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MRI appearance of placenta percreta

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Introduction

Placenta percreta is the most severe form of placenta accreta spectrum (PAS), characterized by abnormal invasion of the placenta through the myometrium and sometimes into adjacent organs. While ultrasound is the first-line imaging modality, magnetic resonance imaging (MRI) provides superior evaluation of the depth and extent of invasion, particularly in complex cases. Identifying reliable MRI features is essential for accurate prenatal diagnosis and surgical planning.

Objective

Describe the magnetic resonance imaging (MRI) features of placenta percreta.

Methods

During the study period, from January 1, 2016, to December 31, 2021, we retrospectively reviewed MRI findings in eight cases of placenta percreta to determine features which assist in identifying the presence and extent of placental implantation abnormality. Pathologic correlation was available in all cases.

Results

- Sensitivity in the diagnosis of placenta percreta was 100% for MRI. Specificity was 50% for MRI. The features of greatest sensitivity on ultrasonography were abnormal heterogeneity of placental signal intensity on T2-weighted imaging and disruption of the myometrial-placental interface continuity (evidenced by a hypointense rim on T1-weighted imaging) 100%. At MRI, extension of placental tissue into adjacent organs (demonstrated by hypointense signal on T2-weighted imaging) had the best specificity (75%). (Table I)
- For these patients, the presence of more than three radiological signs (≥ 3 signs) was observed in six cases (75% of the cases). Only one patient exhibited two signs on placental MRI. (Table II)
- MRI demonstrated greater efficacy in the prenatal diagnosis of percreta placenta. Specifically, the area under the ROC curve was 0.623, with a minimum association of two MRI signs. (Table I)

Table I: Sonographic features in patients with placenta percreta

MRI signs	Sensitivity (%)	Specificity (%)	AUC
Abnormal bulging of the lower uterine segment	66.7	58.3	0.625
Heterogeneous placental signal intensity on T2 (Figure 1)	100	25.0	0.625
Intraplacental dark bands on T2	66.7	41.7	0.542
Loss of continuity of the myometrium–placenta interface (T1 hypointense band) (Figure 3)	100	41.3	0.708
Placental tissue extension into adjacent organs (T2 hypointensity) (Figure 2)	66.7	75.0	0.708

Table II: Distribution of sonographic features for patients with placenta percreta

Combination of signs	Sensitivity (%)	Specificity (%)	AUC
≥ 1 sign	25.0	91.4	0.582
≥ 2 signs	87.5	37.1	0.623
≥ 3 signs	62.5	37.1	0.498

Conclusion

- For patients with placenta percreta, MRI demonstrated superior performance in the prenatal diagnosis of PAS.
- The area under the ROC curve (AUC) was 0.623 when at least two MRI signs were present.
- MRI is useful for identifying the presence and extent of placenta percreta.

