Role of Magnetic Resonance Imaging in the Antenatal Diagnosis of Placenta Accreta - A Case Report

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Abstract:

Placenta Previa (PP) is the abnormal presence of placenta in front of internal os and can be classified into three types (Marginal, partial and complete PP. Transabdominal ultrasound is an effective modality to evaluate PP. Placenta Accreta (PA) occurs when chorionic villi insert deep into the myometrium due to imperfection of decidua basalis. PA is classified on the basis of myometrial invasion. The mildest form of PA is placenta accreta Vera which is classified as attachment of chorionic villi to the myometrium but sparing the muscle. There are 10% chances of PA in women with the initial diagnosis of PP. Previous cesarean section and advanced maternal age are independent risk factors for this high-risk group. Undiagnosed PP is related to significant maternal mortality (up to 25%) and morbidity which occurs due to intrapartum hemorrhage, uterine rupture, abscess formation, and bladder and rectum invasion. The reliability of Brightness mode and color Doppler ultrasound varies widely in different studies for antenatal diagnosis of PA. Magnetic resonance imaging, with and without gadolinium contrast, has been scrutinized as the modality for the greater precision of the antenatal diagnosis of PA in recent times.

Objective:

To assess whether Magnetic Resonance Imaging is an effective modality to rule out placenta accreta, increta, or percreta antenatally.

Subject and Method:

Ultrasound and Magnetic Resonance Imaging (MRI) was performed on one pregnant female with PP prior to delivery. Delivery plan was made according to imaging suggestion of the degree of PP and presence/absence of PA. Findings at cesarean section were considered the gold standard of reference.

Conclusion:

MRI with ultrasound is important for the accurate diagnosis of PP and the seriously co-existing PA.

Key Words:

Magnetic Resonance Imaging, Placenta Previa, Placenta Accreta.

Introduction:

Placenta Previa is an abnormal presence of placenta in front of internal os. Transabdominal ultrasound is an effective modality to evaluate PP.[1-3] PA occurs when chorionic villi insert deep into the myometrium due to imperfection of decidua basalis. PA is classified on the basis of myometrial invasion. The mildest form of PA is placenta accreta Vera which is classified as attachment of chorionic villi to the myometrium but sparing the muscle. Placenta increta is classified as chorionic villi partially invading the myometrium but sparring the Perimetrium. Placenta percreta is the most Severe form, in which the chorionic villi invadedeep into the entire myometrium or beyond the perimetrium.[4-6]

There are 10% chances of PA in women with the initial diagnosis of PP. Previous cesarean section and advanced maternal age are independent risk factors for this high-risk group.[7-9] Undiagnosed PA is related to significant maternal mortality (up to 25%) and morbidity which occurs due to intrapartum hemorrhage, uterine rupture, abscess formation, and bladder and rectum invasion.[10-12]

It was difficult to diagnose PA antenatally, and the precision of sonography and MRI techniques remains in question. The reliability of Brightness mode and color Doppler ultrasound varies widely in different studies for antenatal diagnosis of PA.

Magnetic resonance imaging, with and without gadolinium contrast, has been scrutinized as the modality for the greater precision of the antenatal diagnosis of PA in recent times.[13-15] Our study aimed to detect if there is a need for MR imaging in the evaluation of case with high risk of PA.

Case Report:

A pregnant female patient had been observed for PP. She was at increased risk of PA regarding her medical history, Maternal Age >30years, Grand Multiparity, Previous leprotomy (e.g. cesarean sections).

Method:

The case was subjected to Magnetic Resonance Imaging of the pelvis prior to delivery (> 32 weeks gestation).

Presentation:

