HIGH FIELD OPEN MRI: CORRELATION WITH FETAL ULTRASOUND IN THE EVALUATION OF CENTRAL NERVOUS SYSTEM ABNORMALITIES

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Background and aims: MRI is a valuable alternative diagnostic tool for the assessment of the fetal central nervous system¹, which frequently offers additional information to ultrasound that may change patient counselling and occasionally management². Traditionally these studies were performed at 1.5Tesla. Open MRI is better tolerated by pregnant women and only recently it was made technically possible to achieve high magnetic field strength of 1.0Tesla³ for improved image quality. To date and to our knowledge this is the first systematic study aiming to correlate fetal brain Ultrasound to high field open-MRI.

Methods: Informed parental consent and research ethics committee approval were obtained. 128 fetal CNS scans (median GA 27w+2, range 19w+2 to 37w+0) were performed at a 1.0Tesla open-MRI system (Philips, Best, the Netherlands) during a 40-month period using a standard abdominal coil. These patients were referred for MRI within one week of suspected sonographic abnormality (52.4% ventriculomegaly, 20.63% posterior fossa abnormalities, 15.87% other abnormalities 8.7% callosal abnormalities and 2.4% combination) using state-of-the art ultrasound in the referring centres. Multiplanar T2W single-shot FSE, axial T1W breath-hold GRE, axial DWI and T2* sequences were applied.

Results: In 57.3% of the cases ultrasound and MRI were in complete agreement, in 20.9% MRI correctly provided additional information to ultrasound and in 21.8% it changed diagnosis. Pregnancy management was altered in 31% of the cases.

Conclusions: Open-MRI at 1.0Tesla is a valuable complementary diagnostic tool to US for the evaluation of fetal CNS abnormalities, with images comparable to 1.5Tesla conventional MRI scanners.