

Abstract Neurodevelopment of Gastrointestinal Congenital Malformations: Systematic Review and Meta-Analysis

Context: Children with gastrointestinal congenital malformations may be at risk of neurodevelopmental impairment due to challenges to the developing brain, including perioperative hemodynamic changes, exposure to anesthetics and post-operative immuno-inflammatory influences.

Objective: This study aimed to assess neurodevelopmental outcomes of patients with gastrointestinal congenital malformations, hypothesizing their neurodevelopment may be impaired.

Data Sources: Pubmed, Embase and Web of Science were searched for peer-reviewed articles published until October 2018.

Study Selection: Out of the 4578 unique articles that were identified, 40 studies met selection criteria and were included.

Data Extraction: Standardized mean differences (Cohen's d) between cognitive, motor and language outcomes of patients with gastrointestinal congenital malformations and normative populations were aggregated across studies using random-effects meta-analysis. The value of (clinical) predictors was studied using meta-regression and diagnostic subgroups were compared.

Results: The 40 included studies encompassed 56 cohorts, representing a total of 1,839 children. Patients with gastrointestinal congenital malformations had small-sized overall neurodevelopmental impairment ($d=-0.421$, $p<0.001$; 95%CI -0.525 to -0.316), which was explained by small-sized cognitive impairment ($d=-0.393$, $p<0.001$; 95%CI -0.506 to -0.281), small- to medium-sized motor impairment ($d=-0.483$, $p<0.001$; 95%CI -0.628 to -0.338) and medium-sized language impairment ($d=-0.597$, $p<0.001$; 95%CI -0.893 to -0.302). Effects were not moderated by gestational age or birthweight. Cognitive impairment decreased with age ($r=0.004$; $p=0.03$).

Limitations: Our findings were limited by the impossibility to assess the attributive risk of other potential important etiological factors of neurodevelopmental impairment.

Conclusions: This study shows that children with gastrointestinal congenital malformations exhibit small- to medium-sized impairments in neurodevelopmental outcomes.