

Deep hypothermic circulatory arrest does not impair neurodevelopmental outcome in school-age children after infant cardiac surgery

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BACKGROUND: The purpose of this study was to assess deep hypothermic circulatory arrest (DHCA) as a modifier of neurodevelopmental (ND) outcomes in preschool children after cardiac surgery in infancy for repair of congenital heart defects (CHD).

METHODS: This is a planned analysis of infants enrolled in a prospective study of apolipoprotein E polymorphisms and ND outcome after cardiac surgery. The effect of DHCA was assessed in patients with single or biventricular CHD without aortic arch obstruction. Neurodevelopmental assessment at 4 years of age included cognition, language, attention, impulsivity, executive function, social competence, and visual-motor and fine-motor skills. Patient and procedural variables were evaluated in univariate and multivariate models.

RESULTS: Neurodevelopmental testing was completed in 238 of 307 eligible patients (78%). Deep hypothermic circulatory arrest was used at the discretion of the surgeon at least once in 92 infants (38.6%) with a median cumulative duration of 36 minutes (range, 1 to 132 minutes). By univariate analysis, DHCA patients were more likely to have single-ventricle CHD ($p = 0.013$), lower socioeconomic status ($p < 0.001$), a higher incidence of preoperative ventilation ($p < 0.001$), and were younger and smaller at the first surgery ($p < 0.001$). By multivariate analysis, use of DHCA was not predictive of worse performance for any ND outcome.

CONCLUSIONS: In this cohort of children undergoing repair of CHD in infancy, patients who underwent DHCA had risk factors associated with worse ND outcomes. Despite these, use of DHCA for repair of single-ventricle and biventricular CHD without aortic arch obstruction was not predictive of worse performance for any ND domain tested at 4 years of age.

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