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Comparison of the outcome of living related donor and cadaveric renal transplantation in Queen Mary Hospital — a single centre experience

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Abstract

Living related donors (LRD) have been the main source of donor kidneys in Hong Kong. In recent years, there has been an increase in the proportion of cadaveric (CAD) kidneys transplantation. This review examines the results of renal transplantation in Queen Mary Hospital (QMH) in order to assess the continuing need for LRD kidney transplantation. The records of 159 of 165 transplant cases between 1983 and 1991 were analyzed. The mean age of recipients was 35.6 years (range 11 to 57), with a male predominance in the LRD recipients ($p = 0.03$). The waiting time for the LRD recipients was significantly less than the CAD recipients ($p < 0.001$). There was no difference in the distribution of different primary renal diseases causing end stage renal failure between the LRD and CAD groups. The cumulative graft survival at five years was 82.5% and 65.8% for LRD and CAD respectively ($p = 0.02$). Graft function was also significantly better in LRD recipients ($p < 0.01$). Early surgical complications were more common after CAD transplantation (14% vs 29%, $p = 0.02$). While the transplant centres and the Hong Kong Government continue to promote cadaveric organ donation, the LRD transplant programme should be equally encouraged because of superior graft outcome.

Keywords: Renal transplantation; Donors; Living-related donors

Introduction

Living related donors (LRD) have been the main source of donor kidneys in Hong Kong until recently. There has been a gradual increase in cadaveric (CAD) organ donation over the last few years, probably as a result of an increase in public awareness of the im-

portance of organ donation.^{1,2} However, this small increase in organ supply has been superseded by the big jump in the number of dialysis patients waiting for kidney transplantation.^{1,2} Under the circumstances, many have sought transplantation in mainland China. The use of such unconventional donors organs has raised ethical problems, and is associated with a higher rate of morbidity and mortality.^{3,4} In this review, the results of renal transplantation in Queen Mary Hospital (QMH) are studied, in order to assess the continuing role of LRD kidney transplantation in Hong Kong.

Materials and methods

Between 1983 and 1991, a total of 165 renal transplants were performed by both the University and

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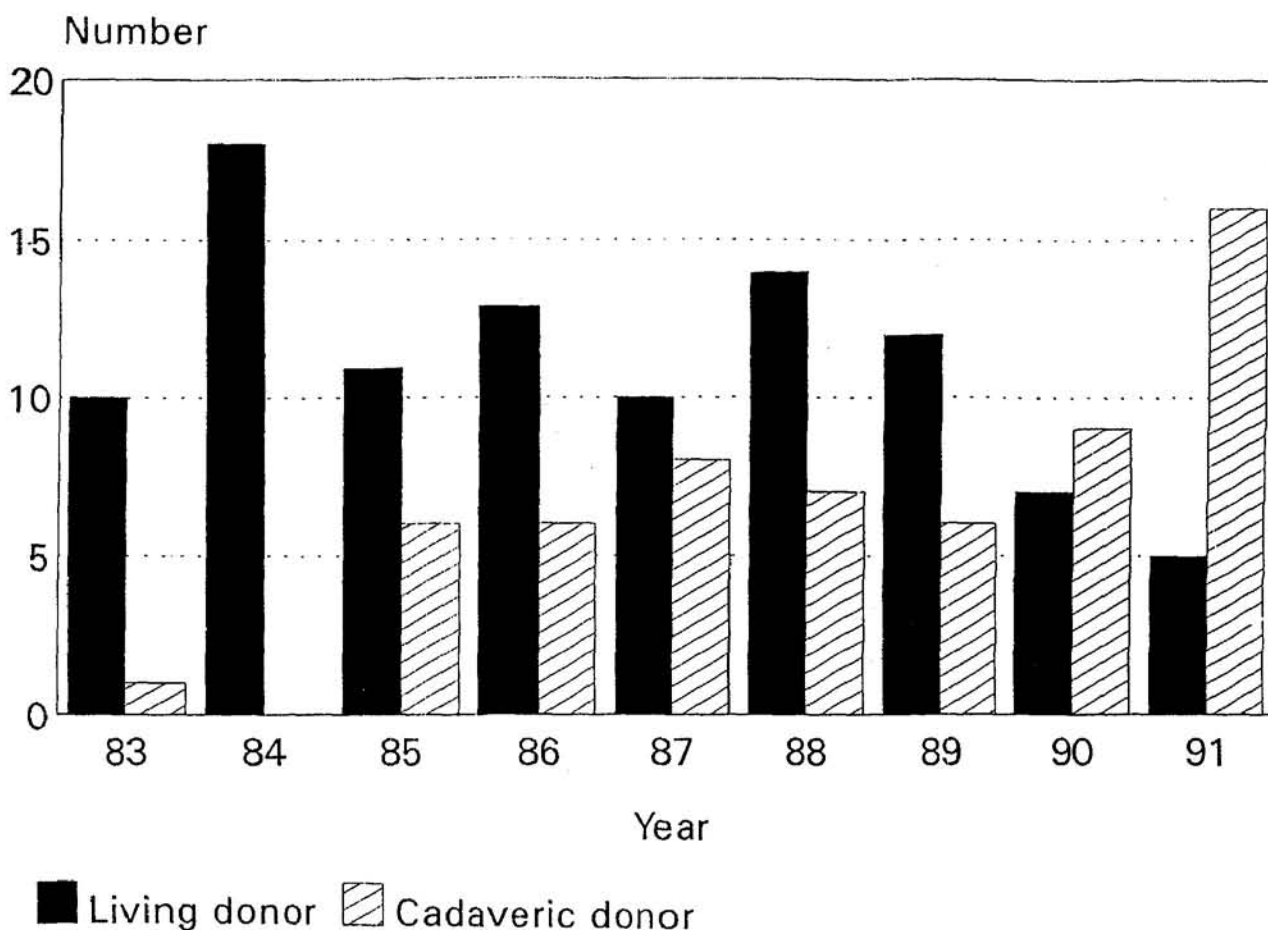


