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Older donors and kidney transplantation

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Abstract. Reluctance to use kidneys from older donors (> 50 years of age) is based on reports of inferior results. We reviewed our experience with 45 kidneys transplanted from older donors. Primary nonfunction, immediate graft function, and 1-, 2- and 3-year graft survival rates were similar to those obtained with kidneys transplanted from donors aged between 20 and 40 years. Renal function at 1 year (as measured by serum creatinine) was poorer in kidneys from older donors. No beneficial effect with respect to graft survival was noted with cyclosporin therapy compared to conventional immunosuppression; however, the numbers are small. We conclude that kidneys from older donors are a valuable source for transplantation.

Key words: Donor age, kidney transplantation – Kidney transplantation, older donors – Cyclosporin, older donors, kidney transplantation

Recent reports suggest that older donors (> 50 years of age) are an important source of kidneys for transplantation but that their use could lead to poorer results compared to younger donors [6, 9]. Age is not a criterion in our selection of suitable donors. We accept kidneys from older donors provided there is no evidence of renal impairment. We have reviewed our experience with 45 kidneys transplanted from donors aged 50 years or greater to assess the effect of donor age on transplant outcome in view of these recent reports of poorer results.

Patients and methods

Between January 1980 and December 1987, 45 kidneys from older donors (> 50 years of age) were transplanted in our unit. During the same period 225 kidneys were transplanted from donors aged between 20 and 40 years, and this group served for comparison. All recipients were adults. The incidence of primary nonfunction, delayed and immediate graft function, 1-, 2- and 3-year graft survival, cause of graft failure, effect of immunosuppression on graft survival, and mean serum creatinine at 1 year were examined. All causes of graft failure, including death with a functioning graft, have been included. Technical failures were those associated with absent renal perfusion due to vascular thrombosis. Data were analysed with Fischer's exact test, the Chi-squared test, and Student's *t*-test for unpaired data.

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Donors

Donor age ranged from 50 to 63 years (mean 54 years) in the older donor group and from 20 to 39 years (mean 26 years) in the control group. All donors were ventilated and had serum creatinine levels less than 130 μmol/l. All kidneys were retrieved from heart-beating donors and stored on ice. Cold ischaemic times were similar in both groups (18.5 vs 20 h).

Recipients

All recipients were adults. Recipients were selected on the basis of blood group compatibility, a negative cytotoxic crossmatch and HLA-A, B and DR typing with a maximum of one mismatch at each allele. Immunosuppression was with azathioprine and prednisolone in 124 patients (23 older donor kidneys and 101 younger donor kidneys) and with cyclosporin in 146 recipients (22 older kidneys and 124 younger kidneys). There were no significant differences between patients receiving kidneys from older donors and those receiving kidneys from younger donors with respect to recipient-related risk factors (Table 1).

Table 1. Recipient-related variables

	Donors 20–40 years ($n = 225$)	Donors > 50 years ($n = 45$)	Statistical significance
Mean recipient age	38 ± 12	36 ± 11	NS
No. of sensitised patients	171 (76%)	35 (77%)	NS
Mean HLA mismatches	1.3 ± 0.8	1.6 ± 0.6	NS
Cold ischaemia time (hours)	18.5 ± 1.5	20 ± 1.0	NS

Table 2. Graft function and survival

	Donors 20–40 years ($n = 225$)	Donors > 50 years ($n = 45$)	P value
Primary nonfunction	27 (12%)	4 (9%)	NS
Delayed onset of function	67 (30%)	21 (46%)	0.02
Immediate function	131 (58%)	20 (45%)	0.06
One-year function	174 (77%)	33 (73%)	NS
Failure	51 (23%)	12 (27%)	NS
Two-year function	166 (74%)	32 (72%)	NS
Failure	59 (26%)	13 (28%)	NS
Three-year function	154 (68%)	30 (67%)	NS
Failure	71 (32%)	15 (33%)	NS

Table 3. Causes of graft failure. Grafts lost at 2 and 3 years were due to rejection

	Donors 20–40 years ($n = 51$)	Donors > 50 years ($n = 12$)	P value
Technical	13	3	NS
Rejection	30	8	NS
Death with a functioning graft	8	1	NS

Results

There was no significant difference between the groups in the incidence of primary graft nonfunction. The number of grafts experiencing delayed onset of function was statistically higher in the group receiving kidneys from older donors ($P < 0.02$). However, this did not affect long-term graft survival as there was no significant difference between the groups with respect to 1-, 2- and 3-year graft survival. When analysed individually, the causes of graft failure were not significantly different between the groups (Tables 2, 3).

