

# Renal Transplantation at a Medical Center in Taiwan

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The purpose of this study was to evaluate the results of renal transplantations performed at our hospital from 1992 through 1998. A total of 22 renal transplantations were performed during this period, while the sources of kidneys included three living donors and 11 cadavers. The kidneys from the living donors were instilled after nephrectomy. The kidneys from cadaver donors were instilled in situ. The gender ratio of recipients was 13 females to nine males. The types of dialysis before transplantation were 12 with hemodialysis and 10 with continuous ambulation peritoneal dialysis (CAPD). The blood types of recipients were three with type A, six with type B, 11 with type O and two with type AB. The complications after transplantation included urinary leakage (n = 1), lymph leakage (n = 1), IgA nephropathy (n = 1), cytomegalovirus infection (n = 1), herpes simplex virus infection (n = 2), acute renal failure (n = 2) and graft renal artery stenosis (n = 1). The patient with graft renal artery stenosis was diagnosed using angiography and treated with percutaneous transluminal angioplasty (PTA). Two patients experienced rejection, one had acute rejection and received graft nephrectomy about three months after the transplantation, the other had a nonfunctioning graft due to chronic rejection about 18 months after the transplantation. Four of the patients in this study died. The causes of death included sepsis in two patients, malignant lymphoma with bony metastasis in one and fulminant hepatitis associated with upper gastrointestinal bleeding in one. The survival rates at 3 months after transplantation were 95.2% for the grafts and 95.2% for the patients; those at 1 year were 81.3% for the grafts and 87.5% for the patients and those at 3 years were 81.8% for the grafts and 90.9% for the patients. ( *Mid Taiwan J Med* 1999;4:121-8 )

## Key words

graft nephrectomy, lymph leak, rejection, renal transplantation, urinary leak

## INTRODUCTION

Diabetes is the most frequent cause of end-stage renal disease (ESRD), followed in order by hypertension, glomerulonephritis, and cystic disease [1]. Renal transplantation is the

preferred method of treatment for most patients with ESRD because it is more effective in the reduction of mortality and morbidity and improvement of quality of life [2-4]. In 1933, the first human renal allograft was performed by Voronoy in the Ukraine [5]. The recipient was a 26-year-old woman who had attempted suicide by ingesting mercuric chloride. The donor was a 66-year-old man whose kidney was removed 6 hours after

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death. With the recipient under local anesthesia, the renal vessels were anastomosed to the femoral vessels and a cutaneous ureterostomy was performed. Only a small amount of blood-stained urine appeared, but the patient died 48 hours after the procedure. The first long-term success with human renal allografting occurred in Boston in 1954 when a kidney from one twin was transplanted into the other, who had ESRD [6]. In Taiwan, the first successful renal transplantation was performed by Lee et al. at the National Taiwan University Hospital (NTUH) in 1968 [Association of Organ Transplantation, R.O.C.]. Since then, renal transplantation has gradually become more common in Taiwan. From 1968 through 1997, 1375 patients accepted renal transplant operations in Taiwan. At our hospital, the first renal transplantation was performed in 1992. The recipient was a 29-year-old man who received one kidney from his mother. A total of 22 cases of renal transplantation were performed from October 1992 through November 1998. These cases are reviewed and analyzed in this article.

#### **MATERIALS AND METHODS**

From October 1992 through November 1998, 22 cases of renal transplantations were performed at our hospital. All the recipients and the donors had received studies of major histocompatibility (MHC) complexes, human lymphocyte antigen (HLA) tissue typing and blood typing. The tissue typing mainly focused on the HLA types of A, B and DR. The procedures, including donor nephrectomy, renal instillation, storage of kidney and renal implantation, were performed by urologists. The method of instillation of the kidneys from the living donors was different from those of the cadaver donors. In the living donors, the kidneys were instilled after nephrectomy, while the kidneys of the cadavers were instilled in situ. The well-procured kidneys were preserved in aseptic plastic bags within iceboxes.

