Relevance of data homogeneity and fetal post-mortem MRI in congenital brain malformations. (Mini-commentary on BJOG-20-1156.R2)

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Mini-commentary on BJOG-20-1156.R2: Post-mortem confirmation of fetal brain abnormalities: challenges highlighted by the MERIDIAN cohort study

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MR imaging is of ever-growing interest in the obstetric community and post-mortem confirmation is crucial in the improvement of this technique. Griffiths et al. assessed the concordance between fetal MRI and brain autopsy in fetuses of the MERIDIAN cohort that ended in termination of pregnancy (BJOG 2020 xxxx). Sixty-two fetuses were evaluated with a concordance of 84% (52/62), which is in accordance with similar studies (Izzo et al. Eur Radiol 2019;29(6):2740-2750). Of ten cases with a disagreement, eight were related to cerebellar malformations or callosal abnormalities.

We would like to stress the importance of post-mortem MRI (PMMR), which could further elucidate disagreements between autopsy and in-utero MRI. PMMR, like any other technique, has limitations, such as limited interpretability due to maceration, and the possibility of non-diagnostic images. Nevertheless, PMMR provides relevant additional diagnostic information, especially in cases where autolysis prevents detailed autopsy (Arthurs et al. Clin Radiol 2015;70(8):872-80). By identifying poor tissue preservation, PMMR may also be efficiently integrated in the post-mortem workup strategy in fetal brain abnormalities. Especially in the setting of posterior fossa malformations, PMMR could be a valuable adjunct.

In the past decade, there has been a strong scientific interest in post-mortem imaging, driven by centers in Great Britain, which have developed a high level of sophistication in this field (Ashwin et al. Prenat Diagn 2017;37(6):566-574). Although, centers that perform fetal MRI according to guidelines should also have the knowledge and technical capabilities to perform PMMR, this technique is generally still underused.

This stands in contrast to the high parental acceptance of PMMR over conventional autopsy (Cannie et al. Ultrasound Obstet Gynecol 2012;39(6):659-65). Despite prospective design and scientific third-party funding support of the current study, surprisingly 55% of abortions went without post-mortem brain examination, by neither autopsy nor PMMR. This may indicate limited availability of post-mortem diagnostics even in the setting of a well-planned prospective study. Further, there is the possibility of a selection bias of cases undergoing autopsy, which needs to be addressed and openly discussed to adequately bill this important source of quality assurance.

Comparing in-vivo imaging to autopsy is challenging for several reasons. As both are influenced by data quality, data homogenization by exclusively comparing excellent MR image quality to autopsies with excellent tissue quality without autolytic changes may help to optimally identify the complementary value of both modalities. Further, an exact definition of the procedure of fetal brain autopsy is crucial to understand to which standard imaging was compared. Fetal brain autopsy can be performed macro- and microscopically (±immunohistochemistry), substantially impacting the level of detail of autopsy findings. Data heterogeneity is also influenced by the variable expertise of pathologists, with only very few being experienced in fetal neuropathology. As we were not able to extract these important aspects from the current paper and they were not explicitly described in the MERIDIAN study protocol (Griffiths et al. The Lancet 2017;389(10068):538-546), we had difficulties in acknowledging and understanding the value of the presented data.

Finally, we hope for initiatives promoting the use of PMMR and further supporting training in fetal neuropathology as important quality control. Improving the accuracy of prenatal neuroimaging will optimize our ethically sensitive decision making in this field. Post-mortem validation by a well-defined imaging and autopsy workup will require support by funding agencies in order to maintain and develop a high standard of quality.

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