Cyclosporin immunosuppression was associated with significantly better 1-, 2- and 3-year graft survival than was azathioprine immunosuppression in kidneys from younger donors ($P < 0.05$). This beneficial effect of cyclosporin was not evident in the group receiving kidneys from older donors. However, the absence of a significant effect of immunosuppression may be due to the small number of patients in the older donor group. In absolute terms, the difference in the proportion of functioning grafts is nearly as great in the older group as in the younger one when cyclosporin is compared with azathioprine (Table 4).

Renal function at 1 year, measured by serum creatinine, was significantly poorer in kidneys from older donors ($P < 0.05$). Comparison within the older donor group is not valid due to the small numbers (Table 5).

Discussion

Despite the gap between available organs and the number of patients awaiting transplantation, there is some reluctance to use kidneys from older donors [7]. This reluctance is based on reports of inferior graft survival and an increased incidence of technical problems due to anastomoses involving diseased vessels, which are more prevalent in older donors [3, 5]. In particular, age-related decline in functioning renal tissue, leading to a limited functional reserve that may be further reduced by insults such as cyclosporin nephrotoxicity, postoperative acute tubular necrosis and acute or chronic rejection, have been cited as possible reasons for the poorer results reported with older donors [1, 4].

In this series of 45 kidneys transplanted from donors aged 50 years or greater, results achieved were comparable to those seen with kidneys from younger donors. In particular, the rate of primary graft nonfunction and the 1-, 2- and 3-year graft survival rates were similar in both groups. The number of grafts experiencing a delayed onset of function was significantly higher in the older donor group ($P < 0.02$), but this did not affect long-term graft survival. There was no significant difference with respect to cause for graft failure between the groups.

Cyclosporin immunosuppression was used in the latter 3 years of the period examined and was associated with a significant improvement in graft survival at all time points in recipients of kidneys from younger donors. In the older donor group there were proportional increases in graft survival associated with the introduction of cyclosporin that did not reach statistical significance, perhaps because of the small numbers involved. Renal function at 1 year, as measured by serum creatinine, was significantly higher in recipients of kidneys from older donors.

The increased incidence of delayed onset of graft function in recipients of kidneys from older donors may pose a potential management problem where cyclosporin immunosuppression is used [2, 8]. Some reports have suggested that delayed onset of graft function is associated with poorer long-term graft survival where cyclosporin is used [2]. However, our experience shows that 1-, 2- and 3-year graft survival rates were unaffected by the time of onset of graft function. The poorer renal function, as measured by serum creatinine, could potentially be worsened by episodes of acute or chronic cyclosporin nephrotoxicity. This

Table 4. Proportion of functioning grafts in both groups under CyA and AZA immunosuppression

% function at	Donors 20–40 years ($n = 225$)			Donors > 50 years ($n = 45$)		
	CyA ($n = 124$)	AZA ($n = 101$)	Difference (CyA-AZA)	CyA ($n = 22$)	AZA ($n = 23$)	Difference (CyA-AZA)
1 year	104/124 = 84%	71/101 = 70%	14%	18/22 = 82%	15/23 = 65%	17%
2 years	100/124 = 81%	66/101 = 65%	16%	17/22 = 77%	15/23 = 65%	12%
3 years	95/124 = 77%	59/101 = 58%	19%	16/22 = 73%	14/23 = 61%	12%

Table 5. Serum creatinine at 1 year (μmol/l)

Donor 20–40 years ($n = 225$)	Donor > 50 years ($n = 45$)
151 ± 19 μmol/l	195 ± 17 μmol/l

may be avoided by careful monitoring of cyclosporin levels and renal function with appropriate dose alteration.

It is concluded from this data that kidneys from older donors are suitable for renal transplantation. An increased incidence of delayed onset graft function does occur, but this does not influence ultimate graft survival. Cyclosporin probably enhances survival but should be used with caution because of the delay in graft function and the inherently poorer renal function in these kidneys.

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