



Impact of donor age on evaluation of renal graft function

Urology

Sayak Roy

M.S., Post Doctoral Trainee, Department of Urology Institute of Post Graduate Medical Education & Research

Arpita Roychoudhury

M.D., D.M., Professor, Department of Nephrology Institute of Post Graduate Medical Education & Research

Dilip Kumar Pal

M.S., M.Ch, Professor & Head, Department of Urology Institute of Post Graduate Medical Education & Research

ABSTRACT

Introduction: In recent times, due to the increasing demands for renal transplant more elderly donors are being recruited. Contrary to previous notions that kidneys taken from elderly donors function poorly, recent studies have shown otherwise. This study aims to evaluate the elderly donor kidney graft function, by comparing younger donor group (<50 years) with older donor group (>50 years).

Materials and methods: A total of 68 donors were taken. They were divided into two groups as per age, <50 years and >50 years. Recipient creatinine and eGFR (by MDRD equation) were obtained in both groups at 1 month, 3 months and 6 months after transplant. They were compared and statistical analysis was done to determine any significant difference.

Results: Out of the 68 patients, 42 were <50 years of age and 26 were >50 years of age. The mean serum creatinine of recipients in the donor age group of <50 years were 0.97 ± 0.56 mg/dl, 1.00 ± 0.88 mg/dl and 0.99 ± 0.54 mg/dl at 1 month, 3 months and 6 months after transplant, and in the group of >50 years were 1.27 ± 0.87 mg/dl, 1.25 ± 0.81 mg/dl and 1.25 ± 0.68 mg/dl at 1 month, 3 months and 6 months. The mean eGFR of recipients in the donor age group of <50 years were 68.79 ± 2.78 , 68.24 ± 2.01 and 68.57 ± 1.98 at 1 month, 3 months and 6 months after transplant, and group of >50 years were 67.55 ± 2.70 , 67.97 ± 1.99 and 67.72 ± 2.02 at 1 month, 3 months and 6 months with no statistically significant difference.

Conclusion: Elderly donor kidneys can be safely used for transplantation, without any significant deterioration of graft function later on in recipients.

KEYWORDS:

Donor age, Renal Transplantation, Graft Function

Introduction:

Kidney transplantation is the optimum replacement therapy for patients with established renal failure (ERF), as it offers better quality of life and improved survival. Kidney transplantation offers longer and better quality of life compared to dialysis. However, the procedure of renal transplantation is complex, as the success of transplantation is influenced by donor and recipient selection, the surgical procedure and appropriate medical management of the transplant recipient. The demand for renal transplantation has increased due to the growing prevalence of ESRD and extension of the criteria for accepting patients onto the waiting list. Thus, more living donors are being recruited, including both related and unrelated donors. Donor's age has significant influence on the outcome of kidney transplantation. Advanced donor age is associated with worsening of initial graft function and poor long term outcome after transplantation (1). Kidneys from donors older than 55 years carry increased risk for development of post transplant anemia, acute and chronic rejection. Cardiovascular complications remain the leading cause of death in transplant recipients with long term functioning graft. Advanced donor age is associated with increased morbidity and mortality related to cardiovascular complications. Aged kidneys have decreased nephron mass which is considered to be one of the causes of early graft dysfunction as well as chronic rejection (2). Multiple studies imply that kidneys from donors older than 60 years can be used for transplantation, provided that no more than 15% of glomeruli in pre-transplantation biopsy are sclerotic (3). Kidneys from donors older than 60 years of age can provide excellent renal function for up to three years after transplantation, on condition that they are allocated as single or dual transplants according to biopsy findings before transplantation and that kidneys showing more severe, chronic changes on biopsy are discarded (4). Increased need and permanent organ donor shortage led to expansion of donor pool, donors older than 60 years are currently accepted in living related and in cadaveric transplantation (5). In Spain renal grafts from elderly donors (> 60 years) constitute

40% of all kidney transplants (6). The use of kidneys from elderly donors (> 60 years) is increasing. Long-term survival of kidneys is similar to the transplants performed with non-expanded criteria donors. After 6 months' post transplant, patients who have been transplanted have a better survival rate than patients remaining on dialysis. Most studies showed that kidneys from older donors had relatively lower graft function, increased rejection episodes and poor long-term graft survival compared to kidneys from younger donors. There is no clear definition or agreement on who should be regarded as an elderly living donor. Many of the studies cited have used different age cutoffs—50, 55, 60, and 65 years. Age stratification may be required in any future study to properly elucidate the effects of aging on kidney function and living donation.

