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Original article

Evaluation of the relationship and postoperative glomerular filtration rate between the living donor and the recipients in kidney transplantation

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ABSTRACT

Objective: This study evaluated the relationship and postoperative glomerular filtration rate (GFR) between the living donors and the recipients in kidney transplantation. A 5-year review of living donor renal transplants in a single transplant center was performed.

Materials and methods: From January 2010 to February 2015, a total of 49 living donor kidney transplantations were performed at the China Medical University Hospital, Taichung, Taiwan. The relationship between donor and recipient and graft survival and changes in GFR during a 5-year period in a single center were retrospectively analyzed.

Results: These 49 living donor kidney transplants represent 68% of all transplants (49/72) that were performed during this 5-year review. The recipients' kidneys were donated from offspring donors (22.4%; mean age, 54.27 years), parent donors (32.7%; mean age, 27.56 years), sibling donors (24.5%; mean age, 37.18 years), and spouse donors (20.4%; mean age, 49.09 years). The GFRs of the recipients were significantly different between these four groups at the last follow-up. The mean last follow-up postoperative GFR of the recipients was 77.71 mL/min for offspring donors, 57.81 mL/min for parents donors, 61.17 mL/min for sibling donors, and 46.30 mL/min for the spouse donors ($p = 0.004$). Two graft losses were noted in the spouse living donor population due to infection (cytomegalovirus and urinary tract infection).

Conclusion: This study shows that the relationship of the donor to their recipient resulted in significant differences in the postoperative GFR and graft loss of the recipients. Recipients' kidneys donated from the spouse had the worst GFR compared to other groups.

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1. Introduction

Kidney transplantation (KT) is a treatment option for patients with end-stage renal disease, and offers better quality of life and survival benefit than long-term dialysis.[1,2] Compared with cadaveric renal transplantation, living donor kidneys show superior outcome in both patient and graft survival.[3,4] Yeh et al[5] evaluated the results of patient and graft survival rate at 3 months, 1 year, and 3 years after renal transplantation in our medical center in 1999, also showing satisfactory results.

The introduction of immunosuppression therapy and tissue typing advancement has contributed to an improvement in patient and graft survival. However, patients who have presensitization to human leukocyte antigens (HLA), such as by having a previous blood transfusion, pregnancy, or transplant, have an increased the risk of rejection and even graft loss.[6]

Although there have been a number of studies that have discussed the donor-recipient relationship on patient and graft survival,[6–13] most of these studies were done in the USA and lacked Asian samples, especially data from Taiwanese.

Our aim in this study was thus to evaluate the relationship between donors and recipients and the recipients' postoperative glomerular filtration rate (GFR) in our hospital. A 5-year review of living donor renal transplantations in a single transplant center was performed.

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2. Materials and methods

Between January 2010 and February 2015, a total of 49 living donor KTs were performed in the China Medical University Hospital, Taichung, Taiwan. Information about the relationship between donor and recipient were obtained and categorized into the following four groups: offspring donation, parent donation, sibling donation, and spouse donation. The data of the recipients' age, underlying disease, ABO blood match, and last GFR during follow-up were collected. The operations were performed by our transplantation team with four main surgeons.

The donor-recipient relationship, graft survival, and changes in GFR during a 5-year period in a single center were retrospectively analyzed. We performed an analysis of variance and used Scheffé's method for data analysis. A p value ≤ 0.05 was defined as statistically significant.

3. Results

In our study, the 49 living donor kidney transplants represent 68% of all transplants (49/72) during this 5-year review. There were 11 recipients whose kidneys were donated from their offspring (22.4%), 16 from their parents (32.7%), 12 from their siblings (24.5%), and 10 from their spouses (20.4%). The mean age of the recipients was 54.27 years in the offspring donors group, 27.56 years in the parent donors group, 37.18 years in the sibling donors group, and 49.09 years in the spouse donors group. There were two ABO-incompatible transplantations, one from a parent donor and the other from a spouse donor. The age and underlying disease of the recipients are presented in Table 1 and categorized by donor-recipient relationship.

