

Twin discordance: a study of volumetric fetal brain imaging and neurodevelopmental outcome

Katorza E, Barzilay E, Halevy T
Sheba Medical Center, Ramat Gan, Israel

Objective

This study employed magnetic resonance imaging (MRI) to compare brain volumes of discordant twins and examined their neurodevelopment after birth by using a validated exam.

Methods

A prospective historical cohort study of discordant dichorionic diamniotic (DCDA) or monochorionic diamniotic (MCDA) twin fetuses, who undergone an MRI scan to evaluate growth restriction in the discordant twin (weight < 10th centile) during 6 years period, at a single tertiary center. Twenty-seven twin pairs were included in the volumetric study and 17 pairs were included in the neurodevelopmental outcome examination. The volumes of the supratentorial brain region, both hemispheres, eyes, and the cerebellum were measured by 3D MRI semi-automated volume measurements. Volumes were plotted on normal growth curves and discordance was compared between weight at birth and brain structure volumes. Neurodevelopmental outcome was evaluated using the VABS-II questionnaire at a mean age of 4.9 years.

Results

The volume of major brain structures was significantly larger in the appropriate-for-gestational-age twins (AGA) compared to the small-for-gestational-age (SGA) co-twins ($p < 0.001$). The birth weight discordance was 32.3% (24.9-48.6) and was significantly greater ($p < 0.001$) than the discordance of the prenatal supratentorial brain (13.6% [5.6-18]), cerebellum volume (21.7% [9.5-30.8]). Further neurodevelopmental outcome evaluation found no significant difference between the AGA twin and the SGA twin.

Conclusion

In discordant twins, the smaller twin showed a "brain-preserving effect, " which in our study was not associated with a worse neurodevelopmental outcome. The use of MRI in such cases may aid in decision-making and parental consultation.