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Imaging of the fetal brain in the third trimester

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Introduction

During the third trimaims to assess normal neurodevelopment and diagnose brain abnormalities. Standardized multi-planar imaging includes relies the biparietal diameter (BPD), the diameter between the occipital and frontal bones (OFD), head circester of pregnancy, the fetal brain undergoes gradual structural changes as part of its maturation. Targeted fetal neurosonography during this period umference (HC) and for assessing the midline of the brain, the ventricles, the cerebral hemispheres, the cerebellum and the cisterna magna. The brain parenchyma increases in volume and cerebral gyration develops. In addition, a gradual closure of the Sylvian fissure is observed, while the width of the lateral cranicortical width (LCW) decreases.

Purpose

the imaging of the fetal brain in the third trimester of the pregnancy.

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Materials and Methods

This is a prospective study on singleton pregnancies presenting for routine growth scan after 30 weeks of gestation. The fetal brain was examined according to a protocol similar to the second trimester anomaly scan protocol. The analysis focused specifically on cranial and brain imaging, including BPD, HC, TCD and coronal and sagittal views. Maternal characteristics as well as maternal abdominal fat tissue thickness, placental location, fetal position and the amniotic fluid were recorded. In addition, the Sylvian fissure was assessed and graded and the LCW was measured.

Results

The study consisted of 629 singleton pregnancies. The brain biometric measurements (BPD, HC) were successfully obtained in 100% of cases. The TCD view and general measurements of the brain were visible in 97.5% of cases. The appearance of the Sylvian fissure was graded on a scale of 1 to 4 in all cases. It was observed that the visualization increased with the progression of gestation, but this pattern varied in cases with brain abnormalities.

Conclusion

Although standard views (BPD, HC) for fetal biometry are routinely achievable in the third trimester, detailed neurosonography depends significantly on factors related to both the mother and the fetus. Third-trimester neurosonography requires a targeted approach, as many of the standard imaging techniques cannot be performed. All limitations must be taken into account, and a proper evaluation of the CNS must be performed.

Table 3. Multivariate logistic regression results with TCD view, Head and brain, Coronal view, Sagittal view, Midsagittal facial profile, ocular and Palate as dependent variables

