Patient and Graft Outcomes in Deceased-Donor Kidney Transplantation

A good Start for a Promising Future

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Introduction. Kidney transplantation from deceased donor has progressively increased in Iran; however, there are limited published data on its outcome. We evaluated the short-term outcome of kidney transplants using deceased donors in Iran.
Materials and Methods. A total of 121 adult patients who received a kidney allograft from a deceased donor in Baqiyatallah Transplant Center were enrolled. The following data were collected: age, gender, body mass index, cold and warm ischemia times, history of dialysis and blood transfusion, blood pressure, panel reactive antibodies, episodes of acute rejection, acute tubular necrosis, serum creatinine concentration, and surgical complications.
Results. The median age of the kidney allograft recipients was 48 years (range, 16 to 71 years). Male gender was predominant (n = 82) with slightly better patient and graft survivals without significant differences. The mean cold ischemic time was 190 ± 50 minutes (range, 1.5 to 4.7 hours). One- and 2-year graft survival rates were 94.0% and 86.8%, respectively. One- and 2-year patient survival rates were 97.4% and 91.9%, respectively. Acute tubular necrosis was the only risk factor for worsening of the graft survival (68.2% versus 85.7% for 2-year survival, $P = .001$) and the patient survival (81.5% versus 94.4% for 2-year survival, $P = .06$). No significant correlation was seen between patient survival and other variables.
Conclusions. The results of the present study indicate a favorable outcome in short-term period for deceased-donor kidney transplantation in our center.

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INTRODUCTION

Kidney transplantation is accepted as a treatment of choice for most patients with end-stage renal disease requiring renal replacement therapy.[1] However, the organ shortage remains the major limiting factor for the growth of kidney transplantation. Increasing demand has led to utilization of deceased-donor kidneys that were previously thought unsuitable. By the year 2000, only a very limited number of kidney transplants had been performed using deceased donors in Iran. In April 2000, the parliament legislated deceased organ donation after brain death.[1] Since then, the annual number of deceased-donor kidney transplants rose from less than 1% of all kidney transplants at the end of 2000, to 13% in 2006.[2]

Kidney transplantation using deceased donors was started at our center in 2002 and its annual number has increased from 0.4% in 2002 to 31% in 2008.[3] Despite recent increases in kidneys

from deceased donors, limited published data are currently available in terms of deceased-donor kideny transplant outcomes from Iran.[4] We, therefore, conducted a retrospective study to assess the short-term outcome of patients receiving kidney allografts from deceased donors in Iran.

MATERIALS AND METHODS

Patients

A total of 504 kidney allografts were transplanted within 2 years in Baqiyatallah Transplant Center between 2008 and 2009, of which 383 were from living donors and 121 from deceased donors. All of the deceased-donor transplants were in patients over 14 years of age and they were all the first kidney transplantation. The recipients were regularly visited in the outpatient transplant clinic following discharge. The median follow-up of these patients was 18 months.

Data collection

Data were collected, including age, gender, body mass index (BMI), cold and warm ischemia times, history of dialysis and blood transfusion, blood pressure, panel reactive antibodies (PRA), episodes of acute allograft rejection, acute tubular necrosis (ATN), serum creatinine concentration, and surgical complications. Graft loss was recognized as the need to dialysis for renal replacement therapy.

Immunosuppression

The immunosuppressive protocol was triple therapy of cyclosporine, mycophenolate mofetil, and prednisolone. Antithymocyte globulin was administered in 28 cases as induction or antirejection therapy. Five patients had high PRA levels (> 40%) and induction therapy with antithymocyte globulin was used in all of them.

Statistical Analyses

The SPSS software (Statistical Package for the Social Sciences, version 17.0, SPSS Inc, Chicago, Ill, USA) was used in all the analyses. Quantitative variables were expressed as mean ± standard deviation and qualitative variables were described as percentage. The Kolmogorov-Simirnov test showed that the parameter values were normally distributed, thus parametric tests were used. Continuous data were compared by the Student *t* test and categorical data were analyzed using the chi-square or Fisher exact test. Overall patient and graft survival rates were calculated using the Kaplan-Meier method, and the log-rank test was used to determine statistical differences in graft survival between different variables such as genders. Statistical significance was defined as a *P* value less than .05.

RESULTS

Demographic characteristic data of all patients are summarized in Table 1. The median age of recipients was 48 (range, 16 to 71 years). Seventy-four percent of the patients had a BMI lower than 25 kg/m^2.

The 1- and 2-year patient and graft survival of deceased-donor kidney allograft recipients are compared with those of living-donor recipients in Table 2; the patient outcomes were comparable, but the 2-year graft survival was lower among recipients of deceased-donor kidney transplant (88.7% versus 97.6%, *P* = .045).