Pelvis MRI was performed for this case using a 1.5T (Multiva, Philips Medical System, Pakistan) MRI. Provisional diagnosis was PP made via ultrasonography. MRI was done in this case of PP to find more accurate place of placental localization, type of Previa and to evaluate radiological sign of placental invasion even if preliminary ultrasound is negative. Patient was imaged in the supine position using Pelvic Phased-Array Coil. T2-Short T1 Inversion Recovery- fast spin echo (STIR): TE 110 ms, TR 4000 ms in the sagittal and coronal planes using 384 × 320 matrix as shown in figure1.
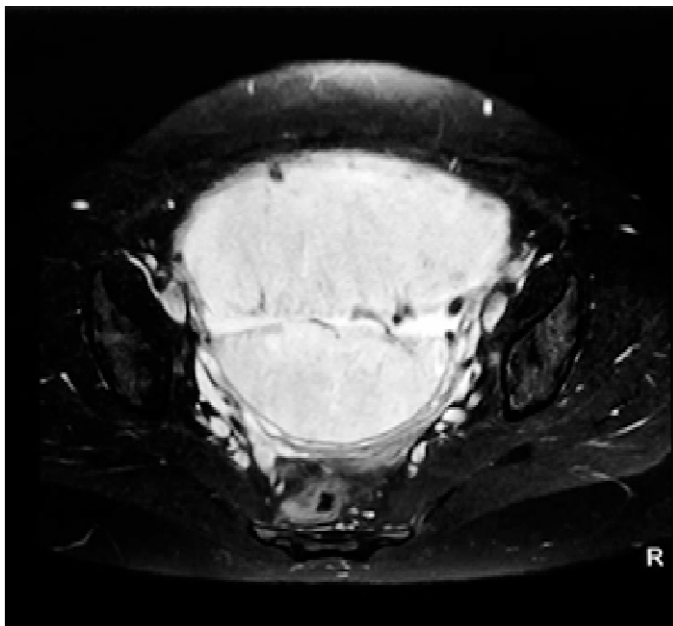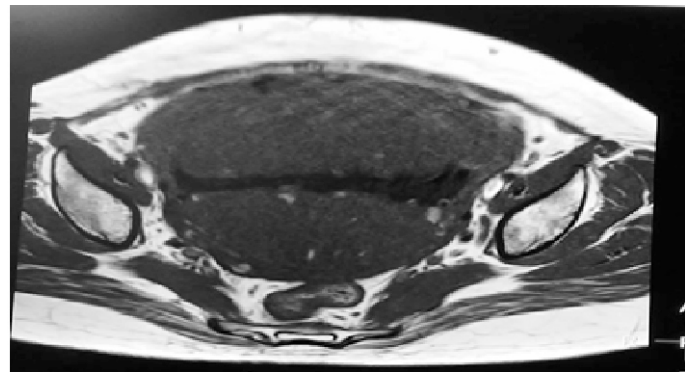

Figure 2: T1 weighted :TR: 735 ms TE:20 ms FOV :400*400

The Maternal pelvis was scanned by:

1. T1 weighted :TR: 735 ms TE:20 ms FOV :400*400 as shown in figure 2.

2. T2 weighted: TE 95 ms TR:800ms matrix 420*400 as shown in figure 3.

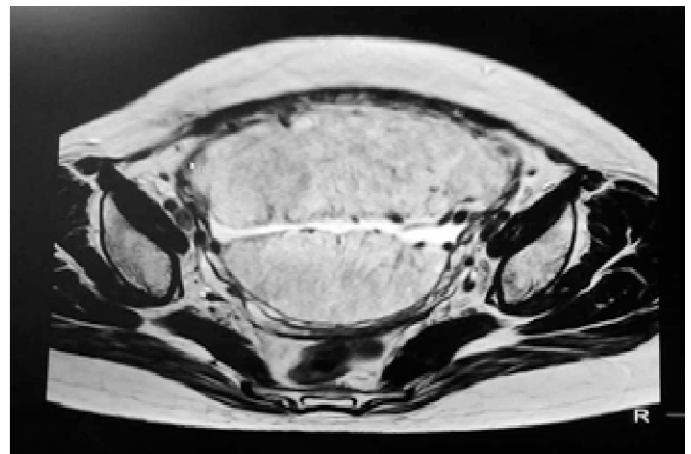**3.** T2 weighted sagittal image showing Placenta Previa as shown in figure 4.

