

ANALYSIS OF PRE-EXTUBATION GAS EXCHANGE AND POST-EXTUBATION RESPIRATORY SUPPORT AFTER INFANT CARDIAC SURGERY

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Background: Predicting extubation success following infant cardiac surgery is at times challenging. Whether alveolar gas exchange is an important metric for extubation readiness in this population has not been well studied. We sought to determine whether pre-extubation gas exchange correlates with post-extubation respiratory support including escalation of therapies in infants after cardiac surgery.

Materials/Methods: An IRB approved retrospective study was performed on infants less than 1 year of age who had biventricular repair between January 2015 - December 2017 and remained intubated during the first postoperative night. Patients were excluded if intubated beyond postoperative day 4 or had preoperative airway or lung anomalies. Pediatric Cardiac Critical Care Consortium (PC4) registry, administrative data, and the electronic health record were queried. Gas exchange data is presented as either mean (oxygenation index) or median (all other indices of gas exchange) with standard deviation and analysis performed with Mann-Whitney test (median) or t-test (mean). A p-value of < 0.05 was considered significant.

Results: For the 205 infants who met inclusion, median age was 102 (IQR 43,180) days with an average weight of 5.1 (1.9) kg. Median time to first extubation was 22 (IQR 16,45) hours. Nearly half (97) were extubated to simple NC, 87(42%) to high flow NC, and 18 (8.8%) to noninvasive positive pressure (NIPPV). Escalation of respiratory support by 24 hours following extubation occurred in 21 (10.2%) patients: 4 reintubated, 13 to NIPPV and 4 to high flow NC. All pre-extubation measures of gas exchange other than oxygen saturation index were worse for those who required escalation of support compared to the remaining cohort: [alveolar-arterial gradient – 113 (66) vs 86 (55), p=0.039; oxygenation index – 3.3 (1.0) vs 2.6 (1.3), p = 0.016; PaO₂/FiO₂ – 272 (107) vs 350 (110), p = 0.002].

Conclusions: Escalation of respiratory support was an uncommon occurrence in this select population, particularly the need for reintubation. However, worse gas exchange prior to extubation was associated with escalation of respiratory support at 24 hours post-extubation. Further study is needed to understand patient and physiologic conditions that confound the findings, as well as to determine predictive value of gas exchange measures in predicting extubation readiness.