

## Donor Nephrectomy With and Without Preservation of Gonadal Vein While Dissecting the Ureter

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**Introduction:** Preservation of the gonadal vein while dissecting the ureter for donor nephrectomy may decrease the distal ureteral ischemia and urological complications in kidney transplant recipients. In this study, we compared the outcome of kidney allografts harvested with preservation of the gonadal vein while dissecting the ureter with allografts harvested without preserving the gonadal vein.

**Materials and Methods:** We reviewed 167 consecutive kidney transplantations between April 2003 and April 2004. During donor nephrectomy, we preserved the gonadal vein in 106 harvested kidneys (group 1), while we did not preserve this vein in 61 allografts (group 2). The recipients in each group were followed up for a 2-year follow-up on average, and the outcomes including ureteral complications, graft loss, and patient and graft survival were compared between the two groups.

**Results:** Urine leakage was noted in few patients (2 in group 1 and 3 in group 2) and its frequency was not significantly different between the two groups ( $P = .26$ ). Ureteral stricture was not seen in any of the kidney allograft recipients. No differences were found in the frequencies of acute rejection episodes, graft loss, and death between the two groups.

**Conclusion:** Preservation of the gonadal veins did not significantly decrease the frequency of ureteral complications in the kidney transplant recipients. We recommend meticulous handling of the ureter in donor nephrectomies to prevent further remote complications regardless of the approach to the gonadal veins while nephrectomy.

Keywords: kidney transplantation, nephrectomy, blood supply, ureter, living donors

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### INTRODUCTION

Ureteral problems seem to be of the most urological complications occurring after kidney transplantation. Although the frequency of posttransplant urological disorders has declined from a range of 3.5% to 30% to less than 5% in the recent years,<sup>(1,2)</sup> ureteral obstruction, accounting for up to one-third of all significant urological complications,<sup>(3)</sup> is still a challenge, and 2% to 10.5% of

the recipients develop ureteral stricture.<sup>(4-7)</sup> The most common cause of ureteral stricture is distal ischemia that may result from a compromised blood supply state due to the operative technique or high-dose immunosuppression.<sup>(8)</sup>

Deterioration of blood supply of the ureter and the adjacent tissues has a causative effect in the development of posttransplant ureteral problems. In addition,

surgical trauma to the ureteral sheath may cause a functional obstruction because of adherence of the ureter to the adjacent structures.<sup>(9)</sup> Surgical errors play independent roles in alternation of blood supply by causing two technical problems. Firstly, stripping the ureter of its adventitia and connective tissue leads to ischemia; and secondly, dissection of the renal artery too near to the renal hilum may develop a compromised state of blood flow in the ureteral branch of this artery. In addition, traction on the renal vessels during removal of the kidney may cause distal ureter ischemia.<sup>(10)</sup> Consequently, trauma to the renal artery during donor nephrectomy may cause distal ureteral ischemia through multiple causes.<sup>(1)</sup>

Division of the ureter may not cause significant ischemia; secondary branches of the ascending and descending arteries in the ureteral sheath always penetrate the adventitial coat of the ureter, providing a freely anastomotic arterial plexus for the entire length of the ureter. Owing to these vascular anastomoses, distal ureteral ischemia is not expected in the site of division of the ureter. Since the vessels do not have long branches immediately from the plexuses in one-fourth of the patients, injuries to the ureters are not uniformly accompanied by distal ureteral ischemia.<sup>(9)</sup>

Some reports addressed the probability of decreasing ureteral complications after dissection of the ureter in conjunction with the gonadal veins rather than its dissection without preservation of the gonadal veins.<sup>(4-6)</sup> Although ureteral blood supply is not directly related to the gonadal vein, it is closely dependent on the surrounding tissues that contain the gonadal vein. It has been proposed that dissection of the ureter together with the gonadal vein would guarantee enough blood supply to the ureter.<sup>(6,11,12)</sup> In this study, we compared dissection of the ureter with and without preservation of the gonadal veins in donor nephrectomies for kidney transplantation.

