CLINICAL POLYOMAVIRUS DISEASE IN PEDIATRIC KIDNEY TRANSPLANT RECIPIENT - AN ANALYSIS OF OPTN/UNOS DATABASE

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Background

Polyomavirus-associated nephropathy often precedes renal allograft dysfunction in adult renal transplant recipients. The Organ Procurement and Transplant Network/ the United Network for Organ Sharing (OPTN/UNOS) began collecting information regarding polyomavirus test results using follow-up forms since June 30, 2004. The aim of this study was to evaluate the impact of clinical polyomavirus disease (PVD) on graft survival after pediatric kidney transplantation.

Materials and Methods

From Jan 2004 to Dec 2006, a total of 2,065 pediatric kidney alone transplants (age 2-20 yrs) with a functioning graft at 6 months were identified in the OPTN/UNOS data as of Aug 20, 2007. Of these, polyoma virus tests were performed for 329 pediatric patients and 57 patients who developed clinical polyomavirus disease after transplantation were identified. Graft survival rates were compared for the following 3 groups: PVD group - Patients who had developed PVD (n=57); no PVD group - Patients who had a negative PV test and had not developed PVD (nPVD) (n=272); and Control group - Patients who had not undergone a PV test on follow up record (nPVT) (n=1,731). Univariate and multivariate Cox regression analyses were performed to identify risk factors of graft loss.

Results

Overall graft survival rates of the PVD group were not significantly inferior to those of the 2 control groups: vs nPVT group, log-rank P=0.13; and vs nPVD group, log-rank P=0.25. In multivariate analysis, both nPVD (RR=1.55 vs nPVT, P=0.31) and PVD (RR=1.00 vs nPVT, P=0.99) were not significant risk factors for graft loss after adjusting for other risk factors (Table). Other significant risk factors for graft loss were rejection treatment within 6 months (RR=3.17, P<0.001), being African American (RR=2.10, P<0.001), recipient age 15-20 (RR=1.48, P=0.046).

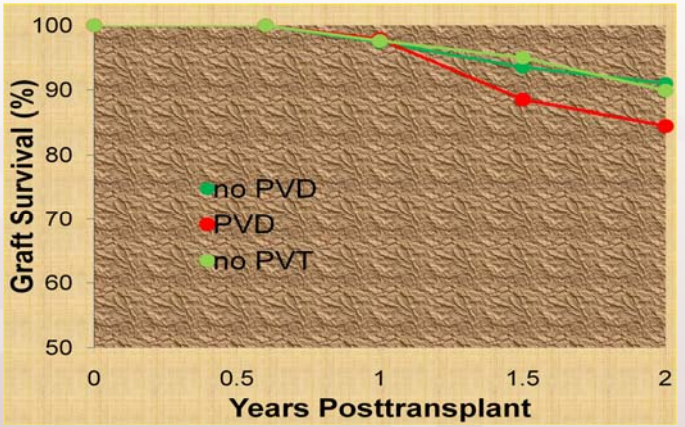
Table 1. Patient characteristics

Variables	Levels		PVD (%)	nPVD (%)	nPVT (%)	P value
		n	(n=57)	(n=272)	(n=1,731)	
Recipient						
Age (yr)	2-9	443	3.2	16.5	80.3	0.024
	10-14	509	3.7	14.0	82.3	
	15-20	1,109	2.2	11.5	86.3	
Gender	Female	850	2.6	12.1	85.3	0.420
	Male	1,210	2.9	14.0	83.1	
Race	Afr Am	395	3.0	15.4	81.5	0.309
	Others	1,665	2.7	12.7	84.6	
Donor						
Type	Living	1,031	2.2	10.7	87.1	0.001
	Deceased	1,029	3.3	15.7	81.0	
Age (yr)	0-2	8	12.5	12.5	75.0	0.071
	3-15	175	4.0	20.0	76.0	
	16-35	1,059	2.8	13.3	83.9	
	36-50	725	2.2	11.9	85.9	
	>50	93	3.2	9.7	87.1	
Rejection in 6m	None	1,849	2.2	12.7	85.2	<0.001
	Yes	211	8.1	18.0	73.9	

Table 2. Results of univariate and multivariate Cox regression analyses

Factors	Unadjusted RR (95%CI)	P value	Adjusted RR (95% CI)	P value
Recip Age 15-20 vs 2-14	1.47 (1.00-2.16)	0.050	1.48 (1.01-2.19)	0.046
Recip African Am vs others	2.15 (1.43-3.22)	<0.001	2.10 (1.40-3.15)	<0.001
Rejection in 6 mths vs none	3.28 (2.11-5.01)	<0.001	3.17 (2.04-4.94)	<0.001
CPVD Not tested	1.0		1.0	
No CPVD	1.89 (0.82-4.32)	0.13	1.55 (0.67-3.56)	0.31
CPVD	0.99 (0.54-1.82)	0.98	1.00 (0.54-1.83)	0.99

Figure. Overall Graft Survival of nPVD, PVD, and nPVT groups



Discussion

It has been reported that up to 10% of renal transplant recipients could develop polyomavirus nephropathy (PVN) in the allograft, leading to premature graft failure. However, pediatric patients might be able to elicit a more vigorous defense against BK virus than adult kidney transplant recipients. Also the effect of cidofovir and leflunomide is still unresolved in pediatric patients. Larger prospective studies are necessary to better define the impact of BK virus immunity for viral replication and disease, as well as the role of reducing immunosuppression with or without cidofovir or leflunomide in pediatric transplant recipients.

Conclusion

Clinical polyomavirus (BK virus) disease may not be a significant risk factor in pediatric kidney survival. Larger prospective studies are needed to understand the impact of BK virus infection, replication and disease on pediatric kidney transplant outcome.