

Neurosonographic assessment of the corpus callosum as a potential biomarker of abnormal neurodevelopment using fetal growth restriction as a model

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OBJECTIVES

To evaluate corpus callosum (CC) morphometric and growth differences by neurosonography (NSG) in small fetuses compared to controls.

METHODS

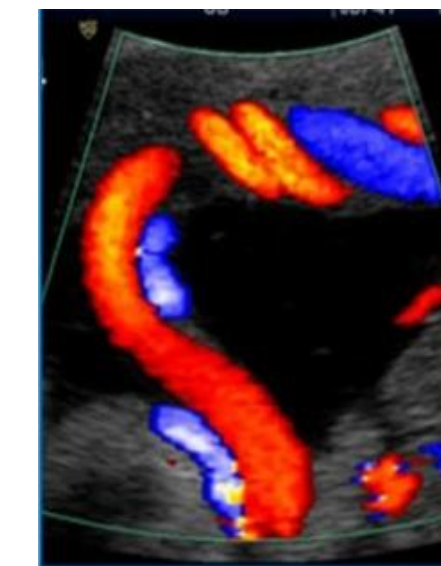
165 PATIENTS

94 SMALL FETUSES

EFW < p10
Normal umbilical Doppler

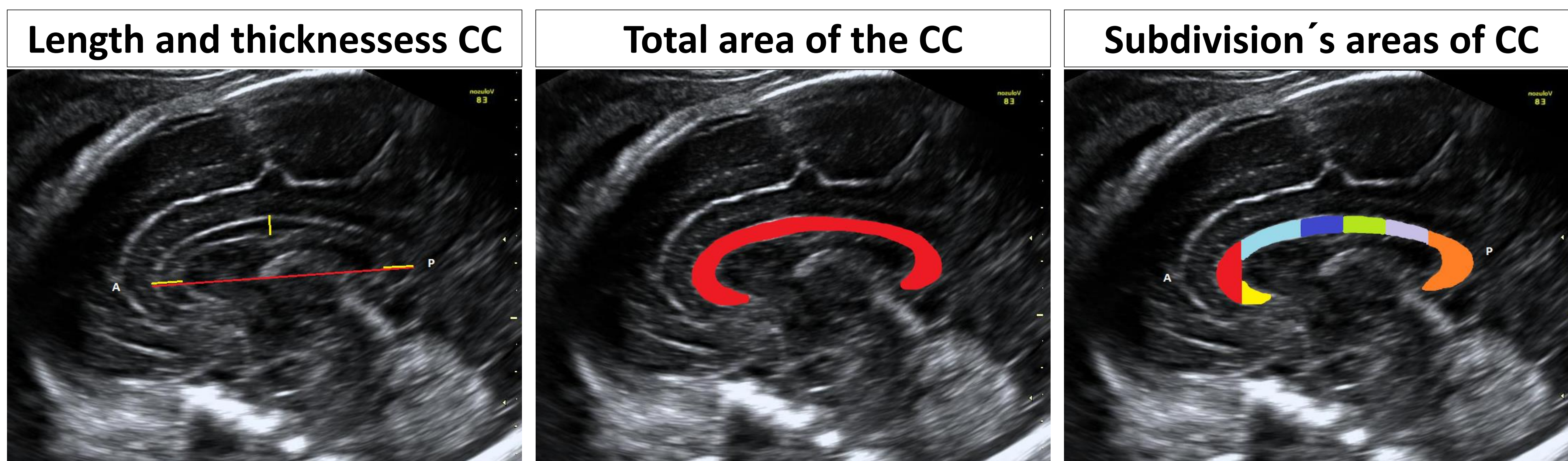
71 AGA

EFW ≥ p10



TRANSABDOMINAL AND TRANSVAGINAL NSG IN 3rd TRIMESTER OBTAINING AXIAL, CORONAL AND MID-SAGITTAL IMAGES

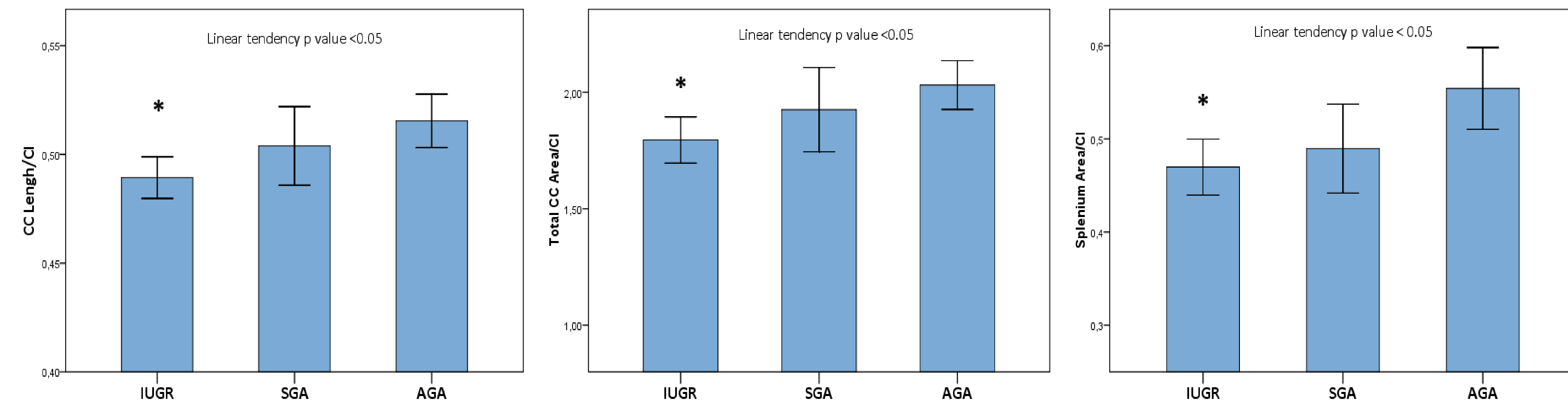
IMAGING POST PROCESSING USING THE MIDSAGITTAL VIEW OF CC



RESULTS

Small fetuses showed significantly shorter (small fetuses: 0.49 vs. control: 0.52; p<0.01) and smaller CC (1.83 vs. 2.03; p<0.01) and smaller areas in all subdivisions particularly in the splenium (0.47 vs. 0.55; p<0.01). These changes were more markedly present in those small fetuses with clinical severity signs (EFW<3rd centile, vasodilatation and abnormal uterine artery Doppler) named IUGR. Also, small fetuses presented lower CC growth rate compared to controls.