Figure 3: T2 weighted: TE 95 ms TR:800ms matrix 420*400

Figure 1: STIR: TR: 4000 ms TE:110 ms all fat tissue is suppressed
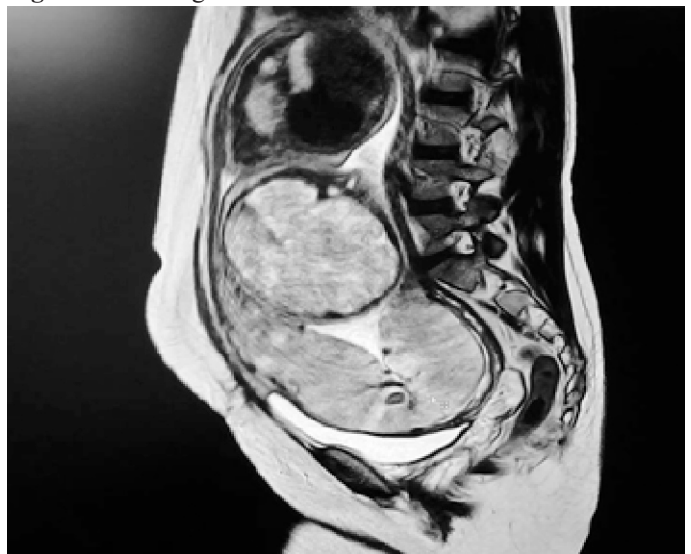

Figure 4: T2weighted sagittal image showing Placenta Previa

For all the aforementioned sequences slice thickness = 6-7 mm with 1 mm gap, flip angle = 90° and FOV = 390 – 410 mm.Sequences 1 and 2 were performed with respiratory triggering to control maternal and fetal motion artifacts. Total scanning time was 32 min.

Discussion:

Placenta accreta secondary to placenta previa is associated with high maternal morbidity, there are also indistinguishable neonatal outcome collated with patients with an isolated PA.[16-18] Teo *et al*., had only described the MRI features of suspected placental invasion in a limited retrospective review which included seven patients who are suspicious for placental invasion on ultrasound findings. They had informed that the described imaging features are handy in evaluating the depth and presence of placental invasion.[19]

The current case study was used to determine the need of MR Imaging in the radiological diagnosis of PA. According to previous studies the average Sensitivity and Specificity of MRI was 93.3% and 85% in their ability to diagnosis PA. A recent study done in 2008 showed that MRI had sensitivity of 80% and specificity of 65%.[20] The specificity of the MRI was higher in our study. Concerning MRI, spin echo sequences were performed with controlled mother apnea, such an option had provided images of better resolution and very few motion artifacts caused by fetal body motion and maternal bowel peristalsis and respiration. Diagnostic study also relied upon different sequences (T2WI FSE, T1WI SE,and TSW1STIR) in different orientations (axial, coronal and sagittal) to evaluate placental grading and stage of Previa.

In this study we had relied upon spin echo sequences in evaluating placental invasion to the myometrium or beyond as follows: T2- weighted images helped in distinguishing placental bulk from the inner and outer myometrium which is of more intermediate signal intensity, T1-weighted images had shown distended tortuous placental/ myometrial vessels as clustered bright signal intensities which are probably due to blood stagnation especially in the pelvic and lower limb vessels accompanying pregnancy. The interface between the urinary bladder and the myometrium was also more clarified at T1W weighted sequence

T2-weighted images may show overestimation of percreta, in such a case we had used T1-weighted sequence to see the disruption of the fat plane overlying the uterine serosa. If the clinical symptomse.g. stiffness at pelvic examination, micturition or defection problems) go with possible invasion then the final diagnosis had to suggest percreta for the sake of the patient.

The limitation of spin echo sequences with respiratory triggering is a long examining time provided that the FOV is wide (to cover as much as area of the gravid uterus) with large number of slices. Each sequence takes about 3:30 min duration if pelvic phased array coil was used (the condition in our study) and if the body coil is not used the time reaches up to 13 min (the latter option was experienced once but was not actually performed in the study). T2 weighted Short T1 Inversion Recovery Sequences (T2-STIR)are the most widely used sequences in placental and fetal MRI. Both sequences cover large FOV (the whole gravid uterus) in a short time with no considered image aliasing and better co-assessment of fetal anomalies. Short Time Inversion Recovery (STIR) suppresses signals from the fat and enhancing the signals from the fluids (like T2-weighted sequences). In the current study, STIR was a fast sequence acquired during free maternal breathing in most cases, but our focus was the placental implantation and its relation to the myometrium. By using such a sequence we can easily distinguish the placenta from the myometrial bulk.

Conclusions:

The current study includes a single case of Placenta Previa at increased risk of the serious co existing Placenta Accreta. MRI with ultrasound is important for the accurate interpreting the localization and invasion of placenta. Co-operation of both modalities may provide more diagnostic information. The use of MR imaging in the routine evaluation of patients with PP may reduce hospital stays and unnecessary interventions with favorable outcome.

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