Fig. 1. Number of transplants per year at QMH.

Government surgical units in Queen Mary Hospital (QMH). 159 cases were regularly followed up by the university medical unit, QMH and were available for analysis. Among them, two patients had two transplants at QMH, and one patient had a previous transplant in China. Recipients were selected on the basis of age, duration of dialysis, blood group compatibility, negative cytotoxic cross-matching, and HLA-A, B, DR matching.

Patients transplanted before 1984 were immunosuppressed with azathioprine and prednisolone. From 1984, patients who received HLA-nonidentical renal allografts were treated with either (1) cyclosporin A and prednisolone, or (2) cyclosporin A, azathioprine, and prednisolone in a randomized trial. Patients who received HLA-identical kidneys were given azathioprine and prednisolone only.

The patient and graft outcomes were analysed and compared between the LRD and CAD groups. Student's *t* test and Wilcoxon test were used respectively in comparisons of waiting time for transplantation and the graft function, as assessed by the latest follow-up serum creatinine. The Chi-square test was used to analyse the sex predominance, the surgical complications and infection incidence. The cumulative graft survival was

compared by using the Mantel-Cox method. The level of statistical significance was $p < 0.05$.

Results

Overall, 100 (63%) were LRD which included three spouse donors and 59 (37%) were CAD (Fig. 1). Recipients had a mean age of 34 years (range 11 to 57) in the LRD group and a mean age of 38 years (range 20 to 56) in the CAD group. While the sex distribution in CAD group was 31 males to 28 females, there was a male predominance of 65 to 35 in the LRD group ($p = 0.03$). If one assumed that all patients who presented with end stage renal failure and bilaterally contracted but smooth kidneys as chronic glomerulonephritis, the distribution was similar in both LRD and CAD transplant recipients (65% and 68% respectively). Glomerulonephritis on the whole accounted for 91.8% of the primary renal diseases causing end stage renal failure in our transplant recipients. Hypertension, diabetes, reflux nephropathy and pyelonephritis accounted for the remainder. Sixty-eight percent of recipients were maintained on peritoneal dialysis, 30% were on hemodialysis and 2% had been on both forms

Table 1. Surgical complications

	LRT	CAD
Lymphocele	*2 (2.0)	6 (10.0)
Artery thrombosis	3 (3.0)	3 (5.1)
Vein thrombosis	0 (0)	1 (1.7)
Artery stenosis	1 (1.0)	2 (3.4)
Vesico-ureteric reflux	2 (2.0)	1 (1.7)
Urinary fistula	1 (1.0)	0 (0)
Ureteric stenosis	0 (0)	1 (1.7)
Wound infection	4 (4.0)	3 (5.1)
Wound dehiscence	1 (1.0)	0 (0)
Total	14 (14.0)	17 (28.8)

*Number affected (percentage)

of dialysis before transplant. The mean waiting time for a LRD kidney was 1.6 years (range 0 to 9 years) and for a CAD kidney was 2.9 years (range 0 to 9 years) ($p < 0.001$).

