

Volumetric brain magnetic resonance imaging in fetuses with intrauterine growth restriction

Katorza E, Fried S, Gafner M, Mayer A, Peretz R
Sheba Medical Center, Ramat Gan, Israel

Objective

According to the medical literature, it is known that intrauterine growth restriction is associated with abnormal fetal brain findings. The aim of this study was to assess the volume of fetal brain structures in fetuses with intrauterine growth restriction compared with the control group and to examine the effect of intrauterine growth restriction on birth weight in relation to the effect on the volumes of these structures.

Methods

This historical cohort study included 26 fetuses diagnosed with intrauterine growth restriction due to placental insufficiency. The control group included 66 fetuses with MR imaging scans demonstrating normal brain structures. The volumes of the supratentorial brain, left and right hemispheres, and the cerebellum were measured using a semiautomatic method. In addition, the cerebellum and supratentorial brain ratio was calculated. The measurements of each brain structure were then converted to percentiles according to growth curves.

Results

The absolute volumes and percentiles of all brain structures examined were smaller in the intrauterine growth restriction group. All examined brain structures showed results that were statistically significant ($P < .015$). There was no statistically significant difference in the cerebellum/supratentorial brain ratio ($P > .39$). The difference in brain volume percentiles was statistically smaller than the difference in birth weight and birth weight percentiles (Dolberg growth curves) between the groups.

Conclusion

Intrauterine growth restriction affects the volume of brain structures, as measured by quantitative MR imaging. Compared with healthy controls, the effect on birth weight was more prominent than the effect on brain structures, possibly due to the "brain-preserving" capability.