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Does the Type of Cardioplegia Solution Affect Intraoperative Glucose Levels? A Propensity Matched Analysis

RESEARCH ABSTRACT

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Purpose

Myocardial protection during cardiac surgery is a multifaceted process that is structured to limit injury and preserve function. Evolving techniques utilize solutions with varying compositions of constituents that enter the systemic circulation and alter intrinsic systemic concentrations. This study compared two distinct cardioplegia solutions on affecting intraoperative glucose levels.

Methods

Data were abstracted from a multi-institutional perfusion registry, including a total of 1,188 propensity matched cases performed from January through October 2016, at 17 cardiac surgical centers across the United States in which both del Nido and 4:1 cardioplegia were used during the study period. Covariate data included insulin administration, crystalloid cardioplegia volume, diabetes history, glucose at operating room entry, and nine additional variables. Primary and secondary endpoints were highest intraoperative glucose level and maximum glucose in excess of 180 mg/dl. Mixed effects multivariable linear and logistic regression models were used to assess the primary and secondary endpoints, respectively, allowing for statistical control of center and surgeon effects.

Results

Greater median crystalloid cardioplegia volume was given in the del Nido group (n=594) 1,040 mL (IQR = [800, 1339]) compared to the 4:1 group (n=594) 466 mL (IQR = [360, 660]) in the 4:1 group (p<0.001), despite these groups being statistically

indistinguishable in terms of bypass and cross clamp times as well as seven other patient covariates. More patients required intraoperative insulin drip in the 4:1 group compared to del Nido (65.7% v. 56.2%, $p < 0.001$). A multivariable linear mixed effects model estimated a 5.7 mg/dl reduction in maximum intraoperative glucose for the del Nido group ($p = 0.03$). Logistic mixed effects analysis showed a statistically non-significant reduction in the likelihood of crossing the 180 mg/dl threshold for del Nido compared to 4:1 (OR=0.79, $p = 0.214$).

Conclusions

After controlling for known confounding variables, intraoperative maximum glucose levels for the del Nido group were 5.7 mg/dl lower than that of the 4:1 group ($p < 0.035$); there was limited evidence suggesting a difference between methods in the likelihood of exceeding the threshold of 180 mg/dl intraoperatively. Further research is warranted to examine the differential effects of cardioplegia solution on intraoperative glucose levels.