



# Pediatric Renal Transplants - Does the anesthetic plan affect graft function?

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## INTRODUCTION

- Pediatric renal transplantation is the treatment of choice for end-stage renal disease (ESRD), however there is yet no consensus on intra-operative anesthetic management
- Our previously published research demonstrated that there is no standard anesthesia practice locally, nationally or internationally (Baboolal et al)
- Invasive monitoring is used ad hoc to guide fluid administration and vasopressor use
- We hypothesized that variations in vasopressor use, fluid administration, epidural analgesia use, central venous access and direct arterial pressure monitoring would independently affect serum creatinine (SCr) at 24 hours and 30 days postoperatively.

## Methods

- We reviewed all of the pediatric (0-18 years old) renal transplant anesthesia records over 7 years at the University of North Carolina. The primary outcome variables were 24-hour and 30-day post-operative SCr
- T-test was used to test the difference for continuous covariates, and chi-square independent test was used for categorical covariates. A p-value  $\leq 0.05$  was considered significant. Wilcoxon rank sum test was used to test the difference between median values when the values were found to not be normally distributed.

## RESULTS

- A total of 47 charts were reviewed.
- There was a negative correlation between 30-day SCr and volume of packed red blood cells (pRBC) administered ( $r = -0.7$ ,  $p = 0.016$ ). (Figure 4)
- Total fluid administered intra-operatively ranged from 19.6 mL/kg - 126 mL/kg and there was no significant correlation with post-operative SCr. (Figures 1,2)
- Epidural catheter placement was associated with a lower average 24-hour SCr (1.94 vs 3.29,  $p = 0.012$ ) and 30-day SCr (0.71 vs 1.03,  $p = 0.015$ ). (Table 2)
- No relationship was found between pre-operative central line placement, invasive arterial pressure monitoring, vasopressor use and post-operative SCr.

## FIGURES & TABLES

	Epidural Analgesia Usage		P-value
	No (N=35)	Yes (N=12)	
<b>Creatinine level 24-hours<sup>a</sup></b>			0.012
Mean (SD)	3.29 (2.49)	1.94 (2.16)	
Median [Min, Max]	2.81 [0.52, 11.6]	1.25 [0.31, 8.16]	
<b>Creatinine level 30-days<sup>b</sup></b>			0.015
Mean (SD)	1.03 (0.40)	0.71 (0.33)	
Median [Min, Max]	0.97 [0.39, 2.28]	0.63 [0.30, 1.30]	

a. Wilcoxon rank sum test was used to test the difference because the outcome is not normally distributed.  
b. Two-sample t-tests with equal variances were used to test the difference since the distribution of the outcome is approximately normal.

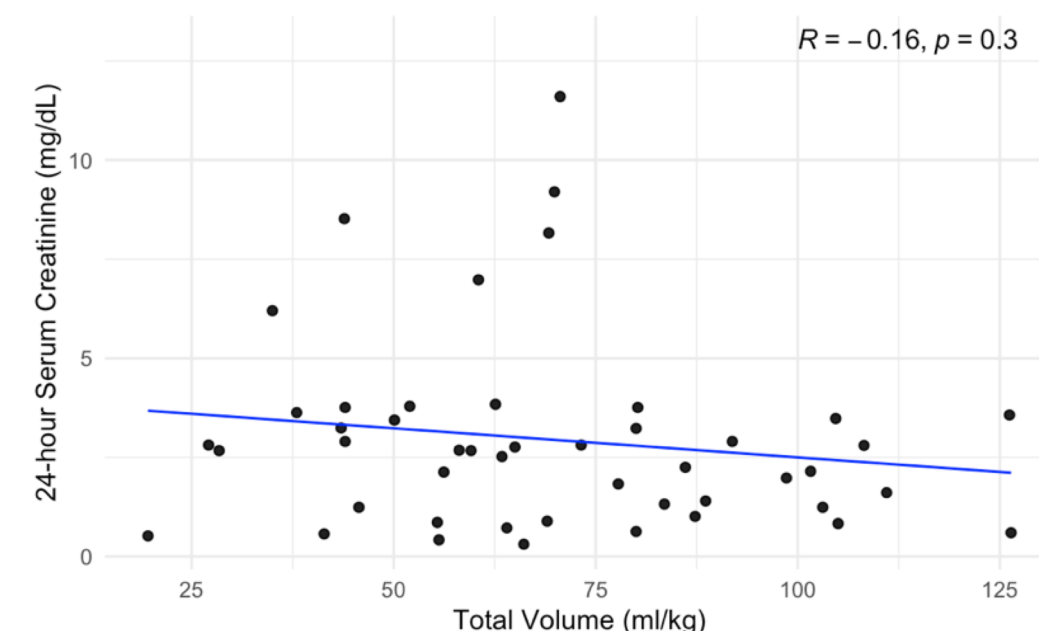


Figure 1. Relationship between and Total Fluid (ml/kg) and 24-hour Serum Creatinine (mg/dL)