CC structure corrected by cephalic index	Small Fetuses (94)	AGA (71)	P*
Length / CI	0.493 ± 0.042	0.516 ± 0.052	<0.01
Anterior thickness / CI	0.061 ± 0.013	0.064 ± 0.014	0.25
Middle thickness / CI	0.041 ± 0.007	0.043 ± 0.007	0.06
Posterior thickness / CI	0.066 ± 0.016	0.068 ± 0.015	0.42
Total area / CI	1.828 ± 0.432	2.034 ± 0.441	<0.01
Rostrum area / CI	0.135 ± 0.054	0.186 ± 0.250	0.06
Genu area / CI	0.283 ± 0.119	0.314 ± 0.110	0.09
Rostral body area / CI	0.341 ± 0.076	0.367 ± 0.073	0.03
Anterior midbody area / CI	0.224 ± 0.056	0.243 ± 0.051	0.03
Posterior midbody area / CI	0.219 ± 0.06	0.235 ± 0.046	0.05
Isthmus area / CI	0.206 ± 0.074	0.215 ± 0.055	0.40
Splenium area / CI	0.473 ± 0.125	0.554 ± 0.185	<0.01



CONCLUSIONS

NSG assessment of CC showed a significantly altered callosal development in small fetuses, supporting the existence of in-utero brain reorganization. This data supports the potential role of CC assessment by US to monitor brain development in fetuses at risk.