause of end-stage renal disease was glomerulonephritis in 18 patients, diabetes mellitus in 5 patients, hypertension in 3 patients, polycystic kidney disease in 2 patients, and unknown in 4 cases [Table 1]. All patients were on maintenance hemodialysis.

We divided the indications for native ureteroureterostomy into two groups: one is elective where we anticipated the need for ureteroureterostomy preoperatively,

and another is emergency, where decision was taken intraoperatively.

Ureteroureterostomy was anticipated preoperatively in 20 patients (elective), and in 12 patients, it was decided intraoperatively (emergency). Among elective ureteroureterostomy, four patients had small capacity urinary bladder, four patients had previous pelvic surgery, four patients had augmented bladders, two patients had atherosclerotic disease involving vessels below bifurcation of common iliac vessels, two patient underwent third kidney transplant, two were pediatric transplants, one patient had neurogenic bladder on clean intermittent catheterization (CIC) with doubtful small capacity, and one patient had had bladder injury repair [Table 2].

In patients with atherosclerotic disease, patients with third transplant and pediatric transplant, vessel anastomosis were performed with common iliac vessels.

Among emergency ureteroureterostomy, donor ureter was short in five patients, bladder wall was too fragile to hold sutures in three patients, bladder was not accessible even after distension in three patients, and in one patient, the graft kidney was placed upside down accidentally, so we had to do native ureteroureterostomy [Table 3]. End-to-end ureteroureterostomy was done in 28 patients, and end-to-side anastomosis was done in four patients.

Of 32 patients, one patient developed urological complication after the removal of D-J stent. There was a kink at the site of ureteroureterostomy in patient with third transplant with end-to-side anastomosis, which was managed by regular change of D-J stenting. Two patients had urinary tract infection and three patients had acute tubular necrosis, which were managed conservatively. No ureteral leak or ureteral necrosis was seen in any patient [Table 4].

DISCUSSION

UNC is the preferred choice in most of the transplant for primary anastomosis, whereas other procedures such as ureteroureterostomy and pyeloureterostomy are reserved for specific indications. Extravesical technique of UNC has gained favor and shown to have less complications, less duration for procedure, and less patient morbidities compared to intravesical UNC in recent studies.^[3-5] This is attributed to limited bladder dissection and requirement of shorter segment of donor ureter.^[6-8]

Ureteroureterostomy and pyeloureterostomy are usually avoided as a primary procedure to preserve the native ureter for correction of any further complication, if needed.^[9-12] The complication rate of ureteroureterostomy and pyeloureterostomy as a primary procedure was

Table 1: Causes of ESRD

	Cause	Number of cases (n=32)
1	Glomerulonephritis	18
2	Diabetes mellitus	5
3	Hypertension	3
4	ADPKD	2
5	Idiopathic	4

ESRD=End stage renal disease, ADPKD=Autosomal dominant polycystic kidney disease

Table 2: Indications for elective ureteroureterostomy

	Indications	Number of cases (n=20)
1	Small capacity bladder	4
2	Previous pelvic surgery	4
3	Augmented bladder	4
4	Atherosclerotic disease	2
5	Third transplant	2
6	Pediatric transplant	2
7	Neurogenic bladder on CIC with suspected small capacity bladder	1
8	Previous bladder injury repair	1

CIC=Clean intermittent catheterization

Table 3: Indications for emergency ureteroureterostomy

	Indications	Number of cases (n=12)
1	Short donor ureter	5
2	Fragile bladder wall	3
3	Bladder not accessible even after distension	3
4	Accidental placement of kidney upside down	1

Table 4: Complications after ureteroureterostomy

	Complications	Number of cases (n=6)
1	Kink at anastomotic site	1
2	Acute tubular necrosis	3
3	Urinary tract infection	2

reported between 1.9% and 12.6%, which is comparable to the complication rate of extravesical UNC procedure, which is reported between 2% and 12%.^[13-18] Lapointe *et al.* reported an overall complication rate of 8.4% in pediatric population using end-to-end ureteroureterostomy. It is also an attractive choice in pediatric kidney transplant because the need for anastomosis on larger vessels necessitates longer length of ureter in children and it also reduces chances of developing vesicoureteral reflux (VUR).^[19] In our study, we also did native ureteroureterostomy in two pediatric transplant patients and neither of them had any complications.

Gurkan *et al.* also showed no difference in urological and anastomotic complication rate using Lich-Gregoir UNC and ureteroureterostomy technique in their prospective randomized trial. VUR was also not seen in any of cases of ureteroureterostomy group, and it was attributed to the preservation of antireflux mechanism.^[20]

Faenza *et al.* reported similar urological complications in both Lich-Gregoir and ureteroureterostomy group patients and also observed decreased postoperative urinary infections, an easier possibility to resolve ureteral stenosis with endourology, and no reflux. They adopted it as a first option for urinary tract reconstruction in kidney transplant.^[21] Nie *et al.* stated that ureteroureterostomy does not change overall incidence of urological complications comparing to UNC, and it decreases the incidence of urine leakage.^[22] In a recent meta-analysis, similar complication rates were reported suggesting that both the procedures can be accepted as primary anastomotic techniques.^[23]

Ureteroureterostomy can be performed end-to-side with leaving native kidney *in situ* or end-to-end with proximal ligation of native ureter with or without native nephrectomy. Lord *et al.* published a case series of 23 patients of renal transplant, in which uretero- or pyeloureterostomy was done with ligation of native ureter without native nephrectomy. There were no complications after median of 22 months of follow-up in relation to native kidney. Hence, they concluded that end-to-end ureteroureterostomy without native nephrectomy can be safely performed for the management of ureteric complications following renal transplant.^[24]

In small capacity bladder, ureteroureterostomy was used, and bladder was managed postoperatively either with medical or surgical management (augmentation cystoplasty), according to the symptoms of the patients. Hence, ureteroureterostomy has certain definitive advantages such as preservation of original antireflux mechanism, maintenance of natural orifice facilitating future endourological procedure and decreased incidence of UTI attributed to decreased VUR and early removal of catheter.

At our center, we prefer extravesical Lich-Gregoir technique as our primary anastomotic technique in kidney transplant. We do not hesitate to use ureteroureterostomy in specific situations primarily. Our results of primary native ureteroureterostomy are encouraging with one complication of obstruction due to kink at ureteroureterostomy site with end-to-side anastomosis, which was managed endoscopically. Thus, now, we prefer end-to-end ureteroureterostomy over end-to-side anastomosis.

CONCLUSION

Ureteroureterostomy is technically and functionally a good option for ureteric re-implant in kidney transplant patients. Every transplant surgeon should be well versed with the technique and should be versatile enough to use the native ureter for urinary tract reconstruction, when needed.

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