Table 1. Characteristics of Recipients of Deceased-Donor Kidney Transplants

Characteristic	Value
Mean age, y	46 ± 14
Gender, %	
Male	68
Female	32
Preemptive transplant, %	12.5
History of transfusion, %	25
History of hypertension, %	38.5
Positive panel reactive antibodies, %	4
Acute rejection episodes, %	26
Graft loss, %	11
Mortality, %	6
Surgical complication, %	7
Median follow-up, mo	18
Median last serum creatinine, mg/dL	1.4
Mean body mass index, kg/m^2	23.5 ± 4.4
Median time on dialysis, mo	15

Table 2. Patient and Graft Survival of Deceased-Donor and Living-Donor Kidney Transplant Recipients

Survival Rate, %	Living-Donor Transplant	Deceased-Donor Transplant	*P*
Patient			
1 year	98.3	95.8	.10
2 years	96.5	90.9	
Graft			
1 year	98.3	97.9	.045
2 years	97.6	88.7	

In the deceased-donor transplant cohort, male gender was predominant (n = 82) and graft survival was slightly better in men (95% and 89.8% versus 91.8% and 75.1% for 1- and 2-year survivals, $P = .40$; Figure 1). Patient survival was also better in men but the difference was not significant (98.8% and 93.8% versus 93.8% and 88.4% for 1- and 2-year survivals, $P = .40$; Figure 2). The cold ischemia time for locally harvested deceased kidneys was 190 ± 50 minutes (range, 1.5 to 4.7 hours; median, 200 minutes), ie, cold ischemia time was relatively short. The 1- and 2-year graft survival rates were 94.0% and 86.8%, respectively. The 1- and 2-year patient survival rates were 97.4% and 91.9%, respectively. The occurrence of ATN was the only risk factor for poorer graft outcomes (68.2% versus 85.7% for 2-year survival, $P = .001$) and patient outcomes (81.5% versus 94.4% for 2-year survival, $P = .06$). No significant correlation was seen between patient survival and other variables, including PRA ($P = .07$), hypertension prior to transplantation ($P = .90$), and blood transfusion before surgery ($P = .20$). There were also no significant correlation between kidney allograft survival and PRA ($P = .40$), history of hypertension ($P = .50$), and history of transfusion ($P = .40$).

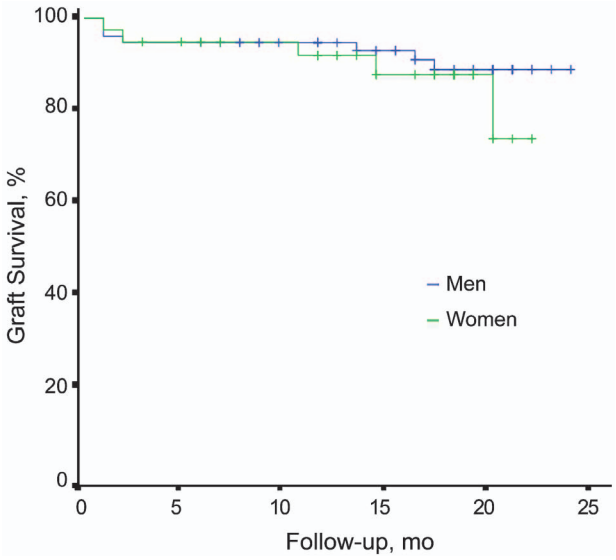

Figure 1. Graft survival rates for deceased-donor kidney transplant recipients by gender

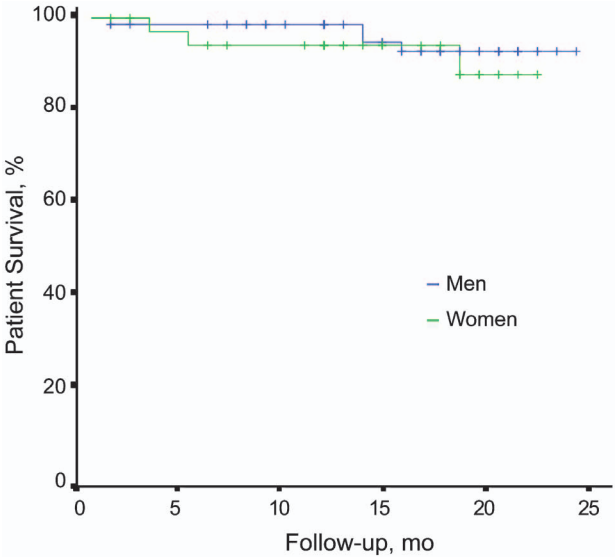

Figure 2. Patient survival rates for deceased-donor kidney transplant recipients by gender

There was a significant correlation between acute rejection episodes and ATN ($P < .001$). It means that patients involved with ATN in the early period after transplantation had more acute rejections. However, most of them responded to antirejection therapy, while graft loss was only seen in 11% of patients.

