Placental Evaluation with Magnetic Resonance Imaging

Essay

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بسم الله الرحمن الرحيم

هُوَ الَّذِي يُصَوِّرُكُمْ فِي الْأَرْحَامِ كَيْفَ يَشَاء

لَا إِلَهَ إِلَّا هُوَ الْعَزِيزُ الْحَكِيمُ

سورة آل عمران

الآيه ٦

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Abdalla Elsadig Abdalla

Contents

List of Abbreviations

3-T .....3 Tesla system

ADC ..... Analog-to- Digital Converter

AP..... Abruptio Placenta

B0 ..... Constant Magnetic Field

CHM ..... Complete Hydatiform Mole

CSE ..... Conventional Spin Echo

CSF ..... Cerebrospinal Fluid

Di Di ..... Diamniotic Dichorionic

Di Mo ..... Diamniotic Monochorionic

DWI..... Diffusion Weighted Image

EPI\DWI.... Echo Planar Imaging\ Diffution Weighted Imaging

FGR..... Fetal growth retardation

FLAIR..... Fluid Attenuated Inversion Recovery

FLASH..... Fast Low Angle shot

FOV..... Field Of View

FSE..... Fast Spin Echo

GTN ..... Gestational Trophoblastic Diseases

HASTE ..... Half Fourier Single Shot Turbo Spin Echo

HM ..... Hydatiform Mole

ICO ..... Internal Cervical Os

IgG ..... Immunoglobuline G

IUFD ..... Intrauterine fetal death

IUGR..... Intrauterine Growth Retardation

MHz ..... Mega Hertz

Mo Mo ..... Monoamniotic Monochorionic

MRI..... Magnetic Resonance Imaging

MZ..... Monozygotic twins

PA..... Placenta Accreta

PACS..... Picture Archiving and Communication System

PADs ..... Placental Adhesive Disorders

PHM..... Partial Hydatiform Mole

PIAs..... Placental Implantation Abnormalities

PSTT ..... Placental Site Trophoblastic Tumor

PTL ..... Preterm labor

RF..... Radio Frequency

SE ..... Spin Echo

SPGR ..... Spoiled Gradient Recalled Acquisition

SSFP..... Steady State Free Percession

SSFSE ..... Single-Shot Fast Spin Echo

STIR..... Short T1 Inversion Recovery

SWI ..... Susceptibility-Weighted Imaging

T ..... Tesla

TE..... Time of Echo

TR ..... Time of Relaxation

True-FISP.. True- Fast Imaging with Steady Percession

UK..... United Kingdom

US..... Ultrasound

USG..... Ultrasonography

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Abstract

- Ultrasonography is the primary screening modality for the identification of abnormal placentation, but magnetic resonance (MR) imaging is a complementary imaging modality that is useful when ultrasonography is inconclusive.
- As most patients referred for placental evaluation with MR imaging have suspicious findings on ultrasonography, the pretest probability for abnormalities on MR imaging is high.
- Imaging features useful for the diagnosis of abnormal placentation include placental lobulation with uterine contour bulge, interruption of the inner low signal-intensity myometrial layer, and placental heterogeneity resulting from dark intraplacental bands and abnormal vascularity on T2-weighted imaging.
- Reliably differentiating placenta accreta from increta and placenta increta from percreta is difficult, and often not possible.
- Antenatal diagnosis of placental abnormalities is critical in aiding the referring clinician to avoid or mitigate potential complications.

Keywords

Placenta, Accreta, Increta, Percreta, Previa, Magnetic resonance

INTRODUCTION

Fetal development requires a sufficient interchange of oxygen and metabolites through the placenta during the whole duration of pregnancy. Adequate placental perfusion from the maternal and the fetal is a vital and essential prerequisite for the exchange **(Scholbach et al, 2012).**

Recently it is well understood that poor placentation occurs in a wider range of pregnancy complications. Complications such as:

- Preeclampsia
- Preeclampsia with fetal growth restriction
- Fetal growth restriction without hypertension
- Intrauterine fetal death
- Placental abruption and even preterm labor **(Kovo et al, 2013).**

Abnormal placentation is becoming more prevalent, largely attributable to increasing rates of cesarean delivery. Since of the possible parental complications are associated with some undetected placental abnormalities, there is a need for proper antenatal diagnosis **(Allen and Leyendecker, 2013).**

Morbidly adherent placenta comprises wide range of conditions manifested by an abnormal adherence of the placenta to the implantation site. The importance of prenatal detection of invasive-placentation relies on the fact that maternal morbidity has been revealed to reduction when these disorders are diagnosed prenatally, as it allows pre planned management of the condition **(Antonio et al, 2014).**

Placenta accrete, increta and precreta describe a continuum of placental attachment disorders associated with incomplete postpartum separation of the placenta and postpartum hemorrhage. During MR imaging assessment of suspected placenta accreta, other anomalies of the placental and umbilical cord might be identified, given their reported association with abnormal placentation. Disorders including placenta previa, velamentous cord insertion and vasa previa might be identified **(Allen and Leyendecker, 2013).**

Ultrasound is useful as the initial diagnostic imaging method throughout pregnancy because of its accessibility, portability and lack of ionizing radiation **(Masselli and Gualdi, 2013)**.

Ultrasound examination is important in the assessment of fetal growth and well-being and Doppler ultrasound is valuable in the assessment of placental perfusion. However, with ultrasound it is difficult to image the hall placenta

simultaneously and obtain accurate measurements of placental size **(Derwig et al, 2011).**

Prenatal (MRI), without the administration of contrast agents, is a non-invasive method which is capable to safely image the fetus and whole placenta with high resolution **(Derwig et al, 2011**)

Fetal MRI is considered to be safe and ultrafast MRI sequences, such as echo-planar imaging, are less sensitive to the artifacts caused by fetal motion **(Derwig et al, 2013).**

MR imaging offers superior soft tissue contrast resolution, multi – planer imaging capabilities and imaging quality independent of the mother's mass or fetus positioning and its absence of ionizing radiation. MRI can be of added diagnostic value when additional characterization is required **(Masselli and Gualdi, 2013)**.

Present data have not clearly documented any harmful effects of magnetic resonance imaging exposure on the intrauterine fetus. So no special precaution is recommended for the first, second or third, trimester in pregnancy **(Kanal et al, 2013).**