Pediatric Renal Transplantation: The Bangalore Experience

Kishore Phadke, Arpana Iyengar, Srilekha Karthik, Anil Kumar and Santosh Olakkengil

From the Children's Kidney Care Center, Department of Pediatrics, St. John's Medical College Hospital, Bangalore-560034, India

Correspondence to: Dr. K.D Phadke, Professor of Pediatric Nephrology, Children's Kidney Care Center, Department of Pediatrics, St. John's Medical College Hospital, Bangalore 560 034, India.
E-mail: kishorephadke@vsnl.com

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A retrospective analysis was done on 47 pediatric renal transplants performed over last 16 years at Bangalore, Karnataka. The median age and weight of the recipients at transplantation were 120 months and 21 kg respectively; male to female ratio was 30:17. Twenty-two children had underlying glomerular disease and 23 had tubulointerstitial disease. Preemptive transplantation was done in 33.3% of patients, 57.2% received hemodialysis and 9.5% received peritoneal dialysis prior to transplantation. The mean duration of dialysis was 2.6 months.The most common source of donor organ was the mother. Immunosuppression medications included cyclosporine, azathioprine, and corticosteroids. Graft survival at 1 year, 5 years, and 10 years was 80%, 45.8% and 37.5% respectively. Renal transplantation is the most optimal way to manage children with ESRD with satisfactory long term results.

Key words: *Cadaveric transplantation, Developing country, End stage renal disease.*

RENAL transplantation is the treatment of choice for children with end stage renal disease (ESRD)(1). Although adult renal transplant programs are in existence in India for more than three decades, pediatric programs have lagged behind. Registry data systems for dialysis and transplantation do not exist in the country. The exact incidence and prevalence of chronic renal failure in children is not known. As per estimates not more than 300 pediatric transplants have been reported so far. Transplantation provides a near normal life and excellent rehabilitation compared to dialysis and is the preferred modality of treatment for children with ESRD(2,3).

The experience with pediatric renal transplantation at Bangalore with a longer follow up of recipients is presented.

Subjects and Methods

A retrospective analysis was done on children who underwent transplantation over the last sixteen years. The age, sex distribution, body weight at transplantation, original renal disease, mode of renal replacement therapy, donor profile; pre-operative, intra-operative and post-operative complications, duration of follow up and outcome were studied. Triple immunosuppression (cyclosporine, azathioprine and steroids) was used. Cyclosporine (CyA) was used at the dosage of 8 mg/kg/day orally in divided doses initially. At the end of two weeks, the dosage was reduced to 6 mg/kg/day, and to 3-4 mg/kg/day at 3 months. Prednisolone was used at the dosage of 1 mg/kg/day initially and gradually tapered to 0.2-0.4 mg/kg/day at the end of three months. Acute rejection was defined as acute

deterioration in graft function secondary to immune mechanisms related to recognition of "non-self". Graft failure was considered when there was reduction in the glomerular filtration rate or irreversible rise in serum creatinine irrespective of the underlying cause. The indications for native kidney nephrectomy were hypertension requiring more than three drugs, when kidneys were a source of infections, massive proteinuria or to create space for an adult kidney in smaller children.

Results

Over the sixteen years, 47 (30 boys) transplants were performed. The median age and weight of the recipients were 120 months and 21 kg respectively; 11 recipients were below 6 years of age at the time of transplantation. Twenty-two patients had underlying glomerular disease, 23 had tubulointerstitial disease and 2 had other causes for ESRD (*Table I*). The dialysis modality used prior to transplantation was maintenance hemodialysis (57.2%) and peritoneal dialysis (9.5%). Fourteen (33.3%) children underwent pre-emptive transplantation. Average duration of dialysis before transplantation was 2.6 months. The source of kidney donor was mother (n = 24), father (n=4), distant relatives (n = 10), unrelated (n = 6) and cadavers (n = 3). Ten children had native kidney nephrectomy at the time of transplantation. In patients weighing less than 15 kg, the graft was placed intraperitoneally. In others, the graft placement was extraperitoneal in the right iliac fossa. Triple immunosuppression (cyclosporine, azathioprine and steroids) was used in all cases life long except in one patient who developed CyA induced hemolytic uremic syndrome. No attempt was made to withdraw CyA or steroids. Induction immunotherapy was not used in any case.

