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Performance comparison of ultrasonography and magnetic resonance imaging in their diagnostic accuracy of placenta accreta and increta

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Introduction

Placenta accreta spectrum (PAS) disorders, including placenta accreta and increta, are associated with significant maternal morbidity and mortality due to abnormal placental adherence. Accurate prenatal diagnosis is essential for planning appropriate management and reducing obstetric complications. While ultrasonography is the primary imaging modality used for screening, magnetic resonance imaging (MRI) is often employed as a complementary tool, particularly in complex cases. This study aims to compare the diagnostic performance of ultrasonography and MRI in detecting PAS and to identify the most predictive imaging features associated with placental invasion.

Objective

To assess the diagnostic precision of ultrasonography and magnetic resonance imaging (MRI) in identifying placenta accreta/increta, and to determine the most significant and specific ultrasonographic and MRI characteristics that may indicate placental invasion.

Methods

We retrospectively reviewed the medical records of all patients referred for suspected placenta accreta to one university hospitals from 01/2016 to 12/2021. Our study population included 12 pregnant women who had been investigated by both ultrasonography and MRI.

Results

- Among the 12 patients who underwent placental MRI for suspected placenta accreta, a discrepancy between MRI and ultrasound findings was observed in 8 cases.
- In 3 patients, MRI excluded the diagnosis of placenta accreta. (Table I)
- In 5 cases, MRI suggested placenta increta or percreta, whereas ultrasound had concluded with a diagnosis of non-percreta placenta accreta.
- The final histopathological diagnosis confirmed either placenta accreta or increta.
- These findings indicate that, in our study, **MRI tended to overestimate the risk of placental invasion. (Table II)**
- Sensitivity in the diagnosis of placenta accreta was 85,7% with ultrasound and 75% for MRI (P=0.03).
- Specificity was 66,7% with ultrasonography and 33,3% for MRI (P=0.6).
- The features of greatest sensitivity on ultrasonography were disruption of the hyperechoic zone at the interface between the uterine serosa and the bladder and increased vascularization at the uterovesical interface (95,7%).
- At MRI, loss of continuity in the myometrial-placental interface (T1 hypointense line) had the best positive predictive value (94,7%).
- The combination of two signes improved the predictive value to 94,2%.

Conclusion

- In this group of patient (placenta accreta/increta), **ultrasound demonstrated superior performance in the prenatal diagnosis of placenta accreta/increta.**
- The difference in the area under the ROC curves (AUC) favored ultrasound.

Table I: Distribution of Patients According to placental MRI, and Final Histopathological Diagnosis

Case No.	Ultrasound Diagnosis	MRI Diagnosis	Final Anatomical Diagnosis
1	Accreta (5 signs)	Accreta (3 signs)	Accreta
2	Accreta (2 signs)	Increta (2 signs)	Accreta
3	Accreta (2 signs)	Accreta (2 signs)	Increta
4	Accreta (4 signs)	Accreta (3 signs)	Accreta
5	Accreta (4 signs)	Accreta (4 signs)	Accreta
6	Accreta (4 signs)	Percreta (3 signs)	Increta
7	Accreta (3 signs)	Percreta (5 signs)	Increta
8	Accreta (5 signs)	Percreta (5 signs)	Accreta
9	Accreta (3 signs)	Increta (4 signs)	Increta
10	Accreta (3 signs)	No accreta	Accreta
11	Accreta (4 signs)	No accreta	Accreta
12	Accreta (2 signs)	No accreta	Increta

Table II: Comparison Between Prenatal Ultrasound, MRI Findings, and Final Anatomical Diagnosis

Case No.	Ultrasound Diagnosis	MRI Diagnosis	Final Anatomical Diagnosis
1	Accreta (5 signs)	Accreta (3 signs)	Accreta
2	Accreta (3 signs)	–	Partial Accreta
3	Accreta (4 signs)	–	Increta
4	Accreta (3 signs)	–	Accreta
5	Accreta (2 signs)	Increta (2 signs)	Accreta
6	Accreta (2 signs)	Accreta (2 signs)	Increta
7	Accreta (4 signs)	–	Accreta
8	Accreta (4 signs)	Accreta (3 signs)	Partial Accreta
9	Accreta (4 signs)	Accreta (4 signs)	Accreta
10	Accreta (4 signs)	Percreta (3 signs)	Increta
11	Accreta (3 signs)	Percreta (5 signs)	Increta
12	Accreta (5 signs)	Percreta (5 signs)	Accreta
13	Accreta (3 signs)	Increta (4 signs)	Increta
14	Accreta (3 signs)	No accreta	Accreta
15	Accreta (4 signs)	No accreta	Accreta
16	Accreta (2 signs)	No accreta	Increta