

Clinical Characteristics of Renal Transplant Recipients that Underwent Urologic Surgery for de novo Disease Before and After Transplantation

The pre-transplantation goal of the urologist is the optimization of urinary tract condition. Therefore, urologic surgery may be needed before or after renal transplantation. We analyzed the results of urologic surgery performed because of de novo urologic diseases. Between January 1986 and January 2001, 281 patients underwent renal transplantation, and 23 urologic surgical procedures were performed on 21 transplant recipients before or after renal transplantation because of de novo urologic diseases. By review the major reasons for urologic surgery in recipients were polycystic kidney diseases, vesicoureteral reflux, and dysfunctional voiding disorders. Nineteen surgical corrective procedures were done average 2.9 months before transplantation. The mortality rate was 10.5%. Four patients underwent urologic surgery at an average 57.5 months after transplantation. We highlight the fact that patients with uremia are vulnerable to surgical complications, and conclude that more intensive long-term urologic follow-ups should be conducted on recipients.

Key Words : Kidney Transplantation; Urology; Abnormalities; Urologic Surgical Procedures

**Kwan-Sik Bae, Jung-Sik Huh*,
Young-Joo Kim*, Sung-Goo Chang**

Department of Urology, School of Medicine, Kyung Hee University, Seoul; Department of Urology*, College of Medicine, Cheju National University, Jeju, Korea

Received : 24 February 2004

Accepted : 11 August 2004

Address for correspondence

Sung-Goo Chang, M.D.

Department of Urology, Kyung Hee University Medical Center, 1 Hoegi-dong Dongdaemun-gu, Seoul 130-702, Korea

Tel : +82.2-958-8533, Fax : +82.2-959-6048

E-mail : sgchang@khu.ac.kr

INTRODUCTION

Renal transplantation is a successful and widely used treatment for renal insufficiency. Better organ matching, improved surgical techniques, and more effective immunosuppressive drugs have led to a steady increase in graft survival.

Although major technical obstacles have been overcome, strict attention to detail is still mandatory in every phase of the transplantation process from initial recipient evaluation until surgical procedure completion.

Pathological findings of urinary tract can occur in up to 25% of patients with end-stage renal disease (1). Therefore, urologic surgery may need to be performed before or after renal transplantation.

The present study reviews the outcomes of 23 urologic surgical procedures performed because of de novo urologic diseases in 21 renal transplant recipients.

MATERIALS AND METHODS

Between January 1986 and January 2001, 281 patients underwent renal transplantation at Kyung Hee University Medical Center. All patients received organs from living related donors. Twenty-one of these patients also underwent urologic surgery before or after renal transplantation because of de novo urologic disease. Patients that required urologic surgery because of complications after renal transplantation were ex-

cluded. Urinalysis, urine culture, and urodynamic studies were performed in all patients. In anuric patients, bladder washing for cytology and culture were performed. The urologic physical examinations included an assessment of the bulbocavernous reflex, anal tone, and perineal sensation. The recipients also underwent voiding cystourethrography prior to renal transplantation. Renal function was followed postoperatively by monitoring serum creatinine and urine output. Additional imaging studies were done according to clinical need.

RESULTS

Patient characteristics

Overall, 21 patients (7.4%) underwent 23 urologic surgeries because of de novo urologic disease. Mean patient age was 38.1 yr. Nine patients were male and 12 were female, and all recipients received grafts from related donors.

Urologic surgery before renal transplantation

Nineteen urologic surgical procedures were performed on 17 patients prior to renal transplantation, and these procedures were done an average 2.9 months (range, 0-8 months) before transplantation. Two patients underwent dual surgery, i.e., bilateral nephroureterectomy with augmentation enterocystoplasty for bilateral vesicoureteral reflux (VUR) with a

contracted bladder, and ileal diversion with bilateral nephroureterectomy for a neuropathic bladder with bilateral VUR. Bilateral nephrectomy was done in 7 patients with extremely large polycystic kidneys. Four of the 7 patients had recurrent bleeding into cysts, pain, and an extremely large kidney. One of these patients expired due to postoperative uncontrolled bleeding. Bilateral nephroureterectomy was performed in 6 patients with bilateral VUR and recurrent urinary tract infections. One of these six expired due to postoperative bleeding. The mortality rate was 10.5% in the patients with urologic surgery before renal transplantation. Ileal urinary diversion without cystectomy was done in 3 female patients for a contracted or neuropathic bladder. These diversions were performed at the same time as the renal transplantation (Table 1).

