OXYGEN CONSUMPTION ASSUMPTIONS ARE INACCURATE IN YOUNG CHILDREN WITH COMPLEX CONGENITAL HEART DISEASE

Poster Contributions
Poster Sessions, Expo North
Monday, March 11, 2013, 9:45 a.m.-10:30 a.m.

Session Title: Congenital Cardiology Solutions: Congenital Catheter Interventions
Abstract Category: 13. Congenital Cardiology Solutions: Pediatric
Presentation Number: 1291-125

Authors: Michael Seckeler, Russel Hirsch, Robert Beekman, Bryan Goldstein, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, USA

Background: Oxygen consumption (VO2) is necessary for the determination of blood flow and vascular resistance during cardiac catheterization. Since measurement of VO2 is cumbersome, most catheterization labs forgo VO2 measurement (M-VO2) in favor of an assumed VO2 (A-VO2) derived from predictive equations, with or without modification. We sought to identify factors associated with an inaccurate A-VO2.

Methods: Retrospective review of consecutive anesthetized cardiac catheterization patients with direct measurement of VO2 (CAiOV Airway Module, GE Healthcare) at a large quaternary care children’s hospital. A-VO2 was calculated using the LaFarge equation. A difference between A-VO2 and M-VO2 ≥ 20% was considered clinically relevant and defined an inaccurate A-VO2. Patients were stratified by age (< 3 and ≥ 3 years) as the LaFarge equation has not been validated for < 3 years of age. Factors evaluated included: patient status (outpatient vs. ICU), age, weight, heart rate, hemoglobin and cardiac diagnosis. Groups were compared using χ2 test. Logistic regression was used to identify risk factors for inaccurate A-VO2.

Results: Of the 370 patients analyzed, 234 (63%) were ≥ 3 years and 136 (37%) were < 3 years of age. ICU status and single ventricle anatomy were prevalent overall (16 and 23%, respectively) but more common in the < 3 years cohort (32% for each). A-VO2 was inaccurate more often in subjects < 3 years compared to older subjects (44% vs. 14%, p < 0.001). In subjects ≥ 3 years, multivariate regression identified lower hemoglobin (OR 1.2, p = 0.04) and ICU status (OR 3.5, p = 0.03) as factors predictive of inaccurate A-VO2. In subjects < 3 years, multivariate regression identified higher heart rate (OR 1.04, p = 0.002), ICU status (OR 4.8, p = 0.004) and single ventricle anatomy following stage I palliation (OR 5.4, p = 0.04) as factors predictive of inaccurate A-VO2.

Conclusions: Use of A-VO2 in young patients is frequently inaccurate and may lead to significant errors in determination of blood flow and vascular resistance. Young critically-ill and stage I palliated patients should have VO2 measured to assure accurate Fick calculations.