	TCD view		Head and brain		Coronal view		Sagittal view		Midsagittal facial profile		Ocular		Palate	
	OR (95% CI)+	P	OR (95% CI)+	P	OR (95% CI)+	P	OR (95% CI)+	P	OR (95% CI)+	P	OR (95% CI)+	P	OR (95% CI)+	P
Age	1.05 (0.96 – 1.15)	0.30	1.05 (0.96 – 1.15)	0.30	1.01 (0.98 – 1.04)	0.41	1.02 (0.99 – 1.05)	0.179	1.02 (0.98 – 1.06)	0.446	1.01 (0.98 – 1.05)	0.463	0.99 (0.96 – 1.03)	0.636
Gestational age	0.72 (0.46 – 1.12)	0.14	0.72 (0.46 – 1.12)	0.14	0.83 (0.71 – 0.96)	0.01	0.84 (0.73 – 0.97)	0.020	1.01 (0.85 – 1.19)	0.954	0.98 (0.83 – 1.16)	0.857	0.99 (0.84 – 1.16)	0.902
BMI (kg/m²)	0.94 (0.85 – 1.04)	0.24	0.94 (0.85 – 1.04)	0.24	0.98 (0.94 – 1.01)	0.19	1.01 (0.97 – 1.04)	0.718	0.98 (0.94 – 1.03)	0.448	0.96 (0.92 – 1.00)	0.062	0.95 (0.91 – 0.99)	0.012
Placenta														
Anterior vs Posterior	0.55 (0.18 – 1.68)	0.29	0.55 (0.18 – 1.68)	0.29	0.79 (0.56 – 1.13)	0.20	0.65 (0.46 – 0.93)	0.018	0.74 (0.46 – 1.22)	0.202	0.66 (0.43 – 1.02)	0.063	0.72 (0.47 – 1.10)	0.126
Other vs Posterior	0.65 (0.03 – 14.31)	0.78	0.65 (0.03 – 14.31)	0.78	0.72 (0.27 – 1.89)	0.49	0.78 (0.31 – 1.93)	0.590	0.57 (0.18 – 1.79)	0.338	0.73 (0.23 – 2.34)	0.598	0.47 (0.16 – 1.35)	0.160
Presentation														
Breech vs Transverse	4.16 (0.13 – 129.70)	0.41	4.16 (0.13 – 129.70)	0.41	0.33 (0.12 – 0.91)	0.03	0.36 (0.11 – 1.17)	0.088	0.43 (0.11 – 1.74)	0.208	0.54 (0.17 – 1.74)	0.301	0.75 (0.23 – 2.39)	0.627
Cephalic vs Transverse	2.18 (0.29 – 16.63)	0.45	2.18 (0.29 – 16.63)	0.45	0.45 (0.18 – 1.12)	0.08	0.21 (0.07 – 0.62)	0.005	0.99 (0.29 – 3.77)	0.986	1.7 (0.56 – 4.97)	0.334	1.96 (0.68 – 5.64)	0.210
EFW	0.96 (0.78 – 1.18)	0.67	0.96 (0.78 – 1.18)	0.67	1.01 (0.94 – 1.09)	0.72	1.02 (0.95 – 1.09)	0.611	0.94 (0.87 – 1.03)	0.175	0.98 (0.90 – 1.06)	0.589	0.98 (0.90 – 1.06)	0.541
Deepest pool	0.99 (0.57 – 1.71)	0.96	0.99 (0.57 – 1.71)	0.96	0.94 (0.80 – 1.11)	0.46	1.17 (1.00 – 1.38)	0.057	1.13 (0.91 – 1.39)	0.264	1.01 (0.83 – 1.22)	0.957	1.02 (0.84 – 1.23)	0.874
Subcutaneous fat	0.83 (0.89 – 0.98)	0.00	0.93 (0.89 – 0.98)	0.00	0.98 (0.95 – 0.99)	0.04	0.95 (0.93 – 0.97)	<0.00	0.96 (0.94 – 0.99)	0.007	0.98 (0.96 – 1.01)	0.229	0.99 (0.96 – 1.01)	0.312
Surgery (yes vs no)	1.73 (0.43 – 6.9)	0.44	1.73 (0.43 – 6.9)	0.44	0.95 (0.64 – 1.40)	0.80	1.04 (0.71 – 1.52)	0.857	0.77 (0.46 – 1.26)	0.294	0.93 (0.58 – 1.50)	0.778	0.98 (0.60 – 1.52)	0.852
Fibroids (yes vs no)	0.87 (0.13 – 5.98)	0.88	0.87 (0.13 – 5.98)	0.88	0.98 (0.28 – 1.15)	0.95	1.52 (0.76 – 3.00)	0.233	0.76 (0.32 – 1.82)	0.534	0.57 (0.26 – 1.24)	0.155	0.99 (0.28 – 1.26)	0.174
Position of the spine														
Lateral vs Posterior	3.33 (0.89 – 12.43)	0.07	3.33 (0.89 – 12.43)	0.07	0.54 (0.30 – 0.98)	0.04	0.30 (0.16 – 0.58)	<0.00	0.09 (0.01 – 0.70)	0.021	0.23 (0.07 – 0.76)	0.017	0.21 (0.06 – 0.70)	0.011
Anterior vs Posterior	3.99 (0.66 – 24.03)	0.13	3.99 (0.66 – 24.03)	0.13	0.49 (0.23 – 1.02)	0.05	0.14 (0.06 – 0.32)	<0.00	0.01 (0.00 – 0.10)	<0.00	0.03 (0.01 – 0.10)	<0.00	0.03 (0.01 – 0.11)	<0.00

+Odds Ratio (95% Confidence Interval)



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