This study aimed at assessing the influence of donor age on renal graft function up to 6 months after transplantation (by way of assessing recipient's creatinine and eGFR after transplant) by comparing effect between younger and older donor age-groups.

Materials and Methods:

In this hospital-based parallel group study, all donors undergoing donor nephrectomy for renal transplantation were taken. A total of 68 patients were taken. Only those few cases in whom the recipients had delayed graft function were excluded. No patient had graft rejection. Donors were divided into two groups as per their age, as <50 years and >50 years. The data was recorded as per the predetermined proforma. All recipients underwent dialysis the day before transplantation. After renal transplantation, the recipient's creatinine was obtained at 1 month, 3 months and 6 months after operation, and eGFR was calculated using MDRD equation at similar time intervals. Creatinine was obtained by biochemical laboratory investigation of recipient's blood. All recipients received standard immunosuppressive therapy and management post-transplant.

MDRD equation: $GFR(\text{ml}/\text{min}/1.73\text{m}^2) = 186X(\text{Cr})^{-1.154}X(\text{age})$

^{0.203}X0.742(if female)X1.21(if African-American)

By assessment of these records, the trend in graft function in transplanted kidney was evaluated with respect to the two age groups of donors.

Statistical Analysis was performed with help of EPI Info (TM) 3.5.3. EPI INFO is a trademark of the Center for Disease Control and Prevention (CDC). Using this software, different frequency tables and cross-tabulation were prepared. Descriptive statistical analysis was performed to calculate the means with corresponding standard deviation (S.D.). Chi-square (2χ) test was used to test the association between different variables under study. t-test was used to compare the means. $p < 0.05$ was taken to be statistically significant.

Results:

Out of the 68 patients, 42 were <50 years of age and 26 were >50 years of age. The mean age (mean± S.D.) of the donors with age < 50 years was 38.76±5.05 years and the mean age (mean± S.D.) of the donors with age≥50 years was 54.65±2.77 years.

In the donor age group of <50 years(42 patients),12 were male and 30 were female. In the donor age group of >50 years(26 patients),8 were male and 18 were female.

Table-1

Mean creatinine of recipients (mg/dl)	Donor with Age<50 years (n=42)	Donor with Age≥50 years (n=26)	p-value
At 1 month	0.97±0.56	1.27±0.87	0.08
At 3 months	1.00±0.88	1.25±0.81	0.24
At 6 months	0.99±0.54	1.25±0.68	0.09

Table-1: Mean serum creatinine of recipients in the two age groups at different time interval.

The mean serum creatinine of recipients in the donor age group of <50 years were 0.97±0.56 mg/dl, 1.00±0.88 mg/dl and 0.99±0.54 mg/dl at 1 month,3 months and 6 months after transplant. The mean serum creatinine of recipients in the donor age group of >50 years were 1.27±0.87 mg/dl, 1.25±0.81 mg/dl and 1.25±0.68 mg/dl at 1 month,3 months and 6 months after transplant. The difference was not statistically significant (p values 0.08,0.24 and 0.09 at 1 month,3 months and 6 months respectively).

The mean eGFR of recipients in the donor age group of <50 years were 68.79±2.78, 68.24±2.01 and 68.57±1.98 at 1 month,3 months and 6 months after transplant(unit-ml/min/1.73m²). The mean eGFR of recipients in the donor age group of >50 years were 67.55±2.70,67.97±1.99 and 67.72±2.02 at 1 month,3 months and 6 months after transplant(unit-ml/min/1.73m²).The difference was not statistically significant(p values 0.07,0.59 and 0.09 at 1 month,3 months and 6 months respectively).

Table-2

Mean eGFR of recipients (mL/min/1.73 m ²)	Donor with Age<50 years (n=42)	Donor with Age≥50 years (n=26)	p-value
At 1 month	68.79±2.78	67.55±2.70	0.07
At 3 months	68.24±2.01	67.97±1.99	0.59
At 6 months	68.57±1.98	67.72±2.02	0.09

Table-2: Mean eGFR of recipients in the two age groups at different time interval.

