

Magnetic resonance imaging of the post mortem fetus - an important adjunct to the autopsy

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Introduction. Post-mortem Magnetic resonance imaging (PM MR) has been shown to provide useful information if the autopsy has been refused (1), however all the studies concentrate on the macroscopic appearances and neglect the additional data that is available from the formal autopsy with regard to the placenta, X-rays, cultures and cytogenetics. In this study we aimed to assess the value of post-mortem MR as part of the autopsy process.

Methods: 250 cases were referred for post-mortem MR over a 4 year period. T2 weighted images (15,662/92 ms [TR/TE]) with a bandwidth of 20.8 kHz and four acquisitions were obtained. A wrist or knee coil was used with a field of view 14 cm, matrix size of 256 x 256 (giving an in-plane resolution of 0.5 mm), and 2mm thick sections (no intersection gap) of the whole brain in the three orthogonal planes. Comparable sequences in the sagittal plane and either axial or coronal plane depending on the expected or demonstrated abnormality were used to image the spine. The bodies were stored in a standard refrigerated environment before imaging. A paediatric neuroradiologist and a neonatal radiologist reviewed brain and spine images. Autopsy was performed by experienced paediatric pathologists who did not know the results of the MR examination at the time of preparing the autopsy report.

The autopsy was performed using what are considered to be standard methods in the United Kingdom at present.

The PM MR images and autopsy were graded for quality of the image/fetus grade 0-4. Grade 0 was non-diagnostic for images and a diffuent brain for autopsy, grade 4 was good quality for images and for similarly for autopsy. The value of ancillary investigations was graded 0-2, grade 0= not useful or failed, grade 1 confirmed what was already known, grade 2= essential for the diagnosis.

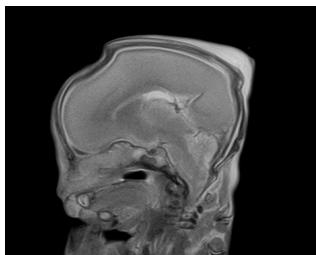
Results

The results were analysed in groupings according to the post-mortem MR imaging quality with respect to pathology, cause of death e.g. termination of pregnancy (TOP), intrauterine fetal death (IUFD) and gestational age to assess where MR had the largest impact and where it would be most useful in the clinical arena. A similar analysis was done in groupings based on autopsy quality. To avoid over complicating the analysis it was restricted to comparing the PM MR imaging of the central nervous system i.e. brain and spinal cord as the whole body was imaged in the minority of cases. The gestational age range was 13-40 weeks, mean 29, median 29. In 16 cases the autopsy was limited and MR was deemed essential to complete the examination.

In 158 cases the MR and autopsy were in 100% agreement on the gross morphology but if all the investigations were considered this fell to 81 cases. The additional information from the placenta, X-rays, cultures, cytogenetics or histology was important to the diagnosis in the other 77 cases. This information would have been lost if the autopsy had not be performed. In cases of intrauterine fetal death the placenta was vital to the cause of death as this demonstrated acute chorioamnionitis in 16 cases out of 68 cases. This information is essential for clinical management of future pregnancies. Overall no cause of death was found in 34 cases after a complete autopsy and ancillary investigations.

When only the macroscopic findings of the autopsy were compared to the MR imaging report there was complete agreement in 158 cases (63%). MR was valuable over and above the autopsy in 77 cases (31%) and the autopsy provided superior information in 15 (6%) cases. Post-mortem MR and autopsy had 100% agreement in 81 cases when all the information from the autopsy was compared (including whole body information, histology, cultures, X-rays, cytogenetics and placental analysis) to the post-mortem MR information. X-rays were essential in eight cases, cultures in 16 cases and cytogenetics in 33 cases. Post-mortem was MR essential for full diagnostic information in 52 cases (16 cases were limited post-mortem cases), and autopsy essential for complete information in 60 cases.

Conclusion: PM MR and additional tests can provide information equivalent to formal autopsy in the majority of cases (76%). Formal autopsy should not be replaced but when the parents refuse to give consent PM MR should be offered if available. PM MR provides essential information over and above that obtained from autopsy in a fifth of all cases.



A. PM MR



B. Autopsy

PM MR (A) and autopsy picture (B) from a case with a Dandy Walker variant (abnormal cerebellum). The small cerebellum is clearly seen on the PM MR images but was never visualised at autopsy.