No significant differences were seen between acute rejection and cold and warm ischemia times, as well as BMI. However, there was a significant correlation between acute rejection and the last creatinine ($P < .001$), ie, kidney function was worse in patients with a history of acute rejection (3.6 ± 3.0 mg/dL versus 1.6 ± 1.4 mg/dL, $P < .001$); however, serum creatinine was not significantly associated with graft loss. Furthermore, a history of ATN was significantly associated with kidney function (3.2 ± 2.7 mg/dL versus 1.6 ± 0.9 mg/dL, $P = .001$), and graft loss was more likely to occur in patients with a history of ATN.

DISCUSSION

This study shows a markedly high short-term graft and patient survivals of recipients using kidneys from deceased donors. Our results are slightly better than those reported for deceased kidney transplantations in the United States.[5] Mahdavi and colleagues[4] have also reported a good short-term outcome of deceased-donor kidney transplantation from Mashhad, Iran. Since our organ procurement is local, the cold ischemia time was short, which may be the key to better graft survival. Cold ischemia time is a known risk factor for delayed graft function and worsened transplant outcome.[6] Vacher-Coponat and coworkers[6] showed

a reduction of cold ischemia time from 21.45 hours to 13.27 hours was associated with a significant decrease in delayed graft function rate from 34.7% to 20.7%.[6] Advances and improvements in surgical procedure, procurement programs, and immunosuppression regimens result in better outcomes compared to the past decades; for example, in a series of 589 patients who received their first deceased transplants between 1984 and 1993, graft survival was 84% at 1 year.[7]

Although human leukocyte antigen matching between the recipient and the donor has important short- and long-term implications for successful renal transplantation,[8] our kidney transplant recipients had all 6 human leukocyte antigens mismatched; however, it has no adverse affect on short-term outcomes of our recipients. Male gender is associated with poorer patient survival[7,9]; however, we found that patient survival was better in men with no significant differences. Mahdavi and colleagues have reported a high mortality rate in females compared to males in the first year after transplantation.[4]

The current study also highlights the importance ATN, which was a risk factor for worsening the patient and the graft survival rates. Poor early graft function may have an adverse effect on long-term graft function and patient survival.[10,11] Acute rejection may also be a predictive factor for poorer allograft survival[11,12]; we found that kidney allograft impairment was associated with acute rejection episodes.

There are limitations to our study including the retrospective nature of the study and relatively short-term follow-up period. The sample size was also small, but we are hoping to reach a higher number in near future. Although short-term results are promising, long-term studies with a larger sample size are needed.

CONCLUSIONS

The present study shows favorable short-term patient and graft survival outcomes in kidney transplants from deceased donors. It seems that the outlook for kidney transplantation from deceased donor is encouraging and comparable with living-donor transplantation in Iran.

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CONFLICT OF INTEREST

None declared.

REFERENCES

1. Einollahi B. Iranian experience with the non-related renal transplantation. Saudi J Kidney Dis Transpl. 2004;15: 421-8.
2. Einollahi B. Cadaveric kidney transplantation in Iran: behind the Middle Eastern countries? Iran J Kidney Dis. 2008;2:55-6.
3. Einollahi B. Is the annual number of deceased donor kidney transplantations in Iran lower than the Middle Eastern countries? Transplant Proc. 2009;41:2718-9.
4. Mahdavi Zafarghandi R, Zeraati AA, et al. Patient and Graft Outcome in Related, Unrelated and Deceased Renal Transplant Recipients: Single Center Experience. Int J Nephrol Urol. 2010;2:514-9.
5. Port FK, Merion RM, Goodrich NP, Wolfe RA. Recent trends and results for organ donation and transplantation in the United States, 2005. Am J Transplant. 2006;6: 1095-100.
6. Vacher-Coponat H, Purgus R, Indreies M, et al. Cold ischemia time in renal transplantation is reduced by a timesheet in a French transplant center. Transplantation. 2007;83:561-5.
7. Woo YM, Jardine AG, Clark AF, et al. Early graft function and patient survival following cadaveric renal transplantation. Kidney Int. 1999;55:692-9.
8. Kim SJ, Gill JS. H-Y incompatibility predicts short-term outcomes for kidney transplant recipients. J Am Soc Nephrol. 2009;20:2025-33.
9. Ojo AO, Hanson JA, Wolfe RA, Leichtman AB, Agodoa LY, Port FK. Long-term survival in renal transplant recipients with graft function. Kidney Int. 2000;57:307-13.
10. Hirata M, Cho YW, Cecka JM, Terasaki PI. Patient death after renal transplantation--an analysis of its role in graft outcome. Transplantation. 1996;61:1479-83.
11. Feldman HI, Gayner R, Berlin JA, et al. Delayed function reduces renal allograft survival independent of acute rejection. Nephrol Dial Transplant. 1996;11:1306-13.
12. Ishikawa A, Flechner SM, Goldfarb DA, et al. Quantitative assessment of the first acute rejection as a predictor of renal transplant outcome. Transplantation. 1999;68: 1318-24.

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