With a mean follow-up period of four years (range 6 months to 9 years), the early surgical complications

(Table 1) were more frequent among the CAD transplant ($p = 0.02$). In particular, the latter had more vascular complications. Three cases of renal artery thrombosis and one renal vein thrombosis occurred in the CAD group and led to graft failure. Among the three cases of renal artery thrombosis in the LRD group, only one led to graft failure, as the other two were partially thrombosed. Of the infective complications, more bacterial infections (46% vs 29%) ($p = 0.03$) and CMV infection (13.6% vs 3%) ($p = 0.01$) occurred in the CAD group.

The LRD group had better graft survival ($p < 0.01$) (Fig. 2). At the end of the study, 16 (16%) LRD grafts and 17 (28.8%) CAD grafts had failed. The cumulative graft survival at five years was 82.5% and 65.8% for the LRD and CAD grafts respectively. The causes of graft loss included renal artery thrombosis ($n = 4$), renal vein thrombosis (1), acute (8) and chronic (11) rejection, recurrent lupus nephritis (1), shock from pulmonary hemorrhage (1) and patients having died with functioning grafts (7). Of the recipients with functioning grafts, more than 90% had serum

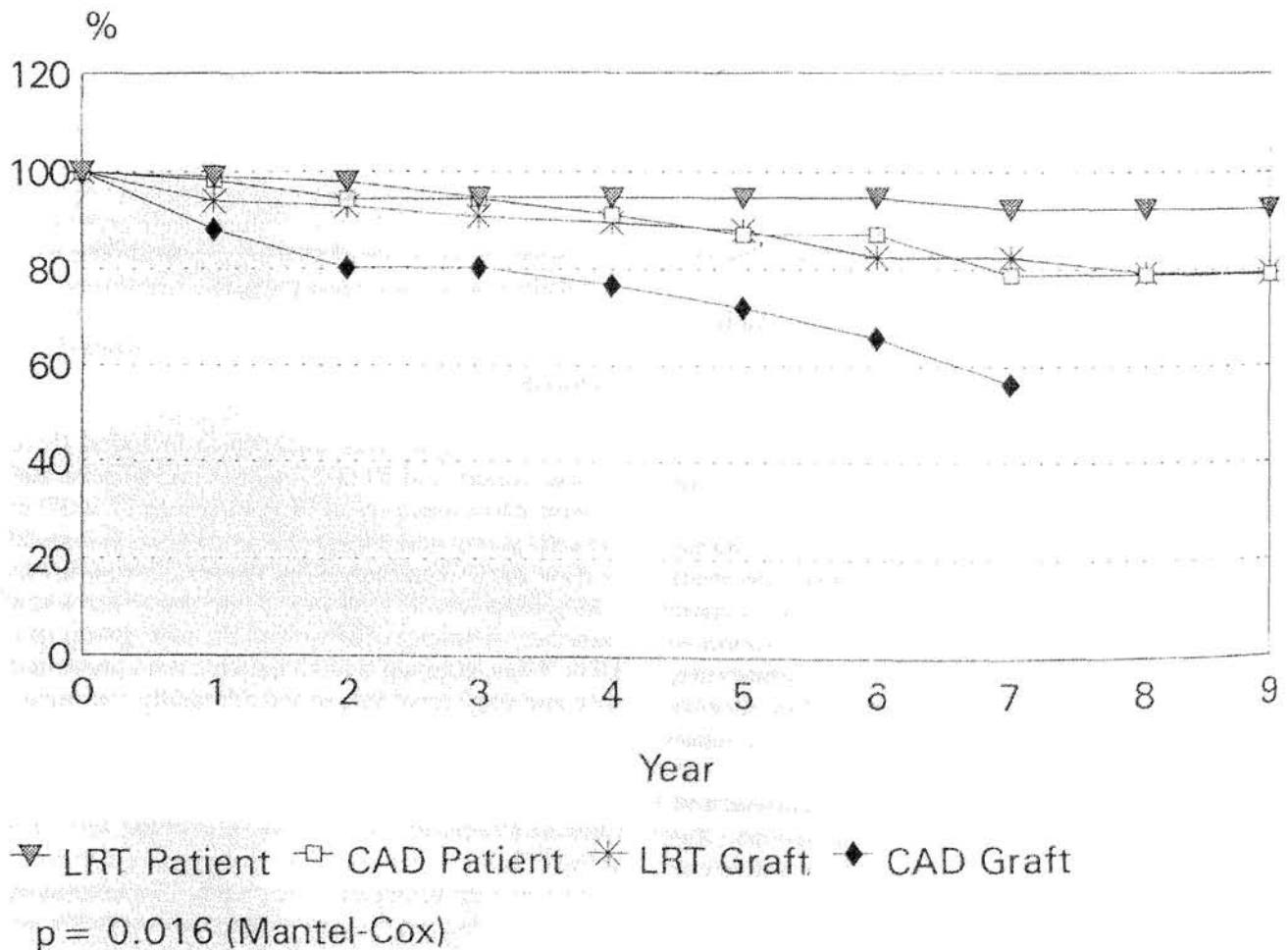


Fig. 2. Cumulative patient and graft survival of LRD and CAD.

creatinine below 300 mmol/L. Graft function was better in LRD compared to CAD recipients ($p < 0.01$) (Table 2). There were no case of skin cancer and four (2.5%) cases of malignancies, including a bladder squamous cell carcinoma, a renal cell carcinoma of the native kidney, an adenocarcinoma of stomach and a hepatoma.

The patient survival was better among the LRD group (7% vs 10.2%), but the difference failed to reach statistical significance. Overall, six patients died of infections, two of malignancies, two of cardiovascular events, one of graft failure and one of unknown cause.

Discussion

The present study has confirmed the findings from overseas series that living related transplants are associated with a better allograft outcome when compared to cadaveric transplant.^{5,6} This is due to better matching of major HLA and minor histocompatibility antigens and a reduced incidence of delayed graft function in living related transplantation due to shorter warm and cold ischemic time and a lack of premorbid conditions in the donors which may adversely affect renal function. The latter is known to play an important role in improving graft outcome because recent studies have shown that living unrelated transplantation is associated with graft outcome close to that of living related transplants and superior to similarly matched cadaveric transplants.^{7,12}