The following techniques were used for implantation of the graft kidneys. Either side of the iliac fossas is satisfactory for renal implantation. For venous return, an end-to-side anastomosis was performed between the graft renal vein and the recipient external iliac vein. For arterial blood supply, the renal artery of the implanted kidney was anastomosed with the side of external iliac artery or to the end of the internal iliac artery. The choice of a double J internal stent insertion at the discretion of the surgeons. Most ureteral implantations were performed using the extra-vesicle method over the lateral anterior aspect of the bladder.

#### **RESULTS**

The basic data of the 22 renal transplant recipients are listed in Table 1 and the yearly distribution of these patients is shown in Fig. 1. There were 13 females and nine males. Their mean age was 37 years (range, 16 to 60 years). Twelve had received hemodialysis and 10 had received continuous ambulatory peritoneal dialysis (CAPD) before transplantation. The mean duration of dialysis was 27.4 months (range, 5 to 89 months). The distribution of the recipients' blood groups were three with type A, six with type B, 11 with type O and two with type AB. Most of the graft kidneys were implanted in the right iliac fossa and only three in the left iliac fossa. Sixteen of the graft kidneys received arterial blood supply from the internal iliac artery and six from the external iliac artery.

Nineteen of the graft kidneys were taken from 11 cadaver donors and the remaining three were from three living-related donors (Cases 1, 4 and 6, from the patients' mother, husband and father, respectively). The mean age of the cadaver donors was 23.9 years (range, 8 to 40 years) and that of the living donors was 51.7 years (range, 45 to 60 years). One of the cadaver donors whose kidney was transplanted into Case 21 was found to have hepatitis C virus infection.

Table 1. Basic data of 22 renal transplant recipients

No.	Age (yr)	Sex	Blood* group	Dialysis	Duration of dialysis (mo)	Implantation site	Arterial supply	Rejection
1 <sup>†</sup>	29	M	A	HD	6	Rt	I	No
2	37	F	O	CAPD	21	Lt	E	No
3	61	M	O	HD	5	Rt	I	No
4 <sup>†</sup>	56	F	O	HD	24	Rt	I	No
5	30	M	B	HD	10	Rt	I	No
6 <sup>†</sup>	17	M	B	CAPD	12	Rt	I	No
7	46	F	O	HD	29	Lt	I	Yes
8	44	F	O	CAPD	24	Rt	E	No
9	42	F	O	HD	22	Rt	I	No
10	18	F	O	CAPD	23	Rt	I	Yes
11	25	F	B	HD	23	Rt	I	No
12	29	F	B	HD	20	Rt	I	Yes
13	39	F	A	HD	43	Rt	I	No
14	16	M	A	CAPD	8	Rt	I	Yes
15	44	F	B	HD	41	Rt	I	Yes
16	48	F	B	CAPD	36	Lt	E	No
17	54	M	AB	HD	12	Rt	E	No
18	47	F	AB	CAPD	5	Rt	E	No
19	16	M	O	CAPD	89	Rt	I	No
20	40	M	O	HD	24	Rt	I	No
21	28	M	O	CAPD	20	Rt	E	No
22	30	F	B	CAPD	62	Rt	I	No

\*All cases were Rh positive. <sup>†</sup>Received a kidney from a living-related donor. M=male; HD=hemodialysis; Rt=right iliac fossa; I=internal iliac artery; F=female; CAPD=continuous ambulence peritoneal dialysis; Lt=left iliac fossa; E=external iliac artery.

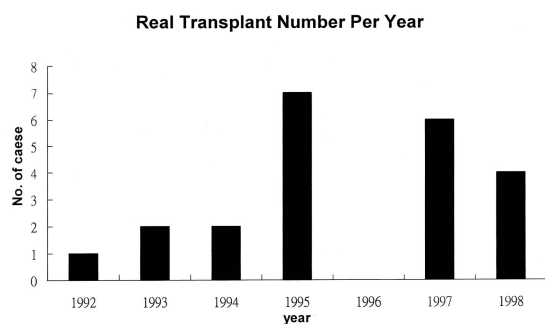


Fig.1 The yearly distribution of renal transplantation in our hospital.