Variation of the mean age of donors between the four groups was noted, and this may have influenced the donor's baseline renal function. To determine whether the donor's preoperation renal function affected the recipient's graft renal function, we performed the Kruskal-Wallis test for the donor's presurgery GFR between the four groups. The results show that there was no significant difference in the donor's preoperation mean GFR between the four donation groups ($p = 0.085$; Figure 1).

We obtained the mean last follow-up postoperative GFR of the recipients in each group, which in the offspring donors group was 77.73 mL/min, in the parent donors group was 57.81 mL/min, in the sibling donors group was 61.17 mL/min, and in the spouse donors group was 46.3 mL/min (Table 2). It was clear that the highest mean last GFR was in the offspring donors group and the worst mean last GFR was in the spouse donors group (Figure 2). The mean last GFR of the recipients revealed statistically significant differences between these four groups ($p = 0.004$; Table 2). The mean follow-up time was 20.2 months (range, 1–61 months).

We categorized the recipients' last renal function into chronic kidney disease (CKD) stage and analyzed these data according to donor relationship, as shown in Table 3. Significant advanced CKD

Table 1
Age and diagnosis of recipients, categorized by donor-recipient relationship.

Group	Offspring	Parent	Sibling	Spouse
n	11	16	12	10
Age (y), mean ± SD	54.27 ± 7.086	27.56 ± 8.641	36.33 ± 8.542	51.30 ± 9.262
Disease, *n* (%)				
HTN	9 (82)	14 (88)	10 (83)	8 (80)
DM	6 (55)	2 (13)	1 (8)	4 (40)
PKD	1 (9)	—	—	—
GN	—	2 (13)	—	—
Others	—	1 (6)	2 (17)	1 (10)

DM = diabetes mellitus; GN = glomerulonephritis (1 was systemic lupus erythematosus (SLE) in our study); HTN = hypertension; PKD = polycystic kidney disease.

Table 2
The mean last follow-up postoperative glomerular filtration rate (GFR) of the recipients.

	GFR last*				
	No.	Mean last GRF	SD	Range	
				Min	Max
Offspring	11	77.73	12.846	54	95
Parent	16	57.81	21.643	28	100
Sibling	12	61.17	21.557	9	86
Spouse	10	46.3	16.439	15	63
Sum	49	60.76	21.223	9	100

* $p = 0.004$; F = 4.992.
Max = maximum; Min = minimum.

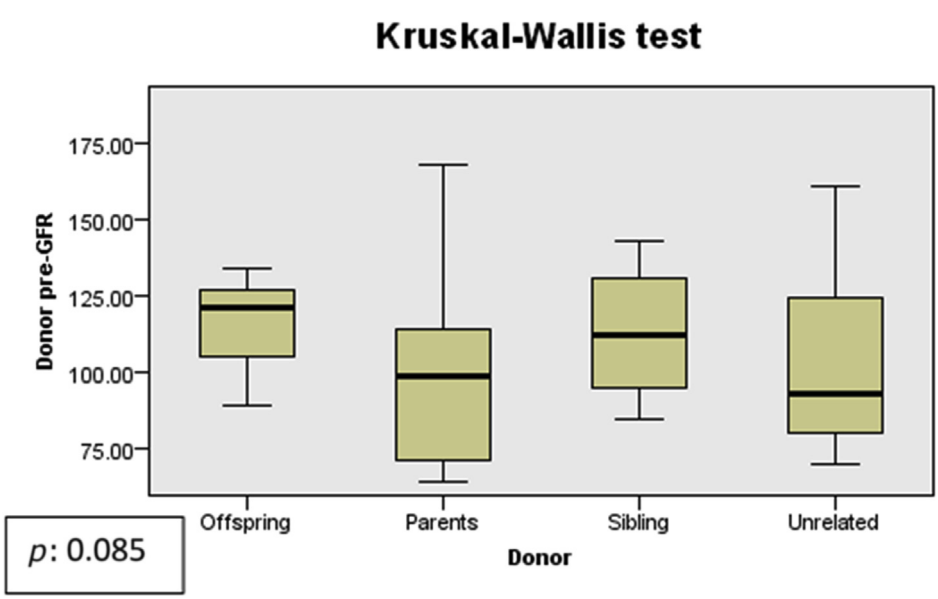

Figure 1. Mean preoperation glomerular filtration rate (GFR) of donors between groups.

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