Practical approach to fetal MR imaging
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INTRODUCTION

Fetal MR imaging is a noninvasive procedure that allows the examination of the fetus in utero. The use of MR imaging in obstetrics is rapidly increasing due to its capability to provide high resolution images of soft tissue structures without the need for ionizing radiation.

POTENTIAL INDICATIONS

Due to potential risks and current limitations of resolution from fetal MR imaging, it is not an all-encompassing imaging modality. Instead, it is best utilized in conjunction with obstetric ultrasound for specific indications.

1. Evaluation for possible in utero infection
2. Renal evaluation in cases of severe polyhydramnios
3. Suspected spine abnormalities (neural tube defect, vertebral dysplasia, spina bifida)
4. Suspected CNS abnormality (cerebellar hypoplasia, microcephaly, hydranencephaly)
5. Brain anomalies (polymicrogyria, porencephaly, schizencephaly)
6. Evaluation of maternal spine, kidneys and other pelvic structures
7. Thrombosis

DEFINITIONS

Fetal MR imaging is performed with maternal and fetal sedation. No fetal sedation is used.

Acoustic damage: Due to potential risks and current limitations of resolution from fetal MR imaging, it is not an all-encompassing imaging modality. Instead, it is best utilized in conjunction with obstetric ultrasound for specific indications.

ECHO PLANAR IMAGING

This technique is useful for evaluating the flow of blood in the fetal heart and great vessels. It is a high-resolution technique that can provide detailed information about the fetal circulation.

Table 1: Fetal MR Imaging Techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>Indications</th>
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<tr>
<td>Sono</td>
<td>Evaluation of fetal heart, placenta, and umbilical cord</td>
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<tr>
<td>SSFSE</td>
<td>Best for evaluating fluid-filled structures, such as the liver and heart</td>
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<tr>
<td>Balanced sequence</td>
<td>Best for evaluating bone, cartilage, and muscle</td>
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<tr>
<td>Diffusion weighted images</td>
<td>Best for evaluating the diffusion properties of water in the brain</td>
</tr>
<tr>
<td>Hydrography</td>
<td>Best for evaluating the flow of blood in the brain</td>
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CLOSER VIEW OF THE SEQUENCES

1. After obtaining large field of view SSFSE T2 of maternal planes, an axial SSFSET2 of the fetus is obtained to help acquire proper fetal orientation.
2. FPSS 3a Figure 1c: after obtaining SSFSET2 images of the fetus, an axial SSFSET2 of the fetal head is obtained to help acquire proper fetal orientation.
3. Maternal coronal plane (figure 1d) or (figure 1g) or (figure 1h) or (figure 1i): after obtaining SSFSE T2 images of the maternal head, an axial SSFSE T2 of the fetal head is obtained to help acquire proper fetal orientation.

DIFFUSION

Diffusion weighted images can be used to evaluate the diffusion properties of water in the brain. This is useful for identifying areas of injury or disease.

Table 2: Fetal MR Imaging Parameters

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Parameters</th>
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<tbody>
<tr>
<td>SSFSE</td>
<td>Field of view: 400 x 400</td>
</tr>
<tr>
<td>Balanced sequence</td>
<td>Matrix: 256 x 192</td>
</tr>
<tr>
<td>Hydrography</td>
<td>NEX: 1</td>
</tr>
<tr>
<td>Hydrography</td>
<td>TR: 4.0</td>
</tr>
<tr>
<td>Hydrography</td>
<td>TE: 1.0</td>
</tr>
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REFERENCES


INTERPRETATION AND COUNSELING

A check list helps assure all MR information is reviewed.

Checklist

- The BRAIN images are useful for the evaluation of the lower and midcerebral, as seen in SPGR T1 and T2, since they are high signal compared to subcortical structures. 3. This is especially true for assessment of tumors and hemorrhage in pregnancy, as well as potential teratogenic effects. 4. The BRAIN T1 and T2 images are useful for evaluation of the lower and midcerebral, as seen in SPGR T1 and T2, since they are high signal compared to subcortical structures. 5. This is especially true for assessment of tumors and hemorrhage in pregnancy, as well as potential teratogenic effects.

ACKNOWLEDGMENTS

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Online interactive version will be available on SPR web site.