Kidney Graft and Patient Survival With and Without a Simultaneous Pancreas Utilizing Contralateral Kidneys From the Same Donor

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Simultaneous pancreas-kidney transplantation (SPK) is considered the treatment of choice for type 1 diabetic patients with end-stage renal disease. The American Diabetes Association supports pancreas transplantation for diabetic patients who have had, or plan to have, a kidney transplant (1). When the procedure is successful, a majority of pancreas transplant recipients have normal levels of glycemia and normal to nearly normal levels of HbA_{1c} (2,3), improving their quality of life (3,4). However, whether pancreas transplants independently contribute to the survival benefit following an SPK above that achieved by a kidney-alone transplantation (KA) is inconclusive (5–9). We analyzed those patients who received SPK or KA using contralateral kidneys from the same deceased donors, who were ideal paired control patients for donor variables.

RESEARCH DESIGN AND METHODS

We analyzed data from all approved U.S. transplant programs collected by the United Network for Organ Sharing (UNOS). Eligible patients were those who received their first SPK or KA from January 1995 to December 2002. In the 544 type 1 diabetic patient pairs, one of the patients received a KA and the other patient received an SPK from the same deceased donors. Our analysis included follow-up information received through December 2004.

Patient characteristics were compared using the paired *t* test for continuous variables and the McNemar's test for categorical variables. Patient and graft survival rates were calculated using Kaplan-Meier methods. The Cox proportional hazard analysis was performed to evaluate prognostic factors for mortality and graft loss among transplant recipients, who survived at least 1 year after transplantation. In the Cox model, the kidney grafts were considered to be independent across, but not within, the pairs. Each analysis was adjusted for major confounding factors, including delayed graft function and immunosuppressive regimens. Mean values were used for missing data. Statistical analyses were performed using Stata version 9.0 (Stata, College Station, TX).

RESULTS

When compared with patients who received KAs, patients who received SPKs were significantly younger (SPK 39.2 ± 7.9 vs. KA 47.9 ± 11.3 years; $P < 0.001$), had lower BMI (24.2 ± 3.8 vs. 27.4 ± 6.2 kg/m^2; $P < 0.001$), had lower levels of preformed anti-HLA antibodies (6.2 ± 15.0 vs. 11.9 ± 24.6%; $P < 0.001$), had shorter durations of dialysis (1.8 ± 1.3 vs. 2.8 ± 2.3 years; $P < 0.001$), and were less likely to be African American (7.5 vs. 20.4%; $P < 0.001$). Sex of the recipients did not differ between SPK and KA patients (male SPK 58.8 vs. KA 59.4%; $P = 0.86$). SPK grafts were transplanted with a significantly shorter cold ischemia time (SPK 13.8 ± 6.2 vs. KA 20.3 ± 8.6 h; $P < 0.001$) and had more HLA antigen mismatches than kidneys without a pancreas (3.9 ± 1.6 vs. 2.6 ± 2.0; $P < 0.001$). Thus, SPK was utilized in patients with six advantageous factors and only one disadvantageous factor. Of the SPK recipients, 7% required dialysis during the 1st week after transplantation compared with 21% of the recipients who received KA ($P < 0.001$). The SPK recipients were more likely to be on tacrolimus (62%), while neoral cyclosporine was the major immunosuppressive treatment among the KA recipients (49%).

The 1-, 3-, 5-, and 9-year patient survival rates of SPK recipients were 96.4, 93.4, 89.6, and 84.5%, respectively, and KA recipients were 95.2, 89.0, 78.2, and 66.5%, respectively. Kidney-graft survival for SPK recipients at 1, 3, 5, and 9 years' posttransplantation were 92.2, 85.2, 78.2, and 61.8%, respectively, and KA recipients were 90.0, 81.3, 65.5, and 47.7%, respectively.

The Cox regression analysis identified two recipient and one transplant factor potentially associated with mortality or kidney graft failure, while type of transplantation was not significantly associated with the outcomes of transplants (Table 1). Patients aged >40 years had a 3.14-fold higher risk of death when compared with patients aged ≤50 years (95% CI 1.74–5.65). African-American patients had a 1.60-fold higher risk of kidney graft failure than non–African-American patients (1.07–2.40). Neither kidney graft survival nor patient survival was associated with the type of immunosuppressive treatment. Kidney graft survival was, whereas patient survival was not, associated with delayed graft function. Those with higher risk for mortality and kidney graft failure were more likely to be recipients of a KA rather than a SPK. This suggests that KA patients are at higher risk than those with SPK, possibly as a result of inferior outcomes in KAs.