Urologic surgery after renal transplantation

Four patients underwent urologic surgery an average 57.5 months (range, 2-122 months) after transplantation. One patient with recurrent urinary tract infection for VUR had a

Table 1. Urologic surgery performed in recipients before renal transplantation

Procedures	No. of patients	Diseases	Time before RT (months)
Bilateral nephrectomy	7	Polycystic kidney	4.4
Bilateral nephroureterectomy	6	Both vesicoureteral reflux	2.2
Ileal diversion	3	Contracted bladder (n=2) Neurogenic bladder (n=1)	Same time with RT
Unilateral nephroureterectomy	1	Unilateral vesicoureteral reflux	2.0
Augmentation enterocystoplasty	1	Contracted bladder	8.0
Internal urethrotomy	1	Urethral stricture	1.0

RT, renal transplantation.

nephroureterectomy 48 months after renal transplantation, and simple nephrectomy was performed 122 months after renal transplantation in a patient with spontaneous rupture of an end-stage native kidney. Bilateral orchiopexy was performed in a 9-yr old patient who had undergone renal transplantation some 4 yr previously. One patient underwent transurethral resection of the prostate (TURP) for benign prostatic hyperplasia (BPH) because of voiding difficulties that were aggravated after renal transplantation (Table 2).

We experienced one case of renal cell carcinoma in an end-stage native kidney 25 months after transplantation. However, the patient refused surgery and the case details are not included in this study.

Result of urologic surgery

Two patients expired due to postoperative uncontrolled bleeding from bilateral nephrectomy for a polycystic kidney and bilateral nephrectomy for bilateral VUR, respectively. After ileal diversion with renal transplantation, one patient had a normal vaginal delivery. After transplantation, the two patients died due to chronic rejection with pericardial effusion and sepsis, respectively. However, graft survival was good in the other 21 patients (Table 3).

Table 2. Urologic surgery performed in recipients after renal transplantation

Procedures	No. of patients	Diseases	Time after RT (months)
Simple nephrectomy	1	Rupture of native kidney	122
Nephroureterectomy	1	Recurrent UTI for VUR of native ureter	48
Orchiopexy, both	1	Bilateral cryptorchidism	58
TURP	1	BPH	2.0

BPH, benign prostatic hyperplasia; RT, renal transplantation; TURP, transurethral resection of the prostate; UTI, urinary tract infection; VUR, vesicoureteral reflux.

Table 3. Results of urologic surgery conducted before or after renal transplantation

de novo urologic disease	No. of cases	Type of surgery	Time of surgery	Result	Follow-up months for Graft survival (range)	Other
Polycystic kidney	7	Bilateral nephrectomy	Before RT	Expired 1pt	150 (3-215)	1pt expired at post-RT 3 months
Both VUR	6	Bilateral nephroureterectomy	Before RT	Expired 1pt	18 (12-169)	1pt expired at post-RT 20 months
Neurogenic or contracted bladder	3	Ileal diversion	Simultaneous with RT		119 (116-121)	1pt successful vaginal delivery
Unilateral VUR	1	Unilateral nephroureterectomy	Before RT		38	
Contracted bladder	1	Augmentation cystoplasty	Before RT		13	
Urethral stricture	1	Internal urethrotomy	Before RT		61	
Spontaneous rupture of native kidney	1	Nephrectomy	After RT		122	
Unilateral VUR	1	Unilateral nephroureterectomy	After RT		119	
Bilateral cryptorchidism	1	Orchiopexy, both	After RT		58	
BPH	1	TURP	After-RT		57	

RT, renal transplantation; VUR, vesicoureteral reflux; BPH, benign prostatic hyperplasia; TURP, transurethral resection of prostate; pt, patient.

DISCUSSION

Renal transplantation is the best available therapy for most patients with end-stage renal disease. The pre-transplantation goal of the urologist is to optimize the condition of the urinary tract, which should be sterile, continent, and compliant before donor kidney transplantation (2).