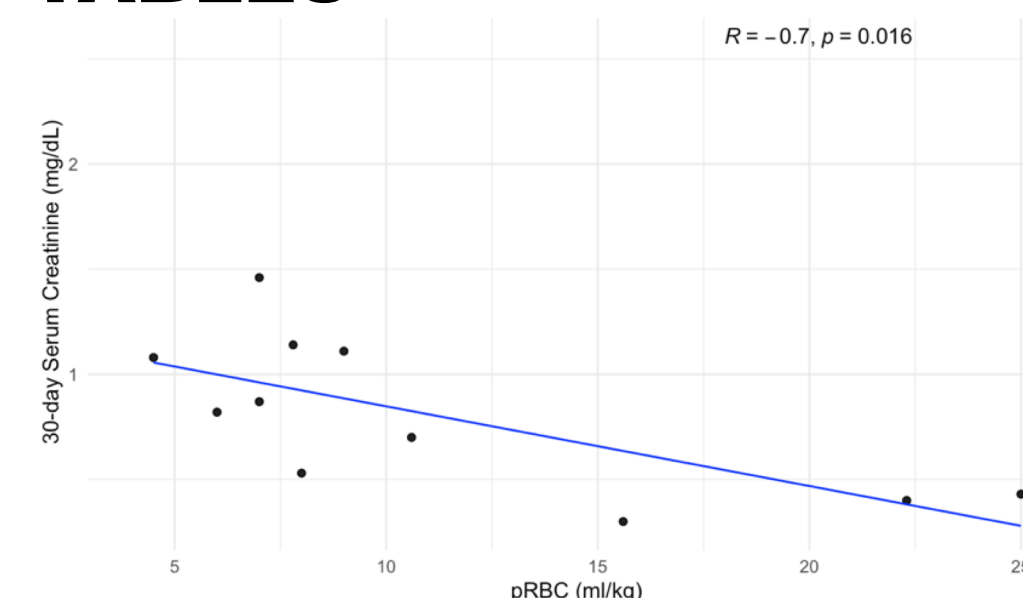


Figure 4. Relationship between pRBC Infusion (ml/kg) and 30-day Serum Creatinine (mg/dL)

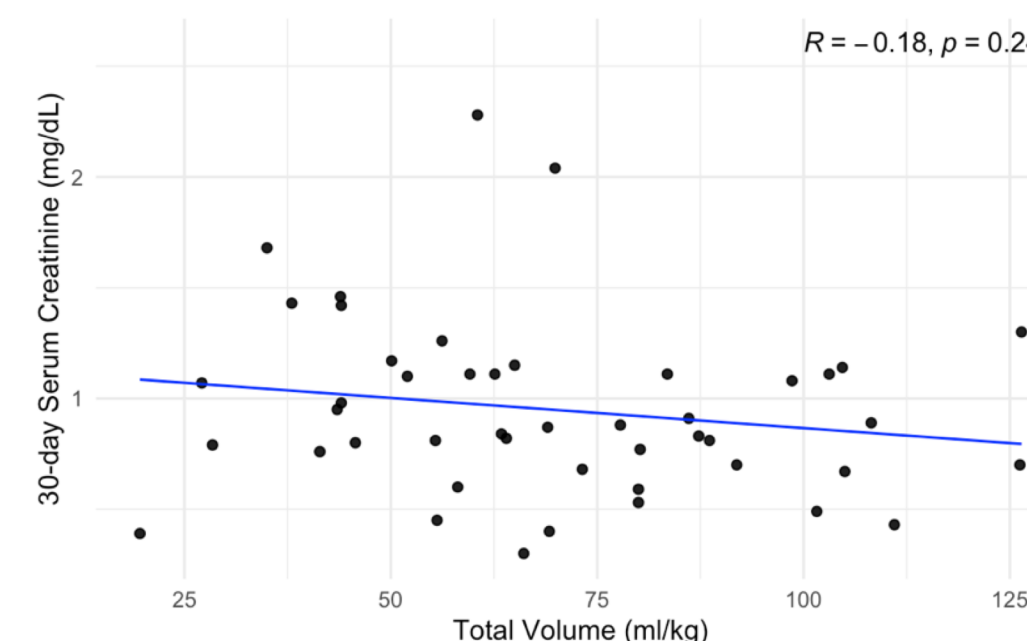


Figure 2. Relationship between Total Fluid (ml/kg) and 30-day Serum Creatinine (mg/dL)

## DISCUSSION

- Concerning the use of invasive monitoring, our results suggest that it does not necessarily help or hurt pediatric patients receiving renal transplants.
- The observed negative association of analgesia and 30-day SCr may be due to pRBC being an oxygen-carrying medium, potentially increasing renal perfusion and therefore, improving graft function.
- The observed association with epidural analgesia use and decreased 24-hour and 30-day SCr may be due to sympathetic blockade or may be due to other variations in anesthetic plan.
- Reanalysis of data may be beneficial to determine if total fluid administration differs between epidural and "no-epidural" group.
- We have demonstrated two potential intraoperative factors which may affect post operative renal function, specifically higher amount of pRBC transfusion and use of epidural analgesia.

## REFERENCES

1. Voet et al, Perioperative anesthesia care for the pediatric patient undergoing a kidney transplantation: An educational review. *Paediatr Anaesth.* 2021
2. Baboolal et al, Intraoperative management of pediatric renal transplant recipients: An opportunity for improvement. *Pediatr Transplant.* 2023
3. Gingell-Littlejohn et al, Below-target postoperative arterial blood pressure but not central venous pressure is associated with delayed graft function. *Transplant Proc.* 2013