The postoperative complications are listed in Table 2. Case 1 had urinary leakage that was demonstrated by high creatinine level in the discharge. Case 2 experienced lymph leakage that presented as persistent discharge (more than 100 ml/day) for two weeks after transplantation. The creatinine level in the discharge was the same as the serum

creatinine level. Other complications included IgA nephropathy (Case 5), cytomegalovirus (CMV) infection (Case 6), graft failure (Case 7, without nephrectomy), herpes simplex virus infection (Cases 9 and 12), acute renal failure (Cases 10 and 14), acute rejection (Case 15, received graft nephrectomy), and graft renal artery stenosis [Case 18, being treated with percutaneous transluminal angioplasty (PTA), Fig. 2]. In addition, most of the recipients experienced at least one episode of urinary tract infection (UTI) after transplantation.

Four patients died during the follow-up period. Case 4 died of sepsis on the 55th day after transplantation. Case 12 had herpes simplex virus and Epstein-Barr virus (EBV) infection, and died 22 months after transplantation due to acute pyelonephritis (APN) with sepsis. Case 3 died of malignant lymphoma with bone metastasis 37 months after transplantation. Case 13 died of fulminant hepatitis with upper gastrointestinal (UGI) bleeding 4 months after transplantation.

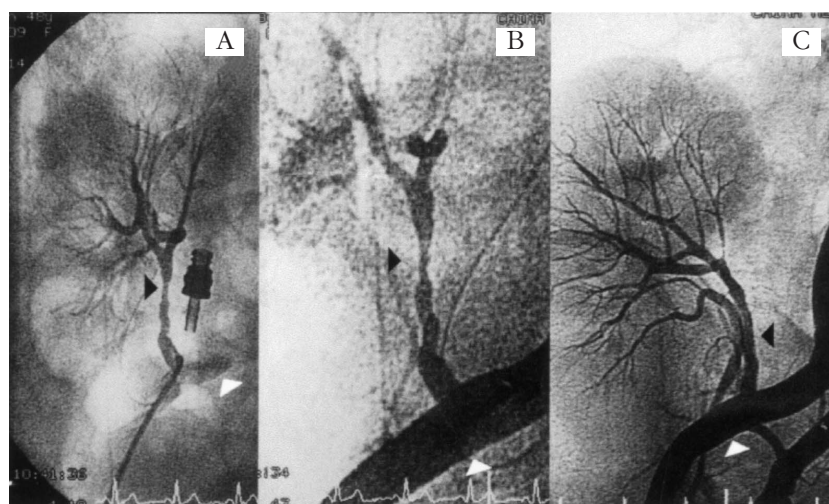


Fig.2 Renal artery stenosis occurred about 5 months after renal transplantation (Case 18). A: angiography showing graft renal artery stenosis (black arrowhead), this artery was supplied by the external iliac artery (white arrowhead). B: the close-up view of A. C: angiography performed after percutaneous transluminal angioplasty. The previous stenosis was successfully dilated.

Table 2. The graft and patient survivals and complications in 22 renal transplant recipients

No.	Graft		Patient		Complication
	Survived	Duration (mo)*	Survived	Duration (mo)*	
1	Yes	73	Yes	73	Urinary leakage
2	Yes	68	Yes	68	Lymph leakage
3	No	37	No	37	Lymphoma with bone metastasis
4	No	2	No	2	Sepsis
5	Yes	51	Yes	51	IgA nephropathy
6	Yes	45	Yes	45	CMV infection, APN
7	No	18	Yes	44	Graft failure
8	Yes	44	Yes	44	
9	Yes	37	Yes	37	HSV infection
10	Yes	37	Yes	37	Acute renal failure
11	Yes	36	Yes	36	
12	No	22	No	22	HSV, EBV infections APN with sepsis
13	No	4	No	4	Fulminant hepatitis, GI bleeding
14	Yes	16	Yes	16	Acute renal failure
15	No	3	Yes	14	Acute rejection <sup>†</sup>
16	Yes	14	Yes	14	
17	Yes	11	Yes	11	
18	Yes	11	Yes	11	Graft artery stenosis <sup>‡</sup>
19	Yes	8	Yes	8	
20	Yes	8	Yes	8	
21	Yes	4	Yes	4	
22	Yes	3	Yes	3	

\*Duration of follow-up or time between transplantation and graft failure or death. <sup>†</sup>Treated with graft nephrectomy. <sup>‡</sup>Treated with percutaneous transluminal angioplasty. CMV=cytomegalovirus; APN=acute pyelonephritis; HSV=herpes simplex virus; EBV=Epstein-Barr virus; GI=gastrointestinal.

