

Placental infarction in fetal MRI: value of flow voids between the uterus and the placenta

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INTRODUCTION:

Fetal MR imaging is increasingly used as a complementary tool to obstetric ultrasonography (US) in selected cases to specify deformity or to verify equivocal findings as seen at US. Doppler US can help tailor the timing of delivery of fetuses with growth restriction; however, they may be too insensitive to detect placental infarction. Despite the fact that MR imaging helps delineate the morphologic alterations of the placenta with appropriate conspicuity during gestation and is of use in the study of placental invasion, few studies have addressed the functional properties of the placental vasculature (1, 2). We hypothesized that evaluating flow voids on T2-weighted RARE images can be used as an additional information to identify placental infarction in fetuses whose placental supply is substantially altered, leading to intrauterine growth restriction (IUGR). Thus, the purpose of this study was to evaluate value of diminished flow voids on T2-weight RARE MR imaging for diagnosing placental infarctions.

MATERIALS AND METHODS:

Thirty-eight fetuses (38 pregnant women) with abnormal findings at obstetric US underwent MRI that included T2-weight half-Fourier rapid acquisition with relaxation enhancement (RARE) (TR/TEeff, 1260/84) and T1-weighted fast low-angle shot (TR/TE, 85/4.76, flip angle = 70°) using a 1.5 T whole body scanner (Magnetom Vision; Siemens Medical System, Erlangen, Germany) with a phased array. Findings from histopathologic examination of the placenta were available in 23 fetuses. Eighteen of the 23 fetuses had infarctions in the placentas. Five of the 23 fetuses had normal placentas. The remaining 15 placentas were treated as normal, because the fetuses did not show signs of IUGR at obstetric US and were appropriate birth weight for gestational age. Two radiologists reviewed T2-weight RARE images for morphologic findings (signs of placental hypertrophy) and flow voids (FVs) between the uterus and the placenta. A thickened, globular placental appearance was diagnosed as positive signs of placental hypertrophy (3, 4). None or decreased size of flow voids between the uterus and the placenta was diagnosed as positive signs of diminished flow voids.

RESULTS:

Sensitivity, specificity, and accuracy with morphologic signs, diminished FVs, and morphologic signs plus diminished FVs in Table 1.

The use of diminished FVs in addition to morphologic signs increased sensitivity for the detection of placental infarction from 66.7% to 83.3%, increased accuracy from 81.5% to 86.8%, and preserved specificity at 90.0%.

CONCLUSION:

Evaluating flow voids on T2-weighted RARE images can be useful for detecting placental infarctions, particularly in placentas without morphologic signs on MR imaging.

Table 1 Sensitivity, specificity, accuracy with morphologic signs, diminished FVs, and morphologic signs plus diminished FVs

	morphologic signs	diminished FVs	morphologic signs + diminished FVs
Sensitivity	12/18 (66.7%)	9/18 (50.0%)	15/18 (83.3%)
Specificity	19/20 (95.0%)	19/20 (95.0%)	18/20 (90.0%)
Accuracy	31/38 (81.5%)	28/38 (73.7%)	33/38 (86.8%)

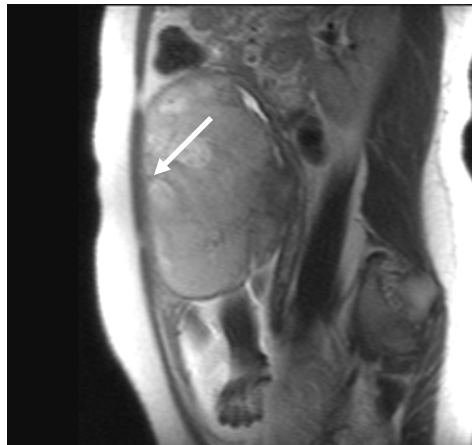


Figure 1 IUGR with morphologic signs and in diminished FVs a 23-year-old pregnant woman at 33 weeks gestation. T2-weighted RARE image shows the thick placenta and decreased size of flow voids between the uterus and the placenta (arrow)



Figure 2 Normal placenta. Fetus had a normal size for 34 weeks gestation and a normal weight at birth. T2-weighted RARE image shows the normal size of placenta and normal size of clear flow voids between the uterus and the placenta (arrows)

References

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