Interestingly, we have found that living related transplants are associated with a lower surgical complication rate when compared to cadaveric transplantation. Although few of these complications are associated with graft loss, they do contribute to increased morbidity in transplant recipients. The reason for this difference could be related to the elective nature of living related transplantation versus the emergency setting of cadaveric renal transplantation. As different groups of surgeons have been responsible for renal transplantation at our hospital over time and the proportion of cadaveric versus living related renal transplantation also varies over time, one could not exclude the alternative possibility that the difference may reflect the relative experience and expertise of different groups of surgeons.

The lack of cadaveric organ donors worldwide and the difficulty in finding a living related donor has prompted many transplant centres to consider the use of organs from living unrelated donors. Recent studies have shown that this form of transplantation can be associated with a good graft and patient survival.^{7,12} While few will argue that transplantation between spouses is acceptable because the recipient and donor are emotionally related, divided opinion exists for relationships other than

Table 2. Kidney function of surviving patients

Cr level (mmol/L)	LRT	CAD
120	*34 (40.5)	12 (28.5)
121–200	44 (52.4)	24 (57.1)
201–300	5 (5.9)	5 (11.9)
301–400	0 (0)	0 (0)
401–500	1 (1.2)	0 (0)
501–600	0 (0)	0 (0)
601–700	0 (0)	1 (2.4)
Total	84 (100.0)	42 (100.0)

*Number affected (percentage)

spouses. Most are concerned with the genuine intention of the donors and the likelihood of commercial exploitation of both donors and recipients. In Hong Kong, the general opinion is against the unrestricted use of genetically or emotionally unrelated donors. This is reflected in the introduction of the Human Organ Transplant Bill which will shortly be enacted to prohibit these types of transplants.

Few will argue that cadaveric renal transplantation is the preferred form of transplantation for patients suffering from end stage renal failure because it does not involve subjecting another otherwise normal individual to surgery. There is also the concern that patients with a single kidney may suffer from the long term consequences because of glomerular hyperfiltration, an adaptive response of the single kidney.⁹ We and others have examined the medical and psychological well-being of renal donors and found that the short-term and long-term risks to donors are minimal.^{8,10,11} This together with the current lack of cadaveric organ procurement in Hong Kong fully justifies the continued use of living related donor kidney for transplantation purpose.

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