The survival rates at 3 months after transplantation were graft, 95.2% and patient, 95.2%; those at 1 year were graft, 81.3% and patient, 87.5% and those at 3 years were graft, 81.8% and patient, 90.9%.

## DISCUSSION

Renal transplantation is considered the optimum therapeutic modality for most of the

patients with ESRD. However, this is a major operation with significant mortality and mobility rates. Some complications are related to the surgical procedures, including urinary leakage, lymph leakage, graft renal artery stenosis, and others are related to the administration of immunosuppressive agents, including infections and malignancies. In addition, graft rejection is also a concern after the transplantation.

One of our patients (Case 1) had urinary leakage 2 weeks after the renal transplantation. This complication presented as discharge with high creatinine level and was treated by surgical intervention. Urinary leakage is usually due to ureteral ischemia. The leak site can be detected by either ultrasonography or nuclear renography, however, antegrade pyelography is the most accurate method [7]. Percutaneous nephrostomy is a simple and less invasive method for the treatment of ureteral leakage. Fontaine et al. [8] treated 17 patients with ureteral leakage using percutaneous nephrostomy. Ten (59%) of them healed after percutaneous nephrostomy and the remaining seven (41%) patients did not respond and went on to surgical repair. Lymph leakage is another complication after renal transplantation. This complication may lead to the formation of lymphocele. The presentation may be insidious or overt, with an early or delayed appearance. The manifestations include palpable rectal or suprapubic mass, unilateral leg edema, and urinary tract obstruction with recurrent urinary infections. Intravenous urography may show a filling defect in the bladder [9]. The treatment of lymphocele includes conservative treatment, repeated aspirations, and internal drainage into the peritoneal cavity with marsupialization through an intraperitoneal window of the lymphocele [9,10]. Unless urinary obstruction is present, conservative treatment should be the first choice because spontaneous resolution may occur [9]. The patient with lymph leakage was treated conservatively in our series. There is

surprisingly little information about complications after transplant nephrectomy reported in the literature. According to the report by Chiverton et al. [11], 154 (32%) of the 480 transplanted kidneys were removed during a 10-year period. While 72% of graft nephrectomies were performed because of severe acute rejection (occurred within 3 months of renal transplantation), 25% of graft nephrectomies were performed because of graft failure due to chronic rejection. In our series, one patient received graft nephrectomy due to acute rejection, and another patient had graft failure at 18 months after transplantation, but he did not have graft nephrectomy. The strategy of timing of transplant nephrectomy after renal transplantation has not been well defined [12].

Transplant renal artery stenosis, a complication with an incidence of 6.6% and is usually due to atherosclerosis and fibrosis at the anastomosis [13], occurred at a mean of 11 months after transplantation in one series [14]. This condition can be diagnosed using Doppler waveform analysis or arteriography [15]. PTA is the therapy of choice in patients with renovascular hypertension due to arterial stenosis by fibromuscular dysplasia. For patients with atherosclerotic renal artery stenosis or stenosis of a renal artery in a transplanted kidney, the treatment should be selected according to the anatomy of the lesion and clinical characteristics [16]. PTA is a less invasive and more effective procedure for transplant renal artery stenosis. At 12 months after using the artery dilation method, clinical improvement was achieved in 81% and cures in 6% of all patients [17].