Transplantation candidates may have undetected urologic abnormalities, and clinical symptoms that are minimal preoperatively can be exacerbated after the restoration of renal function by successful transplantation. If correction is considered, it is recommended that all anomalies should be repaired before transplantation to allow for proper healing before the patient is placed on immunosuppression (3). Many reports indicate that an abnormal lower urinary bladder or posterior urethral valves are no longer a contraindication to renal transplantation, as patients with lower urinary tract anomalies have previously been considered poor candidates for renal transplantation. However, newer techniques of diagnosis and reconstructive urologic surgery have extended the indications and improved the success rate of renal transplantation in these patients (4-6). Infection sources should be controlled to prevent a flare-up and possible septicemia that may occur after the initiation of immunosuppressive therapy with transplantation. In the present study, patients with VUR were corrected before transplantation, because they could incur septicemia during immunosuppressive therapy.

The indications for bilateral nephrectomy in patients with autosomal dominant polycystic kidney disease are recurrent infection, bleeding into cysts, and a huge kidney that interferes with pulmonary function (7). However, Stiasny et al. (8) found that overall patient and graft survival rates did not differ between those with and without a polycystic kidney. As urinary tract infection and lethal septicemia were the leading complications in patients with a polycystic kidney, careful monitoring for infections is important during the post-transplant follow-up. Four of 7 patients with polycystic kidney in our cases had bleeding into cysts and an extremely enlarged polycystic kidney; therefore, we performed bilateral nephrectomy.

Restoration of the urinary tract by urinary diversion, or augmentation enterocystoplasty should be also considered in patients with neurogenic bladder or in those with a contracted bladder (9, 10).

Natarajan et al. (11) reported successful pregnancy in patients with urinary diversion. In our study, one patient achieved a successful vaginal delivery. She underwent ileal urinary diversion at the time of her renal transplantation.

Reinberg et al. (12) recommended that nephrectomy should be performed 6 weeks to 3 months before transplantation, but not before the urethral procedure, to prevent dry urethral syndrome. We performed urologic surgery successfully 2.9 months before transplantation and obtained good result. However, perioperative morbidity and mortality rates are elevated

in patients with uremia. Cardiovascular disease is the most common cause of death in patients with renal disease (13) and bleeding tendency is also another significant risk factor. The most common hemorrhagic manifestations in uremia are prolonged bleeding from operation site, and this kind bleeding is exacerbated by anticoagulation therapy during hemodialysis (14). In the present study, two patients expired due to postoperative bleeding. To reduce mortality and morbidity, increased bleeding related to uremic platelet dysfunction can be managed by the administration of desmopressin, cryoprecipitate, or estrogens, and by avoiding the use of medication with antiplatelets close to the time of surgery. Hyperkalemia can be temporarily improved by the intravenous administration of an insulin-dextrose combination or bicarbonate, and polystyrene binding resins or dialysis can remove excess potassium stores (15).

Spontaneous renal allograft rupture has been occasionally reported (16). However, the rupture of an end-stage native kidney is relatively rare. Piccoli et al. (17) reported spontaneous renal rupture in a patient with acquired cystic kidney disease (ACKD) on hemodialysis. We performed emergency nephrectomy on a patient with a ruptured native kidney 122 months after transplantation. However, this is a life-threatening condition, and many recipients have ACKD. Therefore, close follow-up is needed for these patients. TURP can be performed before or after renal transplantation. However, Shenaky (18) reported that TURP in the patient with BPH might lead to bladder neck contracture or urethral scarring with recurrent stenosis, if it is performed before the reestablishment of urine flow by transplantation. Reinberg et al. (19) found that TURP can be safely performed immediately after renal transplantation only if; urine is sterile, antibiotics and steroids are carefully administered perioperatively, low-gravity irrigation is used, and hemostasis is meticulous. We performed TURP 2 months after renal transplantation without any incident, although renal cell carcinoma was detected 25 months after transplantation in a single patient. Surgery was not performed in this case because of patient refusal.

