Kidney survival in kidney only and combined pancreas/kidney transplants

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Background

- If a donor pancreas is available and there are no suitable 000 mismatched highly sensitised adults or 000 mismatched paediatric patients, deceased heartbeating donor kidneys are offered first to patients awaiting a simultaneous pancreas/kidney (SPK) transplant and then to those awaiting a kidney only (KO) transplant.
- To ensure kidneys are being allocated appropriately, we have investigated whether kidney graft and patient survival are comparable in SPK and KO transplants.

Data

- Data were obtained from the National Transplant Database.
- 224 first SPK transplants in adult patients (≥ 18 years) performed in the UK during the calendar years 1995 to 2004 inclusive.
- The corresponding first KO transplants in adult patients using the contralateral kidney from the pancreas/kidney donors.
- SPK transplants without a corresponding kidney only transplant from the same donor were excluded from the study.

Methods

- Univariate donor and recipient demographics were compared statistically using Fisher's Exact test.
- Kaplan-Meier survival functions were used to illustrate unadjusted graft and patient survival.
- Risk-adjusted Weibull survival models were developed to estimate the relative risks of graft failure and recipient death following a SPK or KO transplant. An additional term was added to account for recipient pairs being transplanted with kidneys from a common donor.

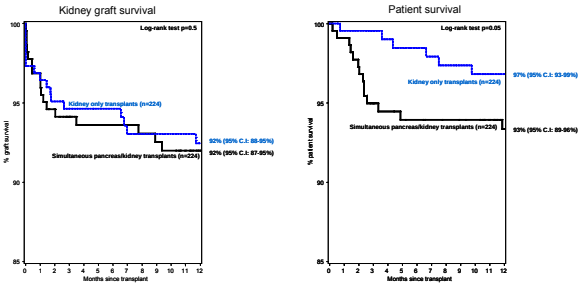
Results

Donor and recipient demographics

Donor/recipient factor	Total	Kidney only N	Kidney only (%)	Simultaneous pancreas/kidney N	Simultaneous pancreas/kidney (%)	p-value
Graft year						
1995 - 1998	108	54	(24)	54	(24)	
1999 - 2001	194	97	(43)	97	(43)	
2002 - 2004	146	73	(33)	73	(33)	
Donor age						
17 or under	18	9	(4)	9	(4)	
18 to 29	180	90	(40)	90	(40)	
30 to 39	138	69	(31)	69	(31)	
40 or over	112	56	(25)	56	(25)	
Donor cause of death						
Trauma	306	153	(68)	153	(68)	
Intracranial injury	102	51	(23)	51	(23)	
Other	40	20	(9)	20	(9)	
Recipient age						
18 to 39	225	102	(46)	123	(55)	
40 to 49	135	50	(22)	85	(38)	
50 or over	88	72	(32)	16	(7)	<0.001
Waiting time						
Less than 6 months	154	54	(24)	100	(45)	
6 months to under 2 years	198	98	(44)	100	(45)	
2 years or more	96	72	(32)	24	(11)	<0.001
HLA Mismatches						
000	31	29	(13)	2	(<1)	
[0 DR and 0/1 B]	116	38	(17)	78	(35)	
[0 DR and 2 B] or [1 DR and 0/1 B]	167	146	(65)	21	(9)	
[1 DR and 2 B] or [2 DR]	134	11	(5)	123	(55)	<0.001
Recipient diabetic						
No	132	132	(59)	0	(0)	
Yes	234	10	(4)	224	(100)	
Unknown	82	82	(37)	0	(0)	
Total	**448**	**224**		**224**		

- Due to the matched pairs design of the study the donor factors across the two transplant types are identical.
- There were statistically significant differences in recipient factors: compared with SPK recipients, KO recipients were generally older, had waited longer for transplant and achieved better HLA matching.
- All patients who received SPK transplants were diabetic compared with only 4% of KO transplant recipients with reported renal disease.

One-year unadjusted kidney graft and patient survival



- Without risk adjustment, there was no statistical evidence to suggest kidney graft survival in SPK transplants differed from that for KO transplants (p=0.5).
- There was statistical evidence to suggest that unadjusted patient survival was significantly poorer following SPK transplant than KO transplant (p=0.05).

Risk-adjusted kidney graft and patient survival

- The effect of transplant type on graft and patient survival was investigated once other factors known to affect survival had been adjusted for. These were:

  year of graft, donor age, donor cause of death, recipient age, waiting time to transplant and HLA match grade

- **Kidney graft survival**

  The relative hazard of failure following KO transplant compared with SPK transplant was **0.77 (95% CI: 0.30 - 1.96)**.

  Adjusting for known risk factors, there was no statistical evidence of a difference between the two transplant types **(p=0.6)**.

- **Patient survival**

  The relative hazard of death following KO transplant compared with SPK transplant was **0.18 (95% CI: 0.05 - 0.57)**.

  Risk-adjusted analysis confirms highly significant statistical evidence to suggest that patients receiving KO transplant have a significantly lower risk of death post-transplant **(p=0.004)**.

Causes of death post-transplant

Reported cause of death	Kidney only N	Kidney only (%)	Simultaneous pancreas/kidney N	Simultaneous pancreas/kidney (%)
Myocardial ischaemia and infarction	2	(18)	6	(27)
Septicaemia	1	(9)	6	(27)
Cerebrovascular accident	0	(0)	3	(14)
Multi-system failure	0	(0)	2	(9)
Haemorrhage - Miscellaneous	2	(18)	1	(5)
Hyperkalaemia	1	(9)	0	(0)
Cardiac - Miscellaneous	1	(9)	0	(0)
Gastrointestinal haemorrhage	1	(9)	0	(0)
Infection – Miscellaneous	2	(18)	0	(0)
Other cause of death – not specified	1	(9)	4	(18)
Total	**11**	**(100)**	**22**	**(100)**

- The higher incidence of deaths for SPK recipients was largely attributable to myocardial ischaemia and infarction, septicaemia and cerebrovascular accidents.
- The increased risk of death for patients receiving SPK transplant over those receiving KO transplant was highest during the first few months post-transplant.

Summary

- There was no statistical evidence to suggest kidney graft survival following SPK transplant differed from that following KO transplant. Kidney grafts appear to function at least as well in SPK transplants as they do in KO transplants.
- There was strong statistical evidence to suggest that patient survival is significantly poorer following SPK transplant than following KO transplant. The additional deaths following SPK transplant are mainly post-transplant complications typically associated with diabetic patients.
- This analysis compared SPK patients, who were all diabetic, with KO patients with a range of indications. Previous studies have shown post-transplant survival in diabetic patients is poorer compared with most other indications. Similar analysis on a dataset restricted to diabetic patients only is to be investigated.