## MATERIALS AND METHODS

In this study, we reviewed the outcome of kidney transplantation in terms of ureteral complications in 167 consecutive kidney transplants. Transplantations were performed in Shahid Modarres Hospital between April 2003 and April

2004, a relatively homogeneous period regarding the surgical techniques and of clinical care. All of the allografts were harvested from living related or unrelated donors. The technique of donor nephrectomy was open classic retroperitoneal approach using flank incision. The harvested kidney was then transplanted to the recipient by the same surgeon and ureterocystostomy was done using the Lich-Gregoire technique.<sup>(13,14)</sup> A Foley catheter was used to drain the bladders of all patients for at least postoperative 7 days.

In 106 donors, we harvested the kidneys and the gonadal veins were preserved while dissecting the ureter (group 1), whereas in 61, we did not preserve the gonadal veins (group 2). The ureter was transected at the level of the common iliac vessels in both groups and particular attention was given to avoiding dissection in the triangular area formed by the kidney, renal hilum, and gonadal vein stump. In group 1, the ureter was dissected conjoint to the gonadal vein. In group 2, we performed double ligation of the gonadal veins and transected just distal to the renal veins.

Cyclosporine-based immunosuppressive regimen was used for all of the kidney recipients. Indwelling ureteral stents were used for approximately one month. Daily serum biochemistry as well as careful clinical observation was used for monitoring the allograft function during the hospital stay. Following discharge, our protocol consisted of clinical examination and biochemical assay every 15 days for the first month and monthly thereafter. For all patients with increased serum creatinine level (greater than 1.3 mg/dL) or an increasing trend of serum creatinine, ultrasonographic evaluation of the urinary tract was performed.

Urological complications and graft and patient outcomes were compared between the two groups. Statistical analyses were performed using the chi-square test, the *t* test, and the nonparametric Mann-Whitney U test for comparisons. The Kaplan-Meier method and log rank test were used for assessment of rejection-free graft survival and patient survival in the two groups. A *P* value less than .05 was considered significant.

## RESULTS

Table 1 demonstrates the recipients and donors' characteristics. The mean duration of follow-up was  $718 \pm 128$  days and  $687 \pm 106$  days for the recipients in groups 1 and 2, respectively ( $P = .34$ ).

Two patients in group 1 (1.9%) and 3 in group 2 (4.9%) developed urinary leakage ( $P = .26$ ). This complication was handled by insertion of a bladder catheter and the leakage was eliminated in all of the patients. No ureteral stricture was noted in any of the kidney recipients. Table 2 demonstrates the operative parameters and the outcomes in the two groups. There was no significant difference between the recipients in the two group regarding the mean rejection-free graft survival ( $835.0 \pm 19.4$  days versus  $799.0 \pm 31.4$

days in groups 1 and 2, respectively;  $P = .50$ ). Similarly, the mean patient survival was not different between the two groups ( $877.3 \pm 10.9$  days versus  $838.6 \pm 23.8$  days;  $P = .26$ ).

## DISCUSSION

Ureteral complications are one of the most important urologic problems occurring in the recipients of kidney allografts. Prevention of urologic complications requires a high level of surgical expertise. Extravesical approaches for ureteroneocystostomy, including a short muscular tunnel over the ureteral tip to prevent reflux, have provided a technique with fewer ureteral obstructions.<sup>(15,16)</sup> Since the shorter length of the ureter is required, the ischemic stricture is probably reduced and extrinsic compression from the submucosal tunnel is also avoided.<sup>(17)</sup>

Several prospective randomized studies suggested using prophylactic ureteral stents to reduce major ureteral complications.<sup>(17-19)</sup> Some authors recommend preserving gonadal vein with ureter to preserve the normal blood supply of the ureter.<sup>(2)</sup> However, this technique is still a matter of controversy among transplant surgeons. Fisher and colleagues<sup>(20)</sup> reported the incidence of ureteral complications in 200 consecutive hand-assisted laparoscopic donor nephrectomies. Of the first 25 donors who underwent ureteral dissection without gonadal vein, 2 experienced ureteral complication. In this study, 9 of 175 patients who underwent ureteral dissection accompanied with gonadal vein experienced ureteral complications. Low frequency of ureteral complications and performing a different procedure in small number of patients in one group precludes the statistical power to detect the difference between the two groups.

