Comparison between two-dimensional and three-dimensional assessment of the corpus callosum: reproducibility of measurements and acquisition time

Léo Pomar¹, Ali Mchirgui², Véronique Lambert², Gustavo Malinger³, Joanna Sichitiu¹, Najeh Hcini², David Baud¹, Yvan Vial¹

1. Ultrasound and Fetal medicine, Department Woman-Mother-Child, Lausanne University Hospital, Lausanne, Switzerland.
2. Prenatal diagnosis, Maternity, Saint-Laurent du Maroni Hospital, Saint-Laurent du Maroni, French Guiana.
3. OB-GYN Ultrasound Unit, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel.

Objectives

• To study the reproducibility of the corpus callosum measurements between 2D and 3D acquisitions
• To compare the acquisition time required for these acquisitions

Methods

• 475 fetuses, 18-38w
• Starting from a trans-cerebellar axial plane, 3D and 2D midsagittal view of the corpus callosum were obtained
• Measurements of length and thickness
• Quality control
• Acquisition time reported

• Means, differences and linear correlations were analyzed using t-test, regression and Pearson correlation coefficients, and Bland-Altman plots.

Results

• Among the 432 cases measured using both methods, 380 (87.9%) were validated by quality control
• 2D and 3D corpus callosum length and thickness were similar (mean ± SD, 33.8 ± 8.7 vs 33.7 ± 8.7 mm, 2.2 ± 0.4 vs 2.2±0.4 mm, p < 0.01)
• Regression and Pearson coefficients were similar for length (0.8283 and 0.9191 vs 0.8271 and 0.9095), but different regarding thickness (0.6775 and 0.8231 vs 0.5831 and 0.7636)
• Differences between 2D and 3D measurements, considering Bland-Altman plots and correlated with gestational age, were acceptable (0.097 ± 0.559 mm, 0.004 ± 0.111 mm, for length and thickness)
• The acquisition time required was significantly lower for 3D acquisitions (25.2 ± 14.5 s vs 35.1 ± 19.4 s, p < 0.01)

Conclusion

Despite a slight difference for thickness linear regressions and limitations > 35 w, this study confirms good reproducibility of corpus callosum assessment by 3D acquisitions.

The lower acquisition time required by 3D method and its feasibility in routine scans may lead to better screening for callosal dysgenesis.