

Katherine Phelps, MD^{1,2}; Joel Davis, RRT¹; Rajit Basu, MD, MS^{3,4}

¹Children's Healthcare of Atlanta, ²Emory University School of Medicine, ³Ann & Robert H. Lurie Children's Hospital of Chicago, ⁴Northwestern University Feinberg School of Medicine

Introduction

While significant effort has been expended to study initiation of (continuous) renal replacement therapy (RRT/CRRT), relatively less effort has been spent on liberation from CRRT. Data guiding CRRT discontinuation could benefit patients given prevalence of RRT utilization in intensive care (1.5-13.5% of all admits). Urine flow rates (UFR) following furosemide (furosemide stress test, FST) as a marker of renal functional reserve has been shown to predict persistent severe acute kidney injury. We sought to provide introductory data regarding FST as it correlates to liberation from CRRT.

Methods and Materials

We conducted a single-center, retrospective cohort study of patients (pts) requiring CRRT in the pediatric ICU between Jan 2018 and Dec 2021. Cohorts were denoted by primary outcome: pts reinitiated on RRT (any modality) within 7 days (T₇) of discontinuation (R+) vs. those not reinitiated (R-). R- was defined as having successfully weaned from CRRT (equivocal to liberation). Secondary outcomes were mortality in T₃₀ and peak creatinine (Cr) in T₇. Both R+ and R- groups received furosemide within 48 hours (hr) following discontinuation of CRRT (mean 8 hours). 2 and 6hr UFR (ml/kg/hr) were determined in first 2hr and first 6hr following FST.

Inclusion Criteria	Age birth to 18.99 years, CRRT >48 hrs, furosemide dose within 48h of CRRT liberation, CRRT reason fluid overload or oliguric/anuric AKI
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Exclusion Criteria	Concomitant ECMO, weight <10 kg, abnormal renal anatomy, GFR <35 ml/min/1.73 m ² , unrepaired congenital heart disease, single ventricle anatomy, need for cardiopulmonary bypass in previous 12 months, CRRT >720 hr, CRRT for inborn error of metabolism, ingestion, intoxication, or hyperammonemia
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Key

(C)RRT: (continuous) renal replacement therapy
 FST: furosemide stress test
 UFR: urine flow rates
 T_x: time in days ('x') since CRRT discontinuation, where T₀ is day of discontinuation
 R+: cohort requiring reinitiation of RRT in T₇
 R-: cohort *not* requiring reinitiation of RRT in T₇
 Cr: creatinine

Results

In 32 pts studied (mean age 13.2 years, 31.1% male), 8 (25%) were R+ and 24 (75%) were R-. 2hr UFR in R+ was 0.37±0.70 vs. 2.38±2.25 ml/kg/hr (p<0.01) in R-. R+ 6hr UFR was 0.24±0.33 vs. 1.77±1.35 in R- (p<0.01). T₃₀ mortality was 1 of 32 (3.1%) (R+ 0.0%). Cr fold-change difference was not statistically significant between the 2 groups (p=0.45).

	R+ (Mean±SD)	R- (Mean±SD)	p-value
2hr UFR (ml/kg/hr)	0.37±0.70	2.38±2.25	0.002
6hr UFR (ml/kg/hr)	0.24±0.33	1.77±1.35	0.0003
Cr Fold-Change in T ₇ (mmol/L)	2.09±0.55	2.00±1.03	0.45

Discussion

In this exploratory study FST results were different between pts who were reinitiated on RRT and those not. The study was limited by small sample size. Timing of FST was suboptimal, coming after decision to liberate had occurred. This data set supports exploration in a larger population of pts, moving toward creation of an algorithmic approach to RRT liberation. Leveraging this research future study should evaluate pre-discontinuation FST, including optimal UFR cutoffs for decision making.

Conclusions

Difference in UFR following FST in pts liberated from CRRT vs. those requiring reinitiation was statistically significant. Further large population study of pre-discontinuation FST is warranted to confirm statistical significance and determine UFR cutoffs.

