Fetal brain cortical and corpus callosum development assessed by MRI as predictors of an abnormal neurodevelopment outcome at 2 years in term small for gestational age-born infants

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Objective

To assess cortical development (cd) and corpus callosum (cc) differences by MRI in a cohort of term small fetuses and controls, and to evaluate their predictive value of an abnormal neurodevelopment at 2 years.

Methods

60 small and 42 control fetuses underwent a fetal brain MRI scan at 37 weeks to assess CD and CC morphometry. At 2 years, Bayley-III scale test for infant and toddler de-velopment was performed in the whole sample to evaluate their cognitive, language, motor, social, emotional and adaptive competencies. Results from Bayley-III test were consid-ered abnormal if one or more domains had a score <85. The predictive value of CD and CC was assessed by means of bivariate correlations and logistic regressions adjusting by gender, socio-economic status, breastfeeding and age at the Bayley-III test.

Results

Small fetuses showed deeper fissures, thinner cortical thickness and smaller cc. They presented significantly worse scores in the cognitive, language and motor domains from the bayley-iii test compared to controls. Cd and cc measurements showed a negative correlation with bayley-iii test scores, which were particularly significant in several of the cc areas. Finally, after using a principal component analysis, posterior callosal midbody area, cc length and right lateral fissure depth were selected and a composite score using these variables was constructed. Our composite score showed a significant predictive value for an abnormal neurodevelopment in this sample.

Conclusion

Fetal cd and cc morphometry at term have the potential to predict an abnormal neurodevelopment and their role as image biomarkers should be further investigated.