Discussion:

Renal transplantation is the mainstay of treatment of end-stage renal disease. As far as donor kidney harvesting is concerned, donor age is a very important factor for determining graft outcome. Nowadays,

with the increase in demand for donor kidneys, efforts are being made to expand the donor pool by incorporating elderly donors. Earlier, it was thought that elderly donor kidneys would not function well in recipients, but that myth has been challenged in a big way by several studies, which show that elderly donor kidneys do fare well most of the time.

In our study, mostly younger donors <50 years age(42/68 patients) were recruited. Also, the predominance of female donors in both age groups can be attributed to the fact that mostly female donors are selected(most of them being mothers, sisters or wives) in our society.

It can be seen from these data that the mean creatinine in the recipients was somewhat more in the elderly donor age group of patients. This is in accordance with available literature, which state that in aged donors, there is some degree of nephron loss with aging, which adversely affects graft function. But, this study shows that there is no significant difference, so we can say that elderly donor kidneys can be selected for transplantation.

A study in 2006 in U.S. studied all(n=73073) first kidney-only transplant recipients between 1995 and 2003 to determine the incidence and outcomes of living donor transplantation as a function of donor age. They defined older donors as ≥55 years. The GFR one year after transplantation decreased with increasing donor age (p<0.001). graft survival from older donors was 85% and 76% at 3 years and 5 years(compared to 89% and 82% with younger donors)(7). Our study on the other hand did not depict any significant deterioration in graft function in elderly donors.

In an observational cohort study(2010) the researchers assessed impact of donor age on post transplant renal function by analyzing following parameters: 24 hour urine output, creatinine clearance (Cr Cl) and glomerular filtration rate (GFR).Depending on donor age, recipients were allocated in to two groups. Group I included patients who received renal graft from donors age up to 55 years, and Group II encountered recipients who received renal graft from donors older than 55 years. The goal was to determine whether donor age over 55 years significantly diminishes renal graft function in first seven post transplant days. No statistically significant difference was found between Group I and II regarding 24 hour urine output. From second to fifth postoperative day creatinine clearance values were higher in the group of patients who received kidney from donors older than 55 years. On the fifth, sixth and seventh post operative day GFR was significantly higher in patients who received renal graft from donors age up to 55 years(p<0.0161). These data showed no significant difference in observed variables between the two groups, thus indicating that utilization of renal grafts from donors aged > 55years is acceptable and may considerably expand the donor pool (8).This is in accordance with our study.

Thus, this study shows that elderly donor kidneys can be safely rendered for transplantation without significant compromise of graft function in recipients. However, there are certain limitations. This study has not taken other co-morbidities of donors into consideration as study variables. Studies have shown that hypertension is an important factor for affecting graft survival. Again, we have incorporated donors of age >50 years in the second group. However, in the guidelines for selection of living donors, expanded criteria donors are those of age >60 years. In our study, only 2 out of 68 donors were >50 years of age. This is because of the fact that in our institution, mostly donors <60 years are selected, with age >60 years being a rare entity of selection of donors.

Another point to be noted in this regard is that this study has not incorporated any disparity in HLA-matching of the donors and there respective recipients. Also, all the donors had GFR of the selected kidney within normal limits(>70 ml/min/1.73m²),and none of the donor renal units were functionally compromised pre-operatively.

Conclusion:

For a successful renal transplantation, many factors play an important role. Because of the recent increase in the need to expand the donor pool to meet the ever-rising demands, elderly donors have been incorporated into the system. In contrary to older beliefs that elderly donor kidneys do not function well in recipients after transplantation, our study has clearly established the fact that kidneys from older aged donors can be safely selected for harvesting. There is no increased risk of graft dysfunction compared to younger donors. But, an important thing to note here is that other factors like donor co morbidities(uncontrolled hypertension)and donor's preoperative native kidney functional status also need to be taken into consideration. More studies are warranted on larger number of patients and incorporating all these parameters to better assess the functional outcome of donor kidneys from elderly donors. As far as donor age is concerned, kidneys from donors more than 50 years of age can be effectively transplanted, but whether the results can be extrapolated and made comparable to donors more than 60 years of age(expanded criteria parameter)can only be confirmed by further studies in future.

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