Viral Infections

in Pediatric Kidney Transplant Recipients:

Effects on Graft Function, Risk Factors, and Patient Outcomes

Prof. Dr. Esra Baskın

Başkent University Department of Pediatric Nephrology, Ankara, Turkey

Introduction

- Kidney transplant is the optimal treatment for children with end-stage kidney failure, as it enhances survival, growth, and quality of life.
- Despite advancements in immunosuppression therapies that prevent graft loss, immunosuppression still raises concerns by increasing the risk of viral infections in kidney transplant recipients.
- Viral infections in kidney transplant recipients rise from 10% to 30% in the first 6 months post-transplant.

Study Objectives:

- **Primary:** Identify risk factors for viral infections in pediatric kidney transplant recipients.
- **Secondary:** Determine infection frequency/types and assess their impact on kidney and patient outcomes.

Materials and Methods

- This single-center retrospective study at Başkent University Adana Dr. Turgut Noyan Research and Training Center reviewed pediatric kidney transplants between 2010-2023.
- Patient medical records were reviewed for demographic details, donor types, pretransplant therapies, causes of end-stage kidney disease (ESKD), immunosuppression, acute rejection episodes, and eGFR.
- The estimated glomerular filtration rate (eGFR) was calculated using the modified Schwartz formula.
- Conducted for patients with clinical symptoms, including tests for CMV, BKV, parvovirus, and SARS-CoV-2.
- Serial monitoring of CMV (serology) and BKV (blood PCR) was done monthly for the first 3 months, every 3 months in the first year, and annually thereafter.
- Induction therapy included basiliximab, with maintenance immunosuppression of tacrolimus, mycophenolate sodium, and steroids, alongside prophylactic antibiotics, trimethoprim/sulfamethoxazole, and valganciclovir to prevent postoperative infections.

Results

Table 1. Demographic and Transplantation Characteristics of The Patients

Patients characteristics	**All patients (n=79)**	**Viremia (n=18)**	**No viremia (n=61)**	**p**
Male, n (%)	52 (66)	12 (67)	40 (66)	0.932
Age at transplant, years, mean±SD	12.7±3.9	11.4±4.1	13.1±3.8	0.470
Follow-up time, years, mean±SD	4.2±3	5.3±3.5	3.9±2.8	0.091
Primary diagnosis of ESKD, n (%) CAKUT Glomerulopathy Ciliopathy Tubulopathy Unknown	 42 (53) 24 (30) 6 (8) 2 (3) 5 (6)	 9 (50) 4 (22) 3 (17) 1 (5.5) 1 (5.5)	 33 (54) 20 (33) 3 (5) 1 (1.5) 4 (6.5)	0.414
Kidney replacement therapy, n (%) Hemodialysis Peritoneal dialysis Preemptive Tx	 43 (54) 25 (32) 11 (14)	 12 (67) 5 (28) 1 (5)	 31 (51) 20 (33) 10 (16)	0.382
Time on dialysis, years, mean±SD	2.2±2.4	2.2±2.3	2.2±2.5	0.900
Donor type, n (%) Living Cadaver	 44 (56) 25 (44)	 13 (72) 5 (28)	 41 (67) 20 (33)	0.688

Table 2. Frequency, Symptoms, Timing, and Rejection Episodes

	BKV	**CMV**	**VZV**	**PVB19**	**COVID-19**
Viremia, No. of patients (%)	7/25 (28)	6/25 (24)	6/25 (24)	4/25 (16)	2/25 (8)
Time to viremia, median (range), mo	15 (3-57)	23 (5-45)	30 (6-93)	13 (4-18)	66 (57-75)
Symptoms (No. of patients)	Elevated Cr (7); Biopsy-proven BKVN (3)	Elevated liver enzymes (1); Elevated Cr (3)	Fever (6); Skin eruption (6)	Cytopenia (4)	Fever (2)
eGFR during infection, mean ± SD, mL/min/1.73 m2	60±19	67±55	57.5±23.5	46.5±23.5	28±7
Rejection, No. of patients	3/7	2/6	4/6	1/4	1/2

Table 3. Allograft Outcomes Based on Presence of Viremia

	Viremia (n = 18)	**No Viremia (n = 61)**	***P***
Follow-up time, mean ± SD, y	5.3 ± 3.6	3.9 ± 2.8	.091
Rejection, No. of patients (%)	10 (56)	23 (38)	.177
Post-transplant eGFR (mean±SD), ml/min/1.73 m^2			
1 year	66.94±21.86	71.20±21.83	0.700
5 years	65.0±45.81	60.81±21.5	0.010
Last visit	54.44±37.59	54.35±23.63	0.039
Graft loss, n (%)	3/18 (17%)	6/61 (10%)	0.044

Discussion

- In our pediatric, single-center study/ previous numerous studies
- 23% of the patients developed viremias with BKV, CMV, VZV, ParvoV B19 and COVID-19 during a thirteen year period
- ***CMV viremia*** was 8%, 66% of whom symptomatic, developed early/late after transplantation, 33% occured after rejection like previous studies
- There was no EBV viremia unlike the previous studies
- ***BKV viremia*** was 9% like previous studies , the appearence was either very early (in the first six months post-transplant) or very late (after 57 months),
- ***BK nephropathy*** developed in 3 patients (3.7%) lower than previous studies that with up to 10%

- We did not identified any statistically significant difference between patients with viremia and those without viremia for risk factors
- Numerous studies identified that young transplant age, anti-thymocyte antibody therapy as risk factors for infections
- Graft function were lower in patients with viremia at 5 years like;
- Numerous previous study that reported adverse graft outcomes with patients with viremia

CONCLUSION

- Our data emphasize the impact of viral infections on pediatric kidney transplant recipients
- Regularly control, early diagnosis and treatment are important
- Clinicians should be alert for and evaluate patients suspected viral infections