The median follow-up duration was 30 months (interquartile range 13-96 months). Graft survival at 1 year, 5 years and 10 years was 80%, 45.8% and 37.5% respectively (*Figure 1*). Satisfactory rehabilitation was achieved in children with functioning grafts, children attending their school with satisfactory performance. Complications following renal transplantation are listed in *Table II.* Eleven acute rejection episodes were encountered, of which 6 responded to methylprednisolone therapy. The other five non-responders lost their graft, as they could not be treated with other anti-rejection drugs due to financial reasons. One child with uncontrolled hypertension underwent percutaneous coil embolization of her native kidneys one week after transplant surgery. Four children with FSGS had recurrence of disease in the transplanted kidney. Plasmapheresis in these children resulted in

TABLE I–*Profile of Native Kidney Disease.*

Glomerular disease(22)	
Focal segmental glomerulosclerosis	7
Chronic glomerulonephritis (GN)	9
Mesangioproliferative GN	2
Systemic lupus erythematosus	2
Hemolytic uremic syndrome	1
Vasculitis	1
Tubulointerstitial disease(23)	
Chronic interstitial nephritis, no reflux	7
Dysplasia with reflux	4
Dysplasia / hypoplasia, no reflux	4
Posterior urethral valves	4
Neurogenic bladder	3
Medullary cystic disease	1
Miscellaneous(2)	
Post-nephrectomy Wilms' tumor	1
Pyonephrosis in a single kidney	1

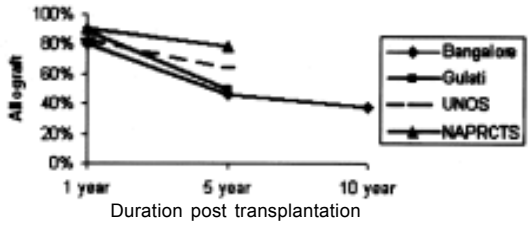

Fig. 1. Renal allograft survival at 1 year, 5 years and 10 years follow-up, as compared to Gulati(9)*, UNOS*(7) *and NAPRTCS*(10) *data.*

resolution or reduction in proteinuria(4). Two children died due to unrelated causes (diabetic ketoacidosis and road traffic accident). There were no malignancies encountered during the post transplant period.

Discussion

At our Institution approximately 30-40 new cases of children with ESRD requiring renal replacement therapy are encountered every year. In our experience, long term maintenance dialysis (continuous ambulatory peritoneal dialysis or hemodialysis) has not been a viable option for these children largely due to financial constraints and parental attitudes. Though facilities and expertise exist, interplay of financial factors severely restricts the number of renal transplants in children(3). In addition to late detection and referral, a poorly developed cadaveric program(2,5) and misconceptions about organ donation have been other retarding factors for transplant programs. The transplants with unrelated donors were performed prior to 1994 Human Organ Transplantation Act. Subsequently, all transplants have been with close blood relatives or distant relatives with permission from the Authorization Committee as specified in the Act.

Compliance towards treatment and follow-up has been satisfactory. This has been reported to be a significant problem in adolescent recipients in the developed world. The patients with graft loss were unwilling for continuation of renal replacement therapy due to financial constraints except two (one of them received CAPD for three years, the other received maintenance hemodialysis for 4 years after graft loss).

TABLE II–*Complications of Transplantation.*

Medical	
Mortality unrelated to transplant surgery	2
Rejection	2 (accelerated), 11 (acute), 14 (chronic)
Recurrence of original disease	4
Hemolytic uremic syndrome	1
Uncontrolled hypertension	1
Significant infections	UTI (4), sepsis (3), varicella (2), gastroenteritis (1), cellulitis (1), herpes zoster (1), tuberculosis (1), infective hepatitis(10), opportunistic chest infection (1)
Surgical	
Vascular thrombosis	1
Urinary leak	2

UTI: Urinary tract infections.

