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Magnetic Resonance Imaging to enhance the diagnosis of fetal developmental brain abnormalities in utero (MERIDIAN)

Firstly we would like to take this opportunity to thank you for participating in the MERIDIAN study.

This letter will provide you with a summary of the results

The MERIDIAN diagnostic accuracy study

Ultrasound scanning is routinely used during pregnancy to identify babies whose brains do not seem to be developing as expected; no medical test is perfect however, and the information provided by ultrasound is occasionally incomplete or inaccurate. Fetal magnetic resonance imaging (MRI) is sometimes used in addition to ultrasound to help diagnose fetal brain abnormalities. Some doctors feel it is very helpful, but others have suggested that fetal MRI scans might not offer much benefit over high quality ultrasound scanning. The aim of MERIDIAN was to find out whether fetal MRI actually does improve the accuracy of prenatal diagnosis by ultrasound.

Sixteen fetal-medicine centres in the UK were involved in the study. After agreeing to take part in the study pregnant women were referred for the MRI scan. The results of the ultrasound scan and of the fetal MRI were compared to the outcome of the pregnancy. These findings were used to assess whether fetal MRI improved the accuracy and confidence of the diagnosis made by the ultrasound

The researchers in the clinical study gathered information from 570 women who took part, where the results from scans during pregnancy and scans after birth were all available. The results showed that using fetal MRI in addition to ultrasound improved accuracy of diagnosis in 1 in 4 cases (i.e. in 25% of cases) and changed the expected outcome for the baby in at least 1 in 5 cases (20%). The results also found that in many cases the pregnancy was managed differently because of the MRI result. Overall, the results led the research team to recommend that when ultrasound detects a fetal brain abnormality in a pregnancy, the woman should be offered a fetal MRI.

The sociological sub-study

As well as understanding how fetal MRI affected the clinical diagnosis, we were also interested in what the pregnant women and the health care professionals thought of their experiences. To better understand this, we included a smaller interview study as part of the MERIDIAN study. We looked at how women described their experiences of the MRI scan, and their views on whether (or not) they found the use of MRI in their antenatal care acceptable and useful. We also looked at the views of the health professionals (e.g. fetal medicine consultants, radiologists) on the role and usefulness of this technology.

Key findings from patient interviews and health professional interviews

Survey findings

Altogether 428 women completed the 1st survey (Q1) and 284 completed the 2nd (Q2). More than 9 out of 10 women gave a positive response (about 95%) to the question of whether women would choose to have an MRI scan as part of their care, if faced with the same difficult situation in a future pregnancy. While the majority found the MRI helpful, more found it helpful for understanding the problem than for understanding how it would affect the baby's quality of life. Where the outlook for the baby was poor, women found the MRI more helpful although this was not the case where women were further on in their pregnancy (34 weeks or later). All the women returning Q2 who had made the difficult decision to have a termination of pregnancy found the MRI helpful. Women who had their MRI at Sheffield rated their healthcare more highly than those who had it in other locations. The majority agreed that the time and place of the scan was acceptable.

Patient interview findings

Most women felt they benefitted from the MRI because it helped them understand the diagnosis, come to terms with the condition and prepare them for how it might affect their baby. Parents were disappointed where there were uncertainties about what the findings might mean for the baby's future, or when they were unprepared for the pregnancy outcome. Others who had a baby who was ultimately found not to have a problem felt they had been put through unnecessary worry. But some spoke of how they trusted professionals more when fetal MRI was available.

Women were willing to have the scan because they wanted to know what was wrong with their baby. But some women suffered discomfort and panic attacks, or other unpleasant experiences especially if they had other problems related to their pregnancy (e.g. severe sickness), or were further on in their pregnancy or were overweight. Their discomfort from the noise, heat and confined space was helped by being reassured by staff and by having their partner with them in the scan room. Others wanted reassurance about the effects of the scan on the baby.

Compared to the ultrasound, the MRI was able to help parents understand the structural features of the brain, while the ultrasound could only show certain features e.g. the size of the ventricles. Women described the MRI being able to offer clarity, reassurance, peace of mind, and assistance in their decision making by adding certainty to 'how things looked' rather than absolute certainty about what the outcome would be.

In this interview study of 41 cases, there were four neonatal deaths, seven pregnancies that were ended, and twelve infants who had a disability. There were more graduates among the interviewees than in the survey part of the study, and the women attended at three out of the six MRI sites in the wider study.

Clinician interview findings

Interviews with health professionals showed that fetal MRI offered many advantages, but only as an addition to ultrasound scanning. Many felt there was a benefit to having a second pair of eyes, or a different technology for viewing, to inform the diagnosis. However, some were worried that too much confidence might be placed on the meaning of a fetal MRI image. Clinicians emphasised the need for timely access to the MRI scan and the results, and many felt that having two people interpreting an image was an important part of good quality care. It was important for health

professionals to work together to improve the quality of the scan reports - this would increase clinicians' confidence in their diagnosis and help build trust between the patient and the professional, and between professionals. The clinicians interviewed differed in their experience of using fetal MRI - those less familiar needed to build their confidence in using this new technology. Looking to the future, health professionals were agreed that proper planning and resourcing were needed for a fetal MRI service to be offered more routinely in the NHS.

Using fetal MRI in prenatal diagnosis of brain abnormality

Although in Sheffield, patients and family were able to view the MRI images and receive preliminary results after the scan, this was not possible in other sites. In some cases, it could be better to wait for the results to be confirmed by more than one professional before they were discussed with the patient.

This study with patients and professionals showed that while there was a variety of views about fetal MRI, overall feedback was more positive than negative. Most participants saw a role for fetal MRI, especially if used together with the ultrasound to give more confidence in the diagnosis of fetal brain anomalies.

Recommendations for improving care

Some of the recommendations from this study include 1) an offer to women to have someone in the scan room to support them, 2) reassurances during the course of the scan, e.g. to expect the noises and vibrations 3) some indication of how the scan went (e.g. were clear images taken) and when they would receive results, 4) more information about the safety of the fetal MRI for the baby, 5) timely provision where a fetal MRI was needed and 6) double reporting of images for good quality care provision.

Further Information

For a more detailed report on the study results please visit the MERIDIAN website which will we keep updated with publications and results: http://sheffield.ac.uk/meridian

If you have any questions please contact your local team:

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