Long-term Results of Renal Transplant From Living Donors Aged Over 60 Years

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Abstract

Objectives: **This study sought to determine whether recipients of grafts from donors aged 60 years or older achieve the same benefit as those from younger donors in the long term.**

Materials and Methods: **Between January 2004 and July 2008, one hundred seventeen living renal transplants were performed. The patients were divided into an older donor group (aged ≥ 60 y, n=23) and a younger donor group (aged < 60 y, n=94). Characteristics and evolution of the donors and recipients were compared between the groups.**

Results: **There was no statistically significant difference between the groups respecting sex, body mass index, duration on dialysis, ischemia time, human leukocyte antigen matches and incidence of primary nonfunction, delayed graft function, acute rejection, and infection (*P* > .05). The 1-, 3-, and 5-year graft survival for the older group versus the younger group was 95.7% versus 97.9% (*P* > .05), 91.3% versus 93.6% (*P* > .05), and 81.8% versus 83.3% (*P* > .05). Patient survival at 1, 3, and 5 years was 100% versus 100% (*P* > .05), 95.7% versus 96.8% (*P* > .05), and 90.9% versus 88.9% (*P* > .05) with no significant difference in the log-rank test for Kaplan-Meier.**

Conclusions: **Our studies suggest that in the long term, renal transplant from live donors older than 60 years it is an acceptable alternative.**

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Introduction

Renal transplant is the best treatment for patients with end-stage renal disease, offering the best chance for rehabilitation and long-term survival. Because of lower human leukocyte antigen mismatches and shorter ischemia time, living-donor renal transplant provides a significant graft survival benefit over deceased-donor transplants. Although the use of live donors is increasing, the major obstacle in renal transplant is the shortage of donor organs. This fact has prompted many centers to adopt new strategies to expand the kidney donor pool. These strategies include the use of paired kidney donation, placement of 2 marginal kidneys into a single recipient, use of non-heart beating donors, and use of brain-dead donors. Many transplant centers have begun using kidneys from donors who are older, although such donors are generally not acceptable.

Using grafts from older donors is increasing in Europe and the United States. According to data from the United Network for Organ Sharing, the percentage of donors older than 60 years has increased from 19.9% in 1996 to 32.4% in 2004.[1] In China, nearly 50% of living-related renal donors are older parents, many aged over 60 years. The long-term and short-term outcomes of transplanting kidneys from older donors are not entirely clear. Several studies have demonstrated that ages of older donors are related to a significantly increased risk of poor graft function and reduced survival rate of the recipient.[2, 3] However, other authors[4, 5] report no significant difference in the graft survival of kidneys from older donors stating that age alone is not a obstacle for renal transplant.

We review the experience of our center with live-donor renal transplant from donors older than 60

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years. We sought to evaluate the long-term outcome of live-renal transplant according to the age of donors.

Materials and Methods

We made a retrospective review of 117 consecutive live-donor renal transplants performed at our center from January 2004 to July 2008. Among the recipients, 23 patients (19.7%) received kidneys from donors older than 60 years (OD group), and 94 patients (80.3%) received kidneys from younger donors (YD group). All patients signed informed consent, and the study protocol was approved by the Institutional Ethics Committee of Central South University and the Second XiangYa Hospital. The protocols conformed with the ethical guidelines of the 1975 Helsinki Declaration. Every donor and recipient was related. Patients are identified by numbers rather than initials.

All live donors had normal serum creatinine levels before renal extraction and underwent extensive medical examinations including blood type compatibility, a negative crossmatch, and imaging techniques to visualize kidney anatomy and function. Exclusion criteria were hypertension, diabetes, proteinuria, and severe heart or liver disease. Renal nephrectomy was performed by open operation. All recipients were diagnosed with chronic glomerulonephritis and were first-time kidney graft recipients.

Age, sex, body mass index, and warm and cold ischemia time were analyzed in all patients. We also recorded patients' duration on dialysis, incidence of primary nonfunction, incidence of delayed graft function (defined as *the need for at least 1 dialysis within the first week after transplant*), incidence of acute rejection (diagnosed by clinical parameters or renal biopsies), and the need for high-dose intravenous methylprednisolone, the incidence of infection, human leukocyte antigen A, B, and DR matches, and patient and graft survival.

