

Return to Cardiopulmonary Bypass (CPB) after the Norwood Procedure and Implication for Outcomes

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Background/Hypothesis: Children with Hypoplastic left heart syndrome (HLHS) do not sufficiently pump oxygen-rich blood to the rest of their bodies. Therefore, surgical intervention can bypass the inadequately functioning left ventricle and create a new functional systemic circuit to provide cerebral and somatic flow. The Norwood procedure (stage I palliation) affords hemodynamic stability in patients diagnosed with HLHS by connecting the single (right) ventricle to the systemic circulation. Stage II palliation (Glenn) and stage III (Fontan) are performed at 4 to 6 months, and 18 months to 2 years, respectively. However, patients may deal with complications that eventually require a heart transplant. Thus, a need has arisen to better understand risk factors for this cohort. We aimed to test the hypothesis that patients who fail to wean from cardiopulmonary bypass, presented with worse outcomes than those patients who wean successfully.

Patients/Methods: Charts were reviewed for patients who underwent the Norwood procedure at Children's Hospital of Wisconsin from June 1, 2005 to March 1, 2017. Total cohort was comprised of 202 patients diagnosed with HLHS and other conditions requiring surgical palliation. Short and mid-term outcomes and intra-operative variables were reviewed. Failure to wean from bypass was defined as requiring ECMO cannulation. Patients were reviewed throughout stage II palliation (Glenn).

Results: Cross tabulations between the two groups revealed significance in three areas: in-hospital mortality after Norwood, Norwood discharge survival, and 30-day discharge mortality ($p=0.013$, 0.012 , 0.011 respectively).

Conclusions: This project supports our original hypothesis that patients who fail to wean from CPB have worse outcomes than those that wean on first attempt, as demonstrated by the greater mortality in the categories of discharge mortality, discharge survival at Norwood, and survival within 30-days of discharge. In-depth analyses are planned to further identify correlations and significant associations.

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Figure 1

req_return_CBP * Deceased Crosstabulation						
			Deceased			Total
			[missing]	No	Yes	
req_return_CBP	no	Count	4	122	25	151
		% within req_return_CBP	2.6%	80.8%	16.6%	100.0%
	yes	Count	0	31	16	47
		% within req_return_CBP	0.0%	66.0%	34.0%	100.0%
Total		Count	4	153	41	198
		% within req_return_CBP	2.0%	77.3%	20.7%	100.0%

p=0.013 if missing excluded

p=0.010 if missing = no

Crosstab					
			d_c_survival_Norwood		Total
			no	yes	
req_return_CBP	no	Count	14	135	149
		% within req_return_CBP	9.4%	90.6%	100.0%
	yes	Count	11	36	47
		% within req_return_CBP	23.4%	76.6%	100.0%
Total		Count	25	171	196
		% within req_return_CBP	12.8%	87.2%	100.0%

P=0.012

Crosstab					
			DC_mortality_2*		Total
			No	Yes	
req_return_CBP	no	Count	137	14	151
		% within req_return_CBP	90.7%	9.3%	100.0%
	yes	Count	36	11	47
		% within req_return_CBP	76.6%	23.4%	100.0%
Total		Count	173	25	198
		% within req_return_CBP	87.4%	12.6%	100.0%

2 responses "U" included with "No"

P=0.011