In a recent survey on 300 consecutive laparoscopic donor nephrectomies, researchers found no significant ureteral obstruction in those who received kidney allograft using the technique of ureteral dissection without preservation of the gonadal vein.<sup>(21)</sup> This study, however, had no control group. Lind and coworkers reported ureteral complications in recipients of 48 laparoscopic donor nephrectomies versus 49 open donor

**Table 1.** Characteristics of Kidney Allograft Recipients and Donors in Two Groups of Donor Nephrectomies With Gonadal Preservation (Group 1) and Without Gonadal Vein Preservation (Group 2)\*

Variables	Group 1	Group 2	P
Number of transplants	106	61	...
Mean donor's age, y	$28 \pm 4$	$27 \pm 4$	.10
Donor's sex			
Male	88 (83.0)	48 (78.7)	
Female	18 (17.0)	13 (21.3)	.49
Donor's side of kidney			
Left	76 (71.7)	37 (60.7)	
Right	30 (28.3)	24 (39.3)	.14
Mean recipient's age, y	$38 \pm 13$	$35 \pm 12$	.20
Recipient's sex			
Male	65 (61.3)	36 (59.0)	
Female	41 (38.7)	25 (41.0)	.77
Mean operative time, min	$107.0 \pm 7.3$	$109.0 \pm 7.5$	.14
Mean hospital stay, d	$17 \pm 16$	$16 \pm 6$	.40

\*Values in parentheses are percents. Continuous variables are demonstrated as mean  $\pm$  standard deviation.

**Table 2.** Outcomes of Kidney Allograft Recipients in Two Groups of Donor Nephrectomies With Gonadal Preservation (Group 1) and Without Gonadal Vein Preservation (Group 2)\*

Variables	Group 1	Group 2	P
Mean follow-up, d	$718 \pm 128$	$688 \pm 106$	.34
Mean serum creatinine at discharge, mg/dL	$1.48 \pm 0.97$	$1.23 \pm 0.40$	.06
Urinary leakage	2 (1.9)	3 (4.9)	.26
Acute rejection	8 (7.5)	6 (9.8)	.61
Graft loss	2 (1.9)	2 (3.3)	.46
Death	2 (1.9)	3 (4.9)	.26

\*Values in parentheses are percents. Continuous variables are demonstrated as mean  $\pm$  standard deviation.

nephrectomies. They did not dissect the ureter together with the gonadal vein. The ureter was implanted in the bladder using a transvesical implantation technique. In that report, the frequency of ureteral complications was relatively low. Therefore, they concluded the requirement for dissection of the ureter together with the gonadal vein still remained under debate.<sup>(11)</sup>

Harvesting the kidney without preserving the gonadal vein provides the ureter without the surrounding connective tissue; consequently, it makes easy handling of the ureter during implantation and eliminates interventions for trimming.<sup>(21)</sup> Particularly in this technique, less unnecessary tissue of the donor is delivered to the recipient. In addition, this approach simplifies nephrectomy, and transection of the gonadal vein at the level of renal vein provides more acceptable access to the lumbar vein. Dissection of the ureter away from the gonadal vein allows easier evaluation of the ureter.

We considered some tips in the surgical technique of our group 2 in whom the gonadal vein was not preserved to guarantee ureteral safety: firstly, we avoided using cautery to dissect the gonadal vein and the ureter; and secondly, we were cautious not to enter the “golden triangle” between the ureter, kidney, and renal artery. Probably for this reason, ureteral complications were not significant compared with those in the recipients with gonadal vein-preserving donor nephrectomy. To our best knowledge, this is the first comparative study to compare urological complications in recipients who received kidneys with and without preservation of the gonadal vein while dissecting the ureter in open donor nephrectomy.

## CONCLUSION

To maintain ureteral blood supply in donor nephrectomy, dissection of the ureter in conjunction with the gonadal vein seems unnecessary and remains optional. Focusing on gentle handling of the ureter during donor nephrectomy and ureteroneocystostomy might protect the ureter from further complications.

## CONFLICT OF INTEREST

None declared.

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