All selected recipients received 1000 mg of mycophenolate mofetil at 12 hours before transplant and 0.5 g of methylprednisolone during days 0 to 3 after transplant. Maintenance immunosuppression consisted of prednisone, cyclosporine or tacrolimus, and mycophenolate mofetil. The initial dosage of prednisone was 80 mg per day. The dosage was then reduced by 10 mg per day, until 20 mg daily was reached, and this was maintained until 1 month after transplant. When the dosage was reduced to 15 mg/d, this dosage was maintained until 6 months after transplant. Administration of cyclosporine or tacrolimus was delayed until the patient had exhibited a brisk diuresis and a declining serum creatinine level (< 40 mg/dL). The dosage of cyclosporine was 5 to 7 mg/kg/d, and dosage of tacrolimus was 0.1 to 0.2 mg/kg/d. Trough concentrations of cyclosporine were maintained between 220 to 250 ng/mL, 180 to 220 ng/mL, and 150 to 180 ng/mL at 1, 6, and 12 months after transplant. Trough concentrations of tacrolimus were maintained between 7 to 9 ng/mL, 5 to 7 ng/mL, and 3 to 5 ng/mL at 1, 6, and 12 months after transplant. Mycophenolate mofetil was given at 750 mg twice daily immediately after the operation for 1 month and then decreased to 500 mg twice daily.

Statistical analyses

Statistical analyses used the Mann-Whitney *U* test for continuous variables, the chi-square test for categorical variables, with statistical analyses performed by SPSS software (SPSS: An IBM Company, version 13.0, IBM Corporation, Armonk, New York, USA). The Kaplan-Meier method was used to evaluate actuarial patient and graft survivals, comparing group differences with the log-rank test. Values for $P < .05$ were considered significant.

Results

Basic data of the older donor group and the younger donor group

According to age, there was a significant difference in the mean age of the donor groups (62.9 ± 1.5 years vs 48.2 ± 7.6 years; $P < .05$). There was no significant sex or body mass index difference found between the groups.

Table 1 gives the data for the recipients' basic characteristics of both groups. Mean recipient age, recipient sex, body mass index, duration on dialysis, warm ischemia time, cold ischemia time, and mean number of human leukocyte antigen matches were not significantly different between the groups ($P > .05$).

Comparison of transplant outcomes between the older and younger groups

Table 2 shows the transplant outcomes of the OD and the YD groups. The incidence of delayed graft function was similar in the 2 groups (4.3% in OD group vs 2.1% in YD group; $P > .05$). Primary

Table 1. Characteristics of Recipients and Transplant Data

	Older group	Younger group	*P* value
Mean age (y)	31.8 ± 8.7	32.4 ± 10.9	> .05
Women/men	10/13	43/51	> .05
Body mass index (kg/m^2)	19.1 ± 3.3	20.1 ± 3.7	> .05
Duration on dialysis (mo)	23.9 ± 11.7	25.6 ± 14.2	> .05
Warm ischemia time (sec)	13.8 ± 4.9	12.1 ± 5.3	> .05
Cold ischemia time (min)	56.4 ± 10.8	61.2 ± 13.0	> .05
Mean number of HLA matches			
HLA-A	1.12 ± 0.06	1.08 ± 0.07	> .05
HLA-B	1.09 ± 0.06	1.10 ± 0.07	> .05
HLA-DR	1.06 ± 0.04	1.09 ± 0.05	> .05

Table 2. Transplant Outcomes

	Older group (actual number /total number)	Younger group (actual number /total number)	*P* value
Delayed graft function (%)	4.3 (1/23)	2.1 (2/94)	> .05
Primary nonfunction (%)	0 (0/23)	1 (1/94)	> .05
Acute rejection (%)	17.4 (4/23)	16.0 (15/94)	> .05
Infection (%)	26.1 (6/23)	24.5 (23/94)	> .05
1-year graft survival (%)	95.7 (22/23)	97.9 (92/94)	> .05
3-year graft survival (%)	91.3 (21/23)	93.6 (88/94)	> .05
5-year graft survival (%)	81.8 (9/11)	83.3 (15/18)	> .05
1-year patient survival (%)	100 (23/23)	100 (94/94)	> .05
3-year patient survival (%)	95.7 (22/23)	96.8 (91/94)	> .05
5-year patient survival (%)	90.9 (10/11)	88.9 (16/18)	> .05

