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Introduction:

The early extubation of pediatric patients following congenital cardiac surgery has a number of benefits. In short, extubation avoids the problems associated with an endotracheal tube including subglottic edema, tracheomalacia, tube obstruction, barotrauma, and accidental or unintended extubation. Patients who remain intubated typically require sedation. Sedatives may result in relative hypotension and potentially necessitate inotropic support or require further resuscitation with crystalloid. Additionally, the unique physiology of patients with congenital cardiac disease may render them especially susceptible to the negative impact of positive pressure ventilation. Patients with Tetralogy of Fallot are at risk for post-operative right ventricular failure, potentially exacerbated by positive pressure ventilation. Patients with circulations dependent on the passive flow of pulmonary blood, (Glenn or Fontan anatomy) are compromised by a decrease in preload, which is a consequence of positive pressure ventilation. At Nationwide Children's Hospital we follow an early-extubation strategy for all patients presenting for congenital cardiac surgery. A quality-control process was established to look at our rate of extubation, the incidence of reintubation, and any associated morbidity or mortality arising from this practice.

Methods:

A retrospective chart review was undertaken as part of a quality-control process. A data base compiling data from October 1, 2010 through October 24, 2013 reviewed. Out of 1285 thoracic procedures, 817 cardiac or great vessels cases were further examined. The age, weight, preoperative diagnosis, procedure, CBP times, aortic cross-clamp times, early (in the OR) extubation versus later extubation (CTICU) and reintubation rates were examined.

Results:

In review, 70.3% of children having cardiac or great vessel procedures were extubated at the conclusion of surgery. Of those patients extubated in the operating room, 40 were re-intubated in the CTICU (4.9%). The data demonstrated that those who were extubated successfully in the operating room had a shorter hospital stay (average 6.6 days) versus those who were not extubated in the OR (23.2 days).

Table 1 illustrates our rate of extubation in the operating room for patients undergoing specific cardiac surgeries, less than 12 months of age. The highlighted boxes represent statistically significant differences at p-values < 0.05. The data in this chart suggests that age and weight impact the likelihood of extubation in the operating room.

Conclusion:

Although there are many benefits resulting from early extubation, it is important to ensure that the practice is both successful and safe. The extubation of children immediately following congenital cardiac surgery was successful in 70% of the patients, with a re-intubation rate of 5%. Patients who were extubated in the operating room had a significantly shorter overall hospital stay.

	# of patients	avg age	avg weight	bypass time	Ao X-clamp
CACV repair	30				
Extubated in OR	17	0.5	5.57	150.94	113
Remained Intubated	13	0.36	5.08	167.38	117.69
Coarctation Repair	24				
Extubated in OR	11	0.028	4.89	N/A	N/A
Remained Intubated	13	0.07	3.38	N/A	N/A
Hybrid Stage I	47				
Extubated in OR	30	0.02	3.24	N/A	N/A
Remained Intubated	17	0.02	2.92	N/A	N/A
Hybrid Stage II	45				
Extubated in OR	14	0.55	6.66	253.43	39.67
Remained Intubated	21	0.47	6	271.85	58.5
Cavopulmonary Anastomosis	15				
Extubated in OR	13	0.61	7.44	128.25	N/A
Remained Intubated	2	0.41	5.8	152	N/A
Palliative Shunt: Systemic to Pulmonary	23				
Extubated in OR	8	0.14	3.87	86.67	N/A
Remained Intubated	15	0.09	3.45	144.7	N/A
TOF Repair	49				
Extubated in OR	31	0.47	6.83	140.81	93.52
Remained Intubated	18	0.31	4.53	157.94	106.5
VSD Repair	58				
Extubated in OR	45	0.44	5.35	95.24	53.57
Remained Intubated	13	0.3	4.38	87.92	51.33

Table 1: Children under 12 months having cardiovascular procedures. Extubation data with average weights and ages, bypass times and aortic cross-clamp times. Highlighted data represents p-values <0.05.