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Malformations of the fetal spine using in utero MR imaging

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Background

The detection of spinal cord malformations *in utero* remains a challenge for clinicians involved in antenatal diagnosis. No imaging method can make accurate predictions as to the neurological/developmental functional outcome in an individual case but having the most anatomical detail of the malformation gives the best chance of accurate counselling. In this paper we report our experience of the first 50 cases in which we performed *in utero* magnetic resonance (MR) imaging for expected fetal spine pathology.

Materials and methods

Cases were referred from five fetal assessment units in the North of England and Midlands. Antenatal fetal anomaly ultrasound scans had shown some variety of vertebral or spinal abnormality. A phased array flexible surface coil was used in all cases and single shot fast spin echo sequences were used (5 mm and 3 mm-thick slices). Detailed follow up was obtained in all the cases examined consisting of post mortem procedures or clinical and radiological follow up. The results of those studies were taken as the reference standard. The diagnoses made independently on the basis of ultrasound and MR were compared with the reference standards.

Results

Normal MR examinations were found in 8/50 cases that were suspected to be abnormal on ultrasound. All of these cases were shown to be normal postnatally. Open dysraphic processes, mainly myelomeningocoele, were found on MR and confirmed on post mortem studies or post natally. Two had been misdiagnosed on ultrasonography. In a further 15 cases developmental spinal abnormalities were correctly characterised by MR an two of those were misdiagnosed on ultrasound. Six other pathologies were shown (sacral teratoma) all of which were correctly diagnosed by ultrasound.

Of the 21 cases of myelomeningocoele 13 were lumbrosacral, 3 thoracic, and 4 sacral. One case of hemimyelomeningocele was correctly diagnosed. 13/21 had low cerebellar tonsils and 8 had normally placed tonsils at the time of scanning. In all 13 with low cerebellar tonsils the extra-axial CSF spaces of the brain were effectively not visualised. 5/8 of the patients with normally placed tonsils had a normal amount of extra-axial CSF. Absence of the extra-axial CSF space was not seen in any closed spinal dysraphic pathologies.

Conclusion

In utero MR contributes to the accurate diagnosis of developmental spine pathology before 24 weeks gestational age. Its major contribution appears to be in confirming or refuting the presence of an abnormality although it does contribute to the anatomical diagnosis. Absence of the intracranial surface CSF spaces are a frequent accompanying factor of open dysraphic processes, particularly those associated with Chiari 2 deformaties.