nonfunction was observed only in 1 case in the YD group, which was caused by graft thrombosis. The difference between the groups was not significant. The overall incidence of acute rejection in 5 years was 17.4% for the OD group and 16.0% for the YD group ($P > .05$). The incidence of infections was not significantly different between the groups (26.1% in OD group vs 24.5% in YD group; $P > .05$).

The 1-, 3-, and 5-year graft survival rates of the OD versus the YD groups were 95.7% versus 97.9% ($P > .05$), 91.3% versus 93.6% ($P > .05$), and 81.8% versus 83.3% ($P > .05$). Patient survival rates at 1, 3, and 5 years was 100% versus 100% ($P > .05$), 95.7% versus 96.8% ($P > .05$), and 90.9% versus 88.9% ($P > .05$).These differences were not significant.

Discussion

Renal transplant offers patients with advanced renal diseases the greatest potential for longevity and enhanced quality of life. However, the demand for kidneys far exceeds the supply. This has led to the increase use of so-called "expanded-criteria organs," or organs that used to be considered "unsuitable" for transplant. Mandelbrot and associates[6] reported that the most-significant change in donor selection between 1995 and 2006 was the acceptance of living-unrelated donors and eliminating old age for donation. The old age limit used to select donors for kidney transplant has significantly changed over the past 10 years; however, it remains controversial. For example, Chavalitdhamrong and associates[7] found that transplants from donors aged 70 years and older were associated with a higher risk of graft loss and patient death compared with transplants from donors aged 60 to 69 years. However, Collini and associates[8] reported their experiences at an Italian transplant center where they used "ultra-old"donors (> 75 years old) with increasing graft survival rates.

As opposed to the United States, where live donors are more likely to be spouses and friends of the recipients,[9] donors are more likely to be blood relatives in China, especially their parents. In our research, nearly 50% of donors were parents and the number of donors aged 60 years or older accounted for 19.7% of all donors. To ensure the kidney is of excellent quality, donor kidney biopsies were performed at the time of transplant in some studies.[10, 11] Biopsy is the criterion standard for defining the quality of an older kidney. However, a renal biopsy potentially can injure the kidney, leading to postoperative aneurysm formation, rupture, and bleeding.[12] When a biopsy is not feasible, the study of the macroscopic anatomy and some donor parameters can be acceptable alternatives.[13] In our study, donor kidneys were extensively assessed at the time of donation using imaging and laboratory tests; the results were satisfactory.

Fuller and associates[14] regarded donors older than 55 years as risk factors for early rejection and poor initial graft function. Additionally, Tandon and associates[15] believed that aged kidneys have an increased susceptibility for, and less tolerance to, nonimmunologic damages, such as duration of cold ischemia time. Noppakun and associates[16] studied the relationship between live-donor age and kidney survival in 1063 adults receiving transplants between 1980 and 2007, and reported that live-donor age is an important determinant of long-term graft survival. Similarly, Oppenheimer and associates[17] reported that graft and patient survival were significantly lower in the older donor group compared to the younger donor group. However, Berardinelli and associates[4] showed that live-donors older than 60 years provide excellent kidney function at 10 years after transplant, when compared with those of

patients receiving younger grafts. Sözen and associates[18] showed that patient and graft survivals at 1, 3, and 5 years were 100%, 96%, and 92%; and 100%, 92%, and 92%. The authors suggested that kidney transplants from older donors should be considered an option for kidney transplant. Consistent with these findings,[4, 18] our analyses showed that patient and graft survival of kidney grafts obtained from donors older than 60 years were similar to those of grafts from younger donors. In addition, in our research, the 5-year overall patient and graft survival of both groups are good, probably because the kidneys were from living-related donors.

The long-term results from our study show that donor age does not affect survival or important secondary endpoints 5 years after a living-donor renal transplant. The application of older donors can help expand the donor pool.

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