

Cognitive and cerebral MRI findings in a GUCH population treated in the late '90s

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Introduction: Infants treated for congenital heart disease (CHD) by invasive procedure including cardiovascular surgery have an increased risk for impaired neurocognitive function, which is well known for the pediatric age group. In contrast, little is known in the growing up congenital heart (GUCH) population. The aim of this study was to evaluate neurocognitive abilities in a group of young adults treated in the late '90s and their possible association with structural magnetic resonance imaging (MRI) findings.

Methods: Prospective cohort study on GUCH population recruited from the University Heart Center in Zurich and compared to healthy peers. Intelligence quotient (IQ) was determined as part of an extended neurocognitive test battery using the vocabulary and matrix reasoning subtests from the Wechsler Adult Intelligence Scale, Forth Edition (WAIS-IV). Information about socioeconomic background, disability and health status of the patients was collected by questionnaire. Cerebral MRI was performed on a 3T GE MR750 scanner and inspection of any abnormalities was done blinded.

Results: Mean (range) age of 68 enrolled GUCH patients (46% females) and 55 peer controls (49% females) was 26.9 years (19.2-32.7) in the GUCH and 26.4 years (19.9-32.6) in controls. Mean IQ was 98.8 (68-123) in GUCH population and 104.5 (77-129) in controls (95%-CI: -10.67 to -2.12, $p = 0.0037$). Complexity of CHD had an influence on IQ ($F(2,63) = 3.87$, $p = 0.026$) whereas those with a severe CHD performed significantly worse compared to those with a moderate CHD (mean IQ 90.7 versus 101.0, 95%-CI: -19.036261 to -1.2934093, $p = 0.021$). Cerebral MRI could be obtained in 47 of the 68 GUCH patients (69.1%) and in 54 of 55 controls (98.2%). Abnormalities on cerebral MRI were discovered in 63.6% of GUCH and in 3.0% of controls ($p < 0.0001$). They consisted of focal infarction or atrophy, microhemorrhages, enlarged cerebrospinal fluid space and abnormal T2 hyperintensities. There was no difference in IQ between patients with or without abnormalities on brain MRI (mean IQ 96.6 versus 100.4, 95%-CI: -2.73 to 10.29, $p = 0.25$).

Conclusions: GUCH patients are at increased risk of cognitive impairment with a high prevalence of structural cerebral MRI findings.