From the results of the present study, we conclude that the major reasons for urologic surgery in recipients are polycystic kidney disease, VUR, and dysfunctional voiding disorders. Surgical correction, with the exception of urethral surgery, should be performed at least 3 months before renal transplantation. However, it must be recognized that patients with uremia are vulnerable to surgical complications due to a bleeding tendency, although urologic surgery was not found to influence graft survival. We also conclude that more intensive long-term urologic follow-up must be undertaken for recipients.

ACKNOWLEDGEMENT

This work was supported by grant No. R13-2002-020-01001-0 from the Korean Science & Engineering Foundation.

REFERENCES

1. Jaeger P. *Problems concerning the bladder in renal transplantation. Prognosis replacement possibilities.* *Urol Int* 1992; 49: 94-8.
2. Koo HP, Bunchman TE, Flynn JT, Punch JD, Schwartz AC, Bloom DA. *Renal transplantation in children with severe lower urinary tract dysfunction.* *J Urol* 1999; 161: 240-5.
3. Nahas WC, Lucon M, Mazzucchi E, Antonopoulos IM, Piovesan AC, Neto ED, Ianhez LE, Arap S. *Clinical and urodynamic evaluation after ureterocystoplasty and kidney transplantation.* *J Urol* 2004; 171: 1428-31.
4. Parada B, Figueiredo A, Mota A, Furtado A. *Renal transplantation in patients with lower urinary tract dysfunction.* *Transplant Proc* 2003; 35: 1089-90.
5. Neild GH, Dakmish A, Wood S, Nauth-Misir R, Woodhouse CR. *Renal transplantation in adults with abnormal bladders.* *Transplantation* 2004; 77: 1123-7.
6. Capizzi A, Zanon GF, Zacchello G, Rigamonti W. *Kidney transplantation in children with reconstructed bladder.* *Transplantation* 2004; 77: 1113-6.
7. Rosenberg JC, Azcarate J, Fleischmann LE, McDonald FD, Menendez M, Pierce JM Jr, Whang CW. *Indication for pretransplant nephrectomy.* *Arch Surg* 1973; 107: 233-41.
8. Stiasny B, Ziebell D, Graf S, Hauser IA, Schulze BD. *Clinical aspects of renal transplantation in polycystic kidney disease.* *Clin Nephrol* 2002; 58: 16-24.
9. Martin MG, Castro SN, Castelo LA, Abal VC, Rodriguez JS, Novo D. *Enterocystoplasty and renal transplantation.* *J Urol* 2001; 165: 393-6.
10. Barry JM. *Kidney transplantation into patients with abnormal bladders.* *Transplantation* 2004; 77: 1120-3.
11. Natarajan V, Kapur D, Sharama S, Singh G. *Pregnancy in patients with spina bifida and urinary diversion.* *Int Urogynecol J Pelvic Floor Dysfunct* 2002; 13: 383-5.
12. Reinberg Y, Bumgardner GL, Allabadi H, Aliabadi H. *Urological aspects of renal transplantation.* *J Urol* 1990; 143: 1087-92.
13. Jaradat MI, Molitoris BA. *Cardiovascular disease in patients with chronic kidney disease.* *Semin Nephrol* 2002; 22: 459-73.
14. Weigert AL, Schafer AI. *Uremic bleeding: pathogenesis and therapy.* *Am J Med Sci* 1998; 316: 94-104.
15. Krishnan M. *Preoperative care of patients with kidney disease.* *Am Fam Physician* 2002; 66: 1471-6.
16. Nikonenko AS, Zavgorodni SN, Kovalev AA, Nikonenko TN. *Surgical strategies in spontaneous rupture of renal allograft.* *Klin Khir* 2002; 1: 37-9.
17. Piccoli GB, Bermond F, Mezza E, La Saponara F, Quaglia M, Gai M, Anania P, Biancone L, Jeantet A, Ferrando U, Segoloni GP. *Kidney rupture: an unusual and oligosymptomatic complication in a dialysis patient with acquired cystic disease.* *J Nephrol* 2002; 15: 394-7.
18. Shenasky JH. II. *Renal transplantation in patients with urologic abnormalities.* *J Urol* 1976; 115: 490-3.
19. Reinberg Y, Manivel JC, Sidi AA, Ercole CJ. *Transurethral resection of prostate immediately after renal transplantation.* *Urology* 1992; 34: 319-21.