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Transplantation of Pediatric En Bloc Kidneys Under FK 506 Immunosuppression

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THE use of kidneys from pediatric donors has been controversial because of reported high rates of graft loss from technical and immunologic complications.¹⁻³ FK 506 has been shown to be an effective immunosuppressive agent in clinical trials in liver transplantation and in recipients of adult cadaver kidneys.^{4,5} We report herein our experience with FK 506 as primary immunosuppression in 39 patients transplanted with en bloc kidneys from young pediatric donors under 4 years of age.

MATERIALS AND METHODS

All kidneys were harvested en bloc with an intact segment of infrarenal aorta and vena cava, the cephalad ends of both closed with polypropylene suture. The inferior ends of the donor aorta and vena cava were anastomosed end-to-side to the recipient's external iliac vessels. All ureters were reimplanted extravesically. Donors ranged in age from 4 to 48 months (mean 19.8 + 4.9

months, median 20 months), weighing 6.4 to 17.7 kg (mean 11.6 + 2.6 kg, median 11.8 kg), with mean terminal BUN/creatinine of 11/0.4. All patients received FK 506 and steroids without Imuran.

RESULTS

Overall patient and graft survival rates are 92% and 74%, respectively, with a mean follow-up of 11 months (range 6

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Table 1. FK 506 and Pediatric En Bloc Kidneys: Patients With Functioning Grafts

Date of Operation	Transplant No.	PRA (%)	Rejection	Donor Age (months)	SCR* (mg/dL)	FK 506* (mg/kg)	Prednisone* (mg/d)
10/26/89	2	23	No	20	1.5	.14 BID	0
11/19/89	1	92	Yes	30	1.1	.16 BID	20
2/16/90	1	0	Yes	18	2.1	.05 BID	5
2/16/90	1	23	No	16	0.9	.06 BID	0
2/23/90	1	0	Yes	21	1.2	.07 BID	7.5
2/26/90	1	0	No	4	1.4	.15 BID	10
3/13/90	1	7	No	20	1.9	.16 BID	0
4/20/90	1	7	No	16	1.6	.15 BID	0
5/9/90	2	7	Yes	24	1.7	.03 BID	0
6/3/90	1	13	No	22	1.1	.16 BID	0
7/13/90	1	0	No	10	1.4	.04 BID	0
7/25/90	1	0	Yes	30	0.9	.17 BID	10
8/16/90	1	0	No	24	1.2	.08 BID	5
8/29/90	1	3	Yes	30	1.6	.10 BID	10
8/30/90	1	0	No	12	0.5	.13 BID	0
9/10/90	1	0	Yes	18	1.1	.18 BID	0
9/14/90	1	0	No	36	1.5	.12 BID	0
10/4/90	1	0	Yes	22	1.7	.13 BID	10
10/10/90	1	0	No	20	1.0	.18 BID	0
10/18/90	1	64	Yes	30	0.8	.24 BID	10
11/7/90	1	23	Yes	36	2.0	.10 BID	0
11/16/90	1	1.5	Yes	31	1.7	.07 BID	7.5
11/20/90	1	1.7	No	17	1.2	.16 BID	5
11/26/90	1	3	Yes	14	2.1	.12 TID	5
12/22/90	1	59	No	9	1.4	.12 BID	7.5
12/29/90	2	57	Yes	17	1.6	.18 BID	7.5
1/31/91	1	0	No	7	2.0	.15 BID	5
1/4/91	1	0	Yes	12	2.3	.14 BID	7.5
1/20/91	1	3	No	8	1.7	.17 BID	0

*At last follow-up (median 11 months).

Table 2. Complications and Causes of Graft Loss

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- Death (*n* = 3)
 - Cardiac arrest (*n* = 2)
 - TB
 - Anatomic complications (*n* = 3)
 - Acute technical venous thrombosis (*n* = 1)
 - Venous thrombosis from severe rejection (*n* = 1)
 - Mycotic arterial anastomotic aneurysm (*n* = 1)
 - Irreversible acute rejection (*n* = 1)
 - Chronic rejection (*n* = 2)
 - Withdrawal of immunosuppression (TB) (*n* = 1)
 - Urologic complications (*n* = 0)
-

to 21). There were 3 patient deaths, 2 due to cardiac arrest, and 1 due to TB. The clinical characteristics of the 29 patients who have functioning grafts are summarized in Table 1. Thirteen of these 29 patients (45%) are currently on FK 506 monotherapy, taking no prednisone. Neither prior transplantation, degree of HLA matching or mismatching, nor PRA altered graft survival. Donor age did not affect graft survival or function. In a subgroup of grafts from donors under 1 year of age (*n* = 9), graft survival is 78% without any technical complications, and the mean serum creatinine 1.5 mg/dL. Table 2 summarizes the complications and causes of graft loss. There were no urologic complications. Twenty-one patients were diagnosed with rejection. Two were not treated because of tuberculosis, 2 grafts were lost to early acute rejection, and 2 were lost to chronic rejection at 12 months. The other 15 patients had successful reversal of rejection, and have a mean serum creatinine of 1.6 ± 0.6 .

DISCUSSION

This report demonstrates satisfactory early results using kidneys en bloc from young pediatric cadaver donors with FK 506 and low-dose steroids. The 29 functioning grafts continue to provide renal function with mean follow-up approaching 1 year. Significant is the absence of any urologic complications using en bloc kidneys from even the smallest donors. The rapid taper of prednisone may be an important advantage of FK 506 in recipients of kidneys from small donors where problems with healing could lead to significant technical complications.

We conclude that transplanting kidneys en bloc from young donors under age 4 can provide excellent renal function with good rates of graft survival and acceptable complication rates. Use of these small kidneys may be an important factor toward increasing the donor pool. In addition, FK 506 appears to be an appropriate immunosuppressive agent in this setting, permitting excellent renal function with minimal toxicity, and the ability to use little or no steroids.

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