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Supplemental administration of blood cardioplegia before graft implantation in pediatric heart transplantation

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Background:

- Optimal myocardial preservation strategy in heart transplantation is unknown
- Despite many novel techniques, pragmatic option currently available is ingenious use of cardioplegia (crystalloid or blood-based)
- Adult studies have shown improved outcomes with additional usage of cardioplegia before graft implantation
- Similar studies in children are lacking

Purpose of the study:

- To analyse if supplemental use of blood cardioplegia before graft implantation can improve outcomes in pediatric heart transplantation

Methods:

- Retrospective, single centre, 2007 – 2016
- Inclusion: All pediatric heart transplants
- Exclusion: Simultaneous lung transplants
- Groups: No cardioplegia (NC), crystalloid cardioplegia (CC), blood cardioplegia (BC)
- Pre-transplant factors:
  Recipient: gender, age, anthropometry, diagnosis, mechanical circulatory support (MCS), renal failure, renal dialysis
  Donor: gender, age, weight, inotrope use
- Transplant factors: graft ischemic time (GIT), cardiopulmonary bypass time (CPB)
- Outcomes:
  Primary: Primary graft failure (PGF)
  Secondary: ventilation days, intensive care unit (ICU) days, new-onset kidney injury (AKI), new-onset dialysis, 30-day mortality

Results:

Total number included = 165 (NC = 22, CC = 28, BC = 115), excluded = 2

Table 1: Baseline characteristics

	NC (n=22)	CC (n=28)	BC (n=115)	*p*-value
Recipients				
Females (%)	12 (55)	15 (54)	66 (57)	0.92
Age (years)	9.3 (5.8)	**6.0 (5.2)**	8.6 (5.6)	**0.06**
Height (cm)	130.6 (35.2)	**108.4 (37.7)**	122.5 (37.2)	**0.09**
Weight (kg)	34.0 (18.4)	26.1 (23.4)	30.1 (22.0)	0.44
BSA (m^2)	1.1 (0.5)	0.9 (0.5)	1.0 (0.5)	0.21
BMI (kg/m^2)	17 .7 (3.5)	18.4 (4.8)	17.4 (4.1)	0.50
Pre-tx MCS (%)	**5 (23)**	14 (50)	59 (51)	**0.05**
Pre-tx surgery (%)	3 (14)	8 (29)	35 (30)	0.27
Pre-tx dialysis (%)	3 (14)	3 (11)	11 (10)	0.85
Diagnosis				
Cardiomyopathy (%)	18 (82)	20 (71)	89 (77)	0.87
Cong heart disease (%)	4 (18)	7 (25)	23 (20)	
Other (%)	0	1 (4)	3 (3)	
Donors				
Females (%)[1]	11 (58)	14 (58)	58 (56)	0.98
Age (years)[2]	23.9 (15.9)	19.6 (16.1)	19.0 (14.4)	0.41
Weight (kg) [3]	52.3 (26.1)	43.9 (25.4)	47.3 (25.7)	0.54
Gender + Weight	4 (21)	4 (17)	14 (14)	0.69
Inotrope use (%) [4]	14 (74)	21 (78)	90 (83)	0.61
Surgery				
GIT (min)[5]	**201.8 (65.9)**	230.4 (64.5)	234.3 (61.4)	**0.09**
GIT >4h (%)[5]	8 (36)	11 (41)	54 (48)	0.55
CPB Time (min)	153.2 (63.9)	176.4 (67.8)	176.6 (72.9)	0.36

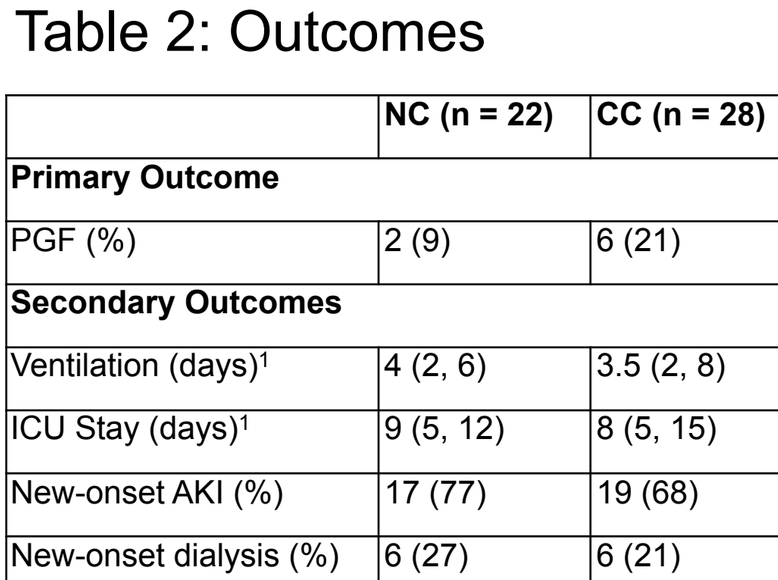
BSA = Body Surface Area, BMI = Body Mass Index, Pre-Tx = Pre-transplant
[1] 19 missing, [2] 8 missing, [3] 9 missing, [4] 10 missing, [5] 3 missing

Table 2: Outcomes

	NC (n = 22)	CC (n = 28)	BC (n = 115)	*p*-value
Primary Outcome				
PGF (%)	2 (9)	6 (21)	26 (23)	0.35
Secondary Outcomes				
Ventilation (days)[1]	4 (2, 6)	3.5 (2, 8)	5 (2, 9)	0.37
ICU Stay (days)[1]	9 (5, 12)	8 (5, 15)	10 (6, 18)	0.43
New-onset AKI (%)	17 (77)	19 (68)	87 (76)	0.66
New-onset dialysis (%)	6 (27)	6 (21)	31 (27)	0.83
30-day mortality (%)	0	1 (4)	5 (4)	0.61

[1] Median (interquartile range), PGF = Primary Graft Failure, AKI = Acute Kidney Injury

Figure 1: Survival analysis



Mortality (n = 24, 14.5%)
No cardioplegia 2
Crystalloid cardioplegia 3
Blood cardioplegia 19

No cardioplegia
Crystalloid cardioplegia
Blood cardioplegia

Y-axis: Time in months

Table 3: Cox regression of survival

	Hazard Ratio (95% CI)	*p*-value
Crystalline vs. No Cardioplegia	1.13 (0.19 to 6.77)	0.89
Blood vs. No Cardioplegia	2.55 (0.59 to 11.02)	0.21

- There was no significant difference between the groups in the primary and secondary outcomes
- Study limitations: retrospective, no randomisation, groups unequal, influence of clinical practice over time not analysed, some factors not captured, some data missing

Conclusion: Supplemental use of blood cardioplegia before graft implantation offers no advantage in early outcomes of pediatric heart transplantation

Disclosure: None

References: Stahel 2014, Cannata 2012, Luciani 2011, Sung 2014