Epidemiology of AKI in Neonatal Cardiac Surgery without Cardiopulmonary Bypass: A Report from the NEPHRON Collaborative

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BACKGROUND

- NEPHRON is a multi-center collaborative created to better understand cardiac surgery associated AKI (CS-AKI).
- The impact of CS-AKI in neonates who undergo cardiac surgery without cardiopulmonary bypass (CPB) is not well described.
- The purpose of the study was to describe the following among neonates who undergo cardiac surgery without CPB:
  - Epidemiology
  - Center Variation
  - Outcomes

METHODS

- 22 Center study of neonates (≤30 days) who underwent cardiac surgery without CPB utilizing NEPHRON data which is linked to Pediatric Cardiac Critical Care Consortium.
- AKI defined by modified KDIGO serum creatinine or urine output
- Descriptive statistics and regression analyses performed to determine the association with outcomes

DATA

- 583 patients (59% male)
- Lower pre-operative creatinine and surgery type were significantly different between those with and without CS-AKI
- Median cross clamp duration was 2 minutes longer in those with CS-AKI (p = 0.02)
- In a regression tree analysis, there was no association of AKI with CICU and hospital length of stay or mortality.

CONCLUSIONS

- CS-AKI occurs in more than a third of patients
- Despite the high prevalence, there was no impact on outcomes
- Future studies to better define AKI in this population may be needed

FUNDING

- Philanthropic grant from Castin' N Catchin'

Prevalence and severity of CS-AKI without CPB varies significantly across centers and by post-operative day with no significant impact on outcomes

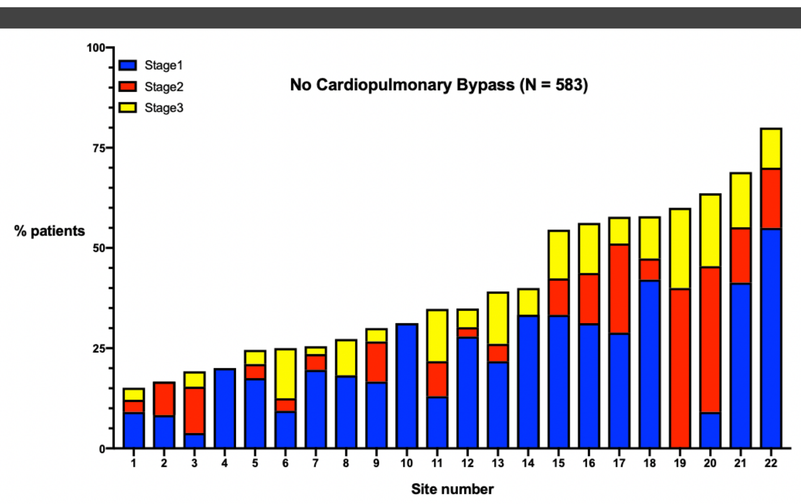

Figure 1. CS-AKI prevalence by site and AKI stage

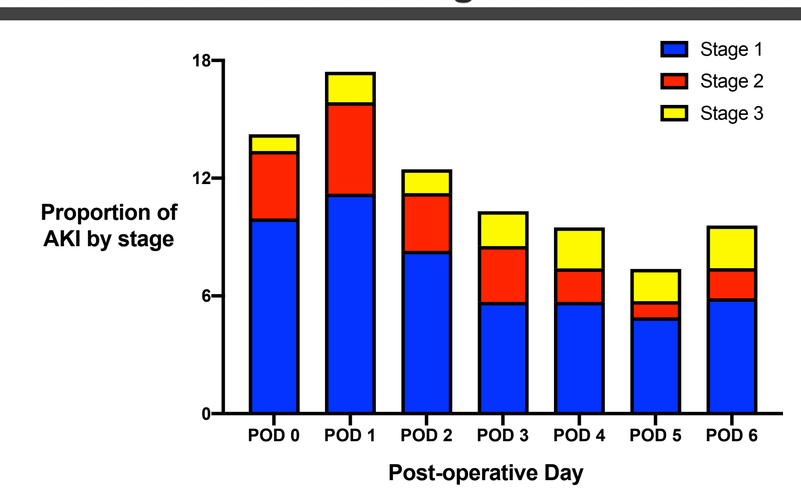

Figure 2. CS-AKI prevalence by post-operative day and AKI stage

	All patients (n= 583)	No AKI (n = 359)	Any AKI (n =224)	P Value
Demographics				
Age at surgery, days	9 (5, 15)	10 (6, 16)	8 (5, 15)	0.09
Weight at surgery (kg)	3.12 (2.61, 3.54)	3.10 (2.57, 3.51)	3.2 (2.70, 3.59)	0.09
Underweight (yes)	153 (26.29)	101 (28.21)	52 (23.21)	0.21
Sex (male)	346 (59)	206 (57.38)	140 (62.5)	0.23
Prematurity (yes)	120 (21)	84 (23.40)	36 (16.07)	0.04
Chromosome/syndrome	113 (19)	75 (20.89)	38 (16.96)	0.09
Pre-operative characteristics/complications				
Preoperative feedings (yes)	175 (30)	116 (32.31)	59 (26.34)	0.14
PGE infusion	394 (68)	238 (66.3)	156 (69.64)	0.08
Lowest preop SCr (mg/dL)	0.4 (0.32, 0.5)	0.42 (0.36, 0.55)	0.4 (0.30, 0.50)	**<0.0001**
Creatinine immediately prior to surgery	0.42 (0.34, 0.55)	0.46 (0.38, 0.60)	0.40 (0.30, 0.50)	**<0.0001**
Preop Cardiac arrest (yes)	2 (0.34)	1 (0.28)	1 (0.45)	1.00
Preop NEC	7 (1.2)	4 (1.11)	3 (1.34)	1.00
Inotropes at Surgery	92 (15.78)	61 (16.99)	31 (13.84)	0.50
Ventilated at Surgery	150 (25.73)	94 (26.18)	56 (25.00)	0.77
Single V (yes)	135 (23.16)	82 (22.84)	53 (23.66)	0.84
Operative characteristics				
Surgery Type				**0.001**
Aortic Arch	248 (43.3)	200 (43.7)	48 (41.7)	
Hybrid Stage 1	40 (7)	31 (6.8)	9 (7.8)	
PA Band Placement	110 (19.2)	91 (19.9)	19 (16.5)	
Pacemaker	20 (3.5)	19 (4.1)	1 (0.9)	
Systemic to pulmonary shunt	127 (22.2)	89 (19.4)	38 (33)	
Other	28 (4.9)	28 (6.1)	0 (0)	
Cross-clamp (yes)	240 (41.17)	152 (42.34)	88 (39.29)	0.49
ACC time (n=240)	18 (14, 24)	17 (13, 22)	19 (15, 28)	**0.02**
Post-operative characteristics and outcomes				
UAC after surgery	160 (27)	93 (25.91)	67 (29.91)	0.30
PD drain (y/n)	14 (2.40)	10 (2.79)	4 (1.79)	0.58
Open Sternum	25 (4.29)	13 (3.62)	12 (5.36)	0.51
Ventilation duration (hours)	41 (18, 95)	42 (18, 93)	40 (18, 95)	0.95
ICU LOS (days)	5 (3-12)	5 (3, 13)	5 (3, 12)	0.72
Hospital LOS (days)	14 (7-32)	14 (7, 36)	13 (7, 27)	0.16
CICU mortality (y/n)	21 (3.60)	13 (3.62)	8 (3.57)	1.00
Hospital mortality	32 (5.49)	20 (5.57)	12 (5.36)	1.00