

Cortical development in fetuses with isolated non-severe ventriculomegaly and neurodevelopmental performance

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Objective

The objective of this study was to analyze whether the prenatal pattern of cortical development of fetuses with isolated non-severe ventriculomegaly correlates with poor neurodevelopmental performance at early infancy.

Methods

We prospectively included 42 healthy controls and 42 INSVM fetuses with ventricular width between 10.0 and 14.9mm. Fetuses with associated malformation, infection or abnormal microarray were excluded. Cortical maturation status was assessed measuring the depth and grading of brain sulci and areas by neurosonography (NSG) at 30 weeks and magnetic resonance (MR) at two time points depending on the onset of INSVM (early 27 weeks and late 33 weeks). Neurodevelopmental performance was assessed performing Bayley-III at 20 months.

Results

Mean gestational age at NSG was 30.4±0.6 weeks and MR in early onset group was 27.7±0.9 weeks and in late onset 33.4±0.9 weeks. Mean ventricular width was significantly higher in INSVM (10.7±1.1mm vs. 4.9±1.1mm p=<0.01). INSVM fetuses showed significant underdevelopment of the cortex (Global cortical grading score: early onset INSVM 37±10 vs controls 43±10, p=<0.01; late onset INSVM 75±6 vs controls 82±6, p=0.02) and poorer performance in Bayley III with lowest scores in adaptive-behavior composite (INSVM 84.5±16.3 controls 94.6±11.6; p=0.04). When predictive analysis were performed, clinical parameters (ventricular width, laterality, progression) did not show correlation with poor performance (Pseudo-R²= 0.06; p=0.44). On the contrary when using prenatal cortical development parameters significant association with abnormal Bayley-III was found (Pseudo-R²= 0.62; p=<0.01).

Conclusion

Fetuses with INSVM showed underdeveloped cortical sulcation being correlated with poorer neurodevelopmental performance at early infancy. These results open the opportunity to apply parameters of prenatal cortical development to identify those INSVM cases with higher risk of altered neurodevelopment that could benefit from early intervention.