One patient (Case 3) developed malignant lymphoma with bony metastasis and died 37 months after renal transplantation. It has been well recognized that the incidence of malignancy in transplant recipients is markedly increased. In the report of Yang et al. [18], 24 (6.2%) of 390 renal transplant recipients had 25 cancers after transplantation. The relative risk of renal malignancy was 13.8-



fold higher among transplant recipients than in the general population. The most common types of cancer were transitional cell carcinoma (TCC) of the urinary tract (8/25) and hepatoma (8/25). The distribution of malignancies in the study of Yang et al. was different from that reported from Spain [19]. The median reported interval from renal transplantation to tumor development was 58 months [20]. Among the renal transplant recipients, those who develop tumors have a lower long-term survival rate [19]. Immunosuppressed patients are more likely to develop cancer than age-matched control subjects in the general population [21]. EBV has been suggested to be the cause of malignant lymphoma [22]. Although the risk of malignant tumor is small in comparison with the benefits of transplants, these patients should be followed up for signs of cancer [23].

Numerous investigators have reported an increased incidence of pneumonia caused by gram-negative bacilli and other secondary pathogens in transplant recipients infected by cytomegalovirus (CMV) [10]. The increased rate of gram-negative bacillary isolation from gargle specimens during CMV infections was not caused by immunosuppressive agents, rejection episodes, antibiotic administration, concomitant hepatitis B virus infection, EBV infection, herpes simplex virus infection, or alterations in salivary fibronectin concentration [10]. UTI may occur frequently during the first year after renal transplantation. However, the incidence of UTI does not increase in patients who received pig-tail catheter or ureteral stent. In addition, the presence of UTI have no significant impact on either graft or patient survival rates at 3 years [24].

Technological and immunological developments have given a variety of therapeutic modalities by which ESRD may be satisfactorily managed [25]. Recipient and graft survival rates are basically related with the degree of histocompatibility and the changing of therapeutic strategy [26]. With the exception

of renal transplantation between identical twins, none of these modalities provides permanent or complete correction of the uremic state [25]. The best results were found in 33 transplants involving HLA identical siblings, with a 5-year actuarial survival rate of 89%, a 10- and 15-year survival rate of 70% [26]. In our series, the 1-year graft survival rate was 81.25% and the patient survival rate was 87.5%, they were comparable with those reported from the NTUH where the 1-year graft survival was 78% and the patient survival rate was 91% [27].

In conclusion, although our experience on renal transplantation was limited, the initial satisfactory results encourage us to make fast progress on our transplant project.

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## 台灣某醫學中心的腎臟移植經驗

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本研究的目的是評估1992年至1998年本院腎臟移植的結果。此期間共有22個病人在本院接受腎臟移植，其腎臟來源包括3個活體腎及來自11個屍體的19個屍體腎。活體腎於取出後再灌洗，屍體腎則在原位灌洗。受腎者年齡16至61歲，平均37歲；屍體捐腎者年齡8至40歲，平均23.9歲；活體捐腎者年齡45至61歲，平均51.7歲。受腎者22人中，9個為男性，13個為女性。腎臟移植前的透析為10個接受腹膜透析，12個接受血液透析。他們的血型分佈為A有3個，B有6個，O有11個，AB有2個。腎臟移植後合併症計有尿漏1例、淋巴漏1例、IgA腎臟病變1例、巨細胞病毒感染1例、單純疱疹病毒感染2例、急性腎臟衰竭2例及移植腎動脈狹窄1例。後者經血管攝影證實並經血管內擴張術治療。惡性腫瘤有淋巴瘤併發骨骼轉移1例。免疫方面，有1病患在移植後18個月後因慢性排斥而引起腎臟衰竭，另1病患在移植後3個月因急性排斥而接受移植腎摘除手術。死亡病例有4個，包括手術後敗血症1例、腎臟移植37個月後因惡性淋巴瘤1例、腎臟移植4個月後因猛爆性肝炎及消化道出血1例及腎臟移植22個月後因敗血症死亡1例。存活率方面則3個月腎存活率為百分之95.2%，病人存活率為95.2%；而1年腎存活率為81.3%，病人存活率為87.5%；3年腎存活率為81.8%，病人存活率為90.9%。（中台灣醫誌 1999;4:121-8）

### 關鍵詞

移植腎摘除，淋巴漏，排斥，腎臟移植，尿漏

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