Children's Hospital of Philadelphia
PolicyLab

Is cardiac diagnosis a predictor of neurodevelopmental outcome after cardiac surgery in infancy?

Date:

Dec 2010
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OBJECTIVES: To determine whether a cardiac diagnosis is a predictor of neurodevelopmental outcomes after infant cardiac surgery.

METHODS: Infants with ventricular septal defect (VSD), tetralogy of Fallot (TOF), transposition of the great arteries (TGA), and hypoplastic left heart syndrome (HLHS) in a study of apolipoprotein E (APOE) polymorphisms, and neurodevelopmental outcome underwent neurodevelopmental and genetic evaluation at 4 years of age. The domains tested included cognition, language, speech, memory, executive function, visual-motor, fine motor, and reading and math skills.

RESULTS: Testing was completed in 178 patients with normal genetic evaluations: VSD (n = 26), TOF (n = 44), TGA (n = 41), and HLHS (n = 67). No differences were found in gestational age, ethnicity, APOE genotype, socioeconomic status, or maternal education among groups. Patient age at the first surgery was significantly lower for patients with TGA and HLHS compared with those with TOF and VSD. The postoperative length of stay was significantly longer for HLHS than all other groups and for TGA compared with TOF and VSD. HLHS correlated significantly with the use of deep hypothermic circulatory arrest and multiple operations. The mean scores for each domain were within normal limits for all groups. Compared with the other patients, those with HLHS had significantly lower scores for cognition, fine motor skills, executive function, and math skills. No significant differences were found among the TGA, TOF or VSD patients for any domain. Significant impairments in at least 1 domain were identified in 8% (2/25) of patients with VSD, 20% (8/41) with TOF, 17% (7/41) with TGA, and 18% (12/65) with HLHS. After correction for the demographic, preoperative, and operative variables, no significant differences were found among the groups for any domain.

CONCLUSIONS: The mean scores for the neurodevelopmental outcomes domains tested were in the normal range for preschool children with no recognized genetic syndromes after surgery for VSD, TOF, TGA, and HLHS. In each diagnostic group, the number of children with impairments in at least 1 domain increased compared with the general population. Unadjusted neurodevelopmental outcomes for HLHS were lower for cognition, fine motor skills, executive function, and math skills compared with the other patients. After correction for the demographic, preoperative, and operative variables, no significant differences were found among the groups for any domain. The specific cardiac diagnosis determines a large portion of the variation in these covariates. Therefore, although HLHS did predict for poorer outcomes in some domains, it did not add predictive power to the other factors considered.

Authors:

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