Associations between SGA Status and Outcomes in Neonates Undergoing Cardiac Surgery

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BACKGROUND: In the general population, it is well established that neonates who are born small for gestational age (SGA) (i.e., birth weight <10th percentile for gestational age) are at increased risk for morbidity and mortality. It is also known that neonates with congenital heart disease are approximately twice as likely as the general population to be born SGA. However, limited data are available assessing the impact of SGA status on outcomes in patients with congenital heart disease. The aim of this pilot study was to explore associations between SGA status and early postoperative outcomes in neonates undergoing cardiac surgery. We hypothesized that when compared to their non-SGA counterparts, SGA neonates would have a longer hospital length of stay and increased morbidity and mortality.

METHODS: In this retrospective, single center, case-control study, we included neonates (<28 days) who underwent 1 of 7 common cardiac operations between 2008-2015. The primary outcome was total days of hospitalization; patients who died were assigned the longest length of stay of a surviving patient + 1 day. Univariate analyses were performed using Chi-square, Fisher's exact, or Wilcoxin rank-sum tests, as appropriate. Multivariable logistic regression models were used to explore associations between SGA status and outcomes, adjusting for prematurity, non-cardiac anomalies, genetic syndromes, and STAT Mortality Category.

RESULTS: Of 275 neonates, 44 (16%) were born SGA. With univariate analysis, SGA neonates, when compared to non-SGA neonates, had significantly longer length of hospital stay [median 29 days (25th-75th percentile, 19-60 days) vs. 21 days (15-35 days); p=0.008]. No significant differences were noted in rates of preoperative intubation (45% vs. 44%, p=0.83), duration of mechanical ventilation (median 4.5 vs. 4.0 days, p=0.33), unplanned cardiac re-interventions (11% vs. 8%, p=0.43), ≥1 postoperative complication (59% vs. 50%, p=0.28), operative mortality (9.1% vs. 3.9%, p=0.14) or readmissions within 30 days of hospital discharge (32% vs. 22%, p=0.14). With multivariate analysis, SGA status was not significantly associated with any adverse outcomes.

CONCLUSIONS: In neonates undergoing cardiac surgery, we identified a univariate association between SGA status at birth and longer hospital length of stay that was not significant after multivariable risk adjustment. Most secondary outcomes tended to be worse (although not significantly so) in SGA neonates. This pilot study was likely underpowered to identify small differences in outcomes, and this issue warrants further exploration in a larger, multicenter dataset.