

129. Timing of Reintervention is Significantly Associated with In-Hospital Mortality following the Norwood Operation

Objective: Outcomes following the Norwood operation are influenced by many factors. We assessed the impact of timing of unplanned reintervention (RI) on in-hospital mortality after the Norwood operation.

Methods: Clinical and echocardiographic data from all patients who underwent the Norwood operation from 01/1997-11/2017 at a single institution were retrospectively reviewed. Patients were included in the analysis if they (1) required an in-hospital unplanned surgical or catheter-based RI on one or more subcomponent areas repaired at the index surgery (excluding planned staged procedures) and (2) survived to the reintervention. Late RI was defined as any in-hospital RI performed later than two days after the initial Norwood operation. The outcome of interest was in-hospital mortality or transplant. Associations between timing of RI and the outcome were assessed using logistic regression, adjusting for age, prematurity, presence of non-cardiac anomalies or genetic syndromes, and various preoperative- (including mechanical ventilation, renal or hepatic failure, cardiopulmonary resuscitation or shock, mechanical circulatory support, stroke, and sepsis or necrotizing enterocolitis) and procedure-specific risk factors (ascending aorta <2 mm, at least moderate atrioventricular valve regurgitation, aortic atresia, intact atrial septum or obstructed pulmonary venous return, and previous intervention).

Results: Of 500 patients who underwent the Norwood operation, 67 (13.4%) required an in-hospital RI. In this cohort, median age at surgery was 4 days (interquartile range [IQR] 3-7 days), 12 (17.9%) were premature, 12 (17.9%) had noncardiac anomalies or genetic syndromes, 20 (29.9%) had at least one major preoperative risk factor, and 50 (74.6%) had at least one procedural risk factor. Median time to reintervention was 3 postoperative days (IQR 1-7 days), and the outcome of interest was observed in 27 (40.3%) patients. Among those who underwent RI within two postoperative days, there were 2 (14.3%) deaths/transplants. In contrast, there were 25 (47.2%) in-hospital deaths or transplants among patients who required a reintervention at postoperative day 3 and beyond. On univariable analysis, late RI (RI ≥ 3 days) was significantly associated with in-hospital mortality or transplant (odds ratio [OR] 5.4, 95% confidence interval [CI] 1.1-26, p=0.039). This finding was robust (OR 6.4, 95% CI 1.2-33, p=0.027) on multivariable analysis as well (Table).

Conclusions: For patients requiring in-hospital unplanned reinterventions for residual lesions following the Norwood operation, early reintervention, ideally within two postoperative days, may improve transplant-free survival to hospital discharge.

Aditya Sengupta (1), Kimberlee Gauvreau (1), Aditya Kaza (1), Katherine Kohlsaas (1), Pedro del Nido (1), Meena Nathan (1), (1) Boston Children's Hospital, Boston, MA

Table. Associations between in-hospital mortality or transplant and timing of RI among patients requiring in-hospital unplanned reinterventions following the Norwood procedure.

	UNIVARIABLE		MULTIVARIABLE	
	OR (95% CI)	P-Value	OR (95% CI)	P-Value
RI >2 Days ¹	5.4 (1.1, 26)	0.039	6.4 (1.2, 33)	0.027
Age ²	0.84 (0.68, 1.0)	0.088	0.80 (0.64, 1.0)	0.055
Prematurity ³	1.6 (0.46, 5.7)	0.45	2.0 (0.46, 8.7)	0.35
Syndrome ⁴	0.70 (0.19, 2.6)	0.59	0.84 (0.18, 3.9)	0.83
Preop Risk Factor ⁵	1.3 (0.46, 3.8)	0.61	1.9 (0.52, 6.7)	0.34
Procedural Factor ⁶	1.3 (0.42, 4.2)	0.63	1.2 (0.32, 4.3)	0.81

¹Time to unplanned reintervention in the anatomic area of repair greater than two days from the date of the Norwood operation; ²odds for each one day increase in age; ³defined as <37 gestational weeks; ⁴presence of non-cardiac anomalies or genetic syndromes; ⁵presence of any of the following preoperative risk factors: mechanical ventilation, renal failure (with or without dialysis), cardiopulmonary resuscitation or shock, extracorporeal membrane oxygenation, stroke, sepsis or necrotizing enterocolitis, and liver failure; ⁶procedural risk factors include ascending aorta <2 mm, at least moderate atrioventricular valve regurgitation, aortic atresia, intact atrial septum or obstructed pulmonary venous return, and previous intervention. CI, confidence interval; OR, odds ratio; RI, reintervention.