Living donors account for at least 50% of pediatric transplants worldwide. Parents, mostly mothers, comprise 85% of living donors(6,7). The rate of renal transplants reported in USRDS was 56 (aged 0-19 years) per 100 dialysis patients; living and cadaveric renal transplants were nearly equal(8). Renal transplants have been fewer in Japan because living donor transplant was not actively pursued with few cadaveric donors. In our

Key Messages

- Renal transplantation is the optimal therapy for children with end stage renal disease.
- Early detection of chronic renal failure and positive attitudes would significantly increase the number of children who will benefit.

country most donors are living donors. Cadaveric donors form a negligible proportion. Although the Human Organ Transplant Act was passed in India in 1994 legalizing brain death, cadaveric transplantation is yet to take off as a full-fledged program in our country.

The data has been partly published earlier(2). The objective of this paper is to present a larger series with a long term follow-up. The longest follow-up is 16 years. This was a child who was three years old at the time of transplantation. Now he is nineteen years old attending a college. The 1-year, 5-years and 10-years graft survival was 80%, 45.83% and 37.5% respectively in our series. Thirty seven, 21 and 17 patients have been followed up at one year, 5 years and 10 years respectively. Gulati et al reported 89% and 50% graft survival at one year and 5 years respectively(9). The lower 5 year graft survival from India as compared to the UNOS(7) and NAPRTCS data(11) (*Fig. 1*) could be due to cyclosporine withdrawal as reported by others(9) or use of lower doses of cyclosporin without adequate blood level monitoring due to financial reasons as in the present series. Results of transplantation have expectedly steadily improved over the years. In our series, in last 5 years there has been only one graft loss among 23 transplants performed.

Renal transplantation is the most optimal way to manage children with ESRD with good long term results. With active involvement of pediatricians, issues of public awareness, passive attitudes and late referrals can be addressed, to make pediatric renal transplantation a feasible option in our country.

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Accuracy of Parental and Child's Reports of Changes in Symptoms of Childhood Asthma

Linjie Zhang, Laila Avila, Luciana Leyraud, Sinar Grassi, Raquel T, Thiago Bonfanti, and Emerson Ferruzzi

From the Department of Maternal and Child Health, Federal University of Rio Grande, Rio Grande-RS, Brazil.

Correspondence to: Linjie Zhang, Rua Barao de Santa Tecla 884/202A, Pelotas-RS, Brazil 96010-140. E-mail: zhanglinjie63@yahoo.com.br

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This cohort study was conducted to evaluate the accuracy of parental and child's reports of changes in asthma symptoms. Fifty three asthmatic children and their parents were interviewed at enrollment and after 4 and 8 weeks. The outcomes were parental and child's reports of changes in asthma symptoms, changes in mean daily symptom scores and changes in pulmonary function. Among patients 6 to 10 years old, parental reports were more strongly than child's reports to correlate with changes in mean daily symptom scores (r: 0.54 vs 0.23). In patients aged 11 yr or older, parental and child's reports were equally correlated with changes in mean daily symptom scores (r: 0.63 vs 0.57). In both age groups, neither parental nor child's reports were significantly correlated with changes in pulmonary function. Conclusion: Parental reports of changes in asthma symptoms are more reliable than child's reports in patients under 11 yr. Among patients aged 11 yr or older, child's reports are so valid as their parent's reports for clinical judgment of asthma control.

Key words: *Childhood asthma, Cohort study, Peak expiratory flow Symptom diary.*

ASTHMA is the most common chronic respiratory disease in childhood. Most of asthmatic children need regular assessment and long term follow-up. There are a number of clinical and functional parameters for assessment of these patients, such as asthma symptom diary, quality of life questionnaire, spirometric test and peak expiratory flow rate (PEFR)(1-3). In general pediatric practice, parental and child's reports of changes in asthma symptoms over a period of observation are the most available source of