Commentary: Who wins after renal replacement therapy in congenital heart surgery?

Aaron Eckhauser, MD, MS

From the Pediatric Cardiothoracic Surgery, Division of Cardiothoracic Surgery, Department of Surgery, University of Utah, Salt Lake City, Utah.

Disclosures: Author has nothing to disclose with regard to commercial support.

Received for publication June 26, 2019; accepted for publication June 28, 2019; available ahead of print Aug 21, 2019.

Address for reprints: Aaron Eckhauser, MD, MS, 100 N Mario Capecchi Dr, Suite 2200, Salt Lake City, UT 84113 (E-mail: Aaron.eckhauser@hsc.utah.edu).

J Thorac Cardiovasc Surg 2019;158:1456

0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2019.06.078>

Aaron Eckhauser, MD, MS,

Central Message

Early recognition of renal failure and earlier initiation of RRT improve survival after pediatric heart surgery.

See Article page 1446.

In this month's edition of the *Journal*, Hames and colleagues¹ present their work attempting to identify risk factors for mortality among patients with congenital heart disease whose postoperative course is complicated by renal failure requiring renal replacement therapy (RRT). In the multivariable analysis of their cohort of 48 patients over a 9-year period, they found that a longer duration of stage 3 acute kidney injury before the initiation of RRT was the only independent predictor of mortality. Although this is a relatively small sample size from a single institution, there is much to be learned from this experience.

First, the mortality rate in this cohort of pediatric patients requiring RRT after cardiac surgery is a staggering 75%, in the context of a highly reputable center that performed 6500 concurrent cardiac surgeries over the same time period with only a 0.7% rate of requiring RRT after cardiac repair. The authors do acknowledge that their mortality rate is much higher than in other series, but perhaps reflects a sicker cohort (evidenced by more than half of their patients requiring at least 1 run of extracorporeal membrane oxygenation), a younger and smaller cohort, and a higher prevalence of increased complexity (*STAT* 4 and 5) cases. In their neonatal cohort requiring RRT, the mortality rate was 100%, and in infants aged less than 1 year of age, mortality was not much better at 95%. This sobering fact should cause us pause to reflect on the impact of renal failure on mortality.

The authors state the median time from diagnosis of stage 3 acute kidney injury to initiation of RRT was 4.9 days, and perhaps this delay partially accounts for their increased mortality. When the cohort was evaluated by survivors versus nonsurvivors, the only independent predictor of mortality was a delay in the initiation of RRT, with an odds ratio of 1.4 per day of delay. Although not statistically significant, the patients with lower urine output and lower glomerular filtration rates trended toward improved

survival, implying that earlier recognition and treatment of renal failure could positively affect mortality. These facts highlight the main weakness of this study, namely, the lack of identifying an optimal time to initiation of RRT to optimize the odds of renal recovery and survival.

Additionally, uncertainty remains regarding the impact of residual lesions on renal failure. More than half of the cohort required a second intervention for a residual lesion, and almost all of the RRT in these patients was initiated after the second intervention. Although the impact of a second intervention was not statistically important, the sample size was small and requires a more detailed exploration of the hemodynamic significance of residual lesions on renal failure and mortality.

Despite study limitations, this excellent article readdresses the impact of renal failure on postoperative mortality in pediatric patients undergoing heart surgery and the importance of early recognition and treatment. I eagerly await further study to determine optimal timing and whether earlier treatment will really decrease mortality in our youngest, most vulnerable populations (neonates/infants).

Reference

1. Hames DL, Ferguson MA, Kaza AK, Rajagopal S, Thiagarajan RR, Teele SA, et al. Renal replacement therapy in the pediatric cardiac intensive care unit. *J Thorac Cardiovasc Surg*. 2019;158:1446-55.