CONCLUSIONS

By utilizing the contralateral kidneys, kidney allograft outcome in SPK recipients was higher

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Abbreviations: KA, kidney-alone transplantation; SPK, simultaneous pancreas-kidney transplantation; UNOS, United Network for Organ Sharing.
A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.
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Table 1—*Prognostic factors among SPK and KA recipients, 1995–2002*

	All recipients (n = 1,088)			
	Patient death		Graft loss	
	HR (95% CI)	*P* value	HR (95% CI)	*P* value
Recipient factors				
Age (years)				
≤40	Referent		Referent	
41–50	1.54 (0.87–2.72)	0.14	0.71 (0.47–1.08)	0.11
≥51	3.14 (1.74–5.65)	<0.001	1.20 (0.78–1.84)	0.40
Race				
Non–African American	Referent		Referent	
African American	1.01 (0.57–1.78)	0.97	1.60 (1.07–2.40)	0.02
Sex				
Male	Referent		Referent	
Female	0.86 (0.53–1.39)	0.53	0.96 (0.69–1.33)	0.80
BMI (kg/m^2)				
<20	Referent		Referent	
20–24.9	0.85 (0.37–1.99)	0.71	1.12 (0.59–2.13)	0.73
25–29.9	1.03 (0.44–2.43)	0.94	1.27 (0.67–2.41)	0.47
≥30	1.30 (0.51–3.31)	0.58	1.38 (0.68–2.82)	0.38
Dialysis duration (years)				
≤3	Referent		Referent	
>3	1.57 (0.93–2.65)	0.09	1.01 (0.67–1.53)	0.95
Transplant factors				
Type of transplantation				
KA	Referent		Referent	
SPK	0.77 (0.40–1.48)	0.43	0.80 (0.49–1.31)	0.38
Delayed graft function				
No	Referent		Referent	
Yes	1.38 (0.80–2.39)	0.25	1.73 (1.17–2.57)	0.007
Type of immunosuppressive treatment				
Cyclosporine A	Referent		Referent	
Tacrolimus	0.90 (0.46–1.75)	0.76	0.69 (0.42–1.13)	0.14
Neoral cyclosporine	0.74 (0.39–1.39)	0.35	0.66 (0.41–1.05)	0.076

Adjusted for year of transplantation, anti-HLA antibodies, HLA mismatches, and cold ischemia time. The mean age of donors was 27.4 ± 12.2 years, 65.7% were male, and 14.0% were African American. The main cause of death among donors was head trauma (67.8%). $P < 0.05$ was used to determine statistical significance. HR, hazard ratio.

than that in KA recipients. However, after adjusting for major confounding variables, the survival advantage of SPK was not evident.

Previous studies comparing survival rates between SPK and KA recipients showed conflicting results (5–11). In some studies, more favorable donors were used for SPK and healthier recipients received SPKs (5,7,8,11). These studies relied on the multivariate analyses to adjust for recipient, donor, and transplant variables. However, even multivariate analyses do not provide complete adjustment for confounding, and there are residual effects from unmeasured factors or incompletely measured confounders. Our analyses on contralateral kidneys to compare survival between SPK and KA recipients minimized selection bias due to donors.

Since UNOS/OPTN (Organ Procurement and Transplantation Network) does not collect serial clinical data for patients, it is not possible for us to adjust for the clinical conditions of the recipients at the moment of transplantation. Our results of posttransplant mortality should be interpreted with some caution.

In summary, SPK was not associated with improved long-term kidney allograft and patient survival compared with KA. While the study is far from a randomized, prospective, controlled study, we consider it to be about as close to that ideal as practical for the question at hand. UNOS does not collect the information about quality of life after transplantation, which prevented us from analyzing the factors associated with improved quality of life. Future studies with larger samples and longer follow-up that examine not only survival but also quality of life may elucidate the potential benefits of SPK over KA.

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