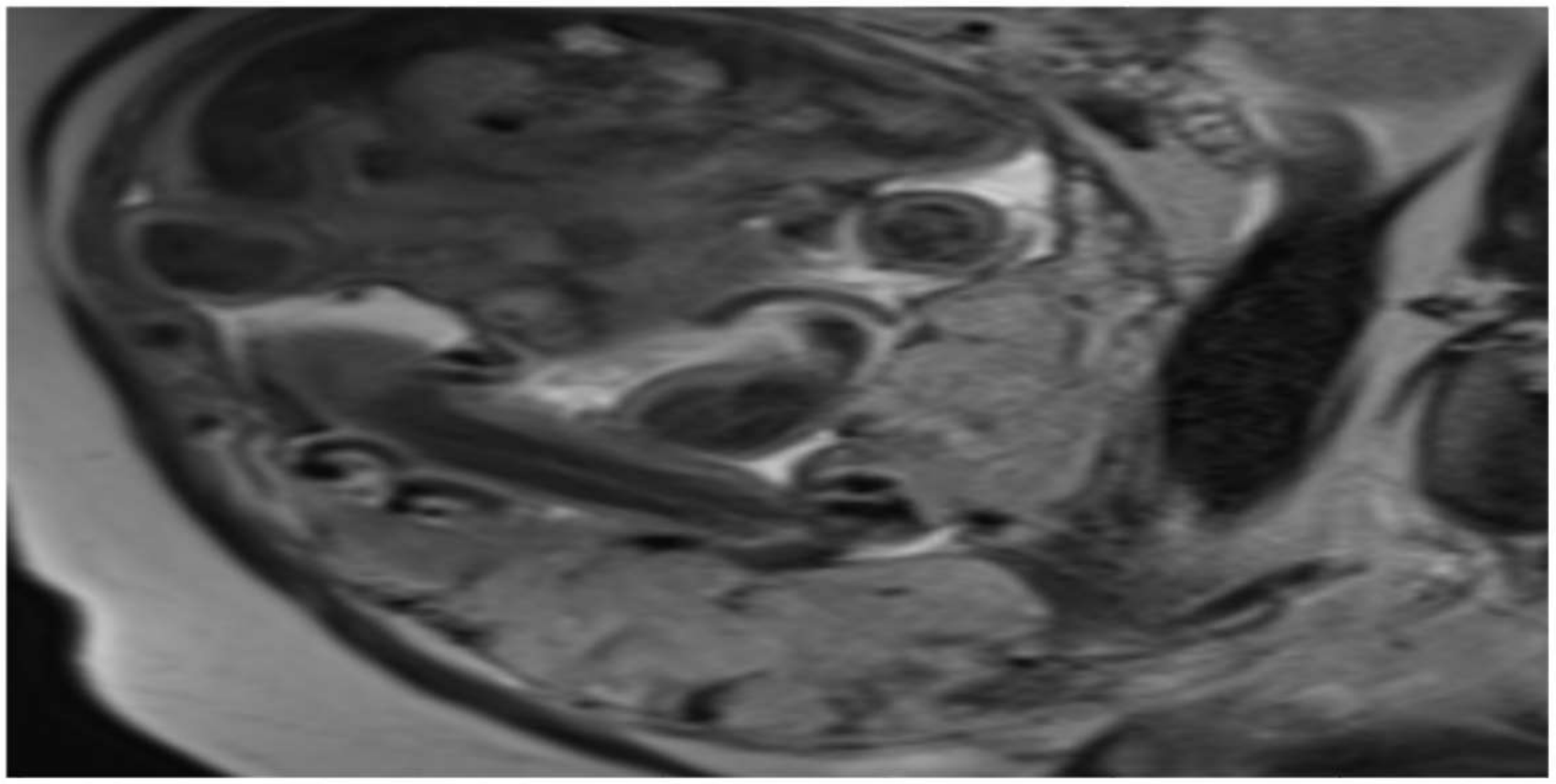


Figure 1: Sagittal T2-weighted MRI showing abnormal bulging of the lower uterine segment with heterogeneous placental signal intensity.

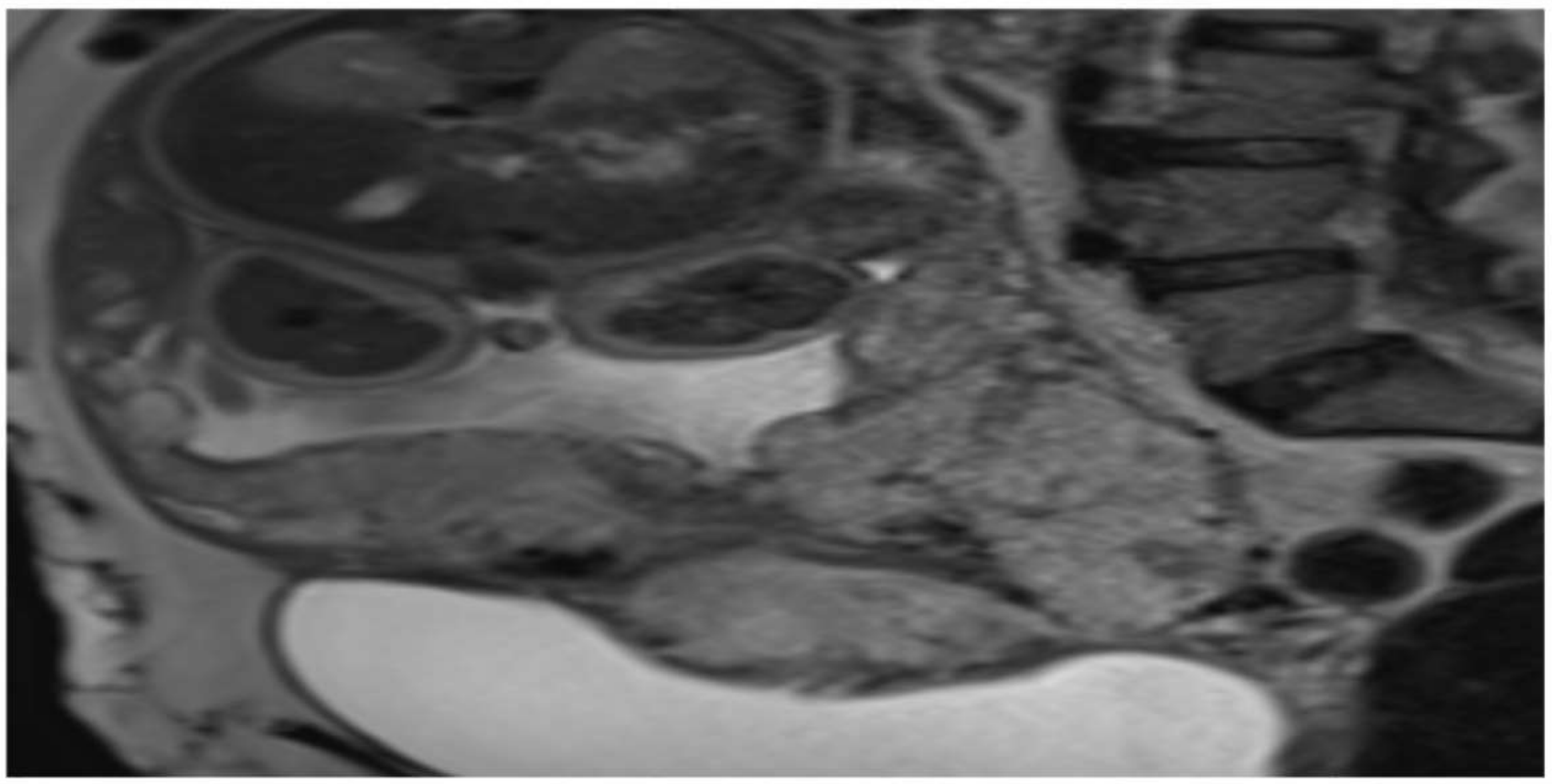


Figure 2: Sagittal T2-weighted MRI showing heterogeneous placental signal with loss of the myometrium–placenta interface and placental tissue extension into adjacent organs (T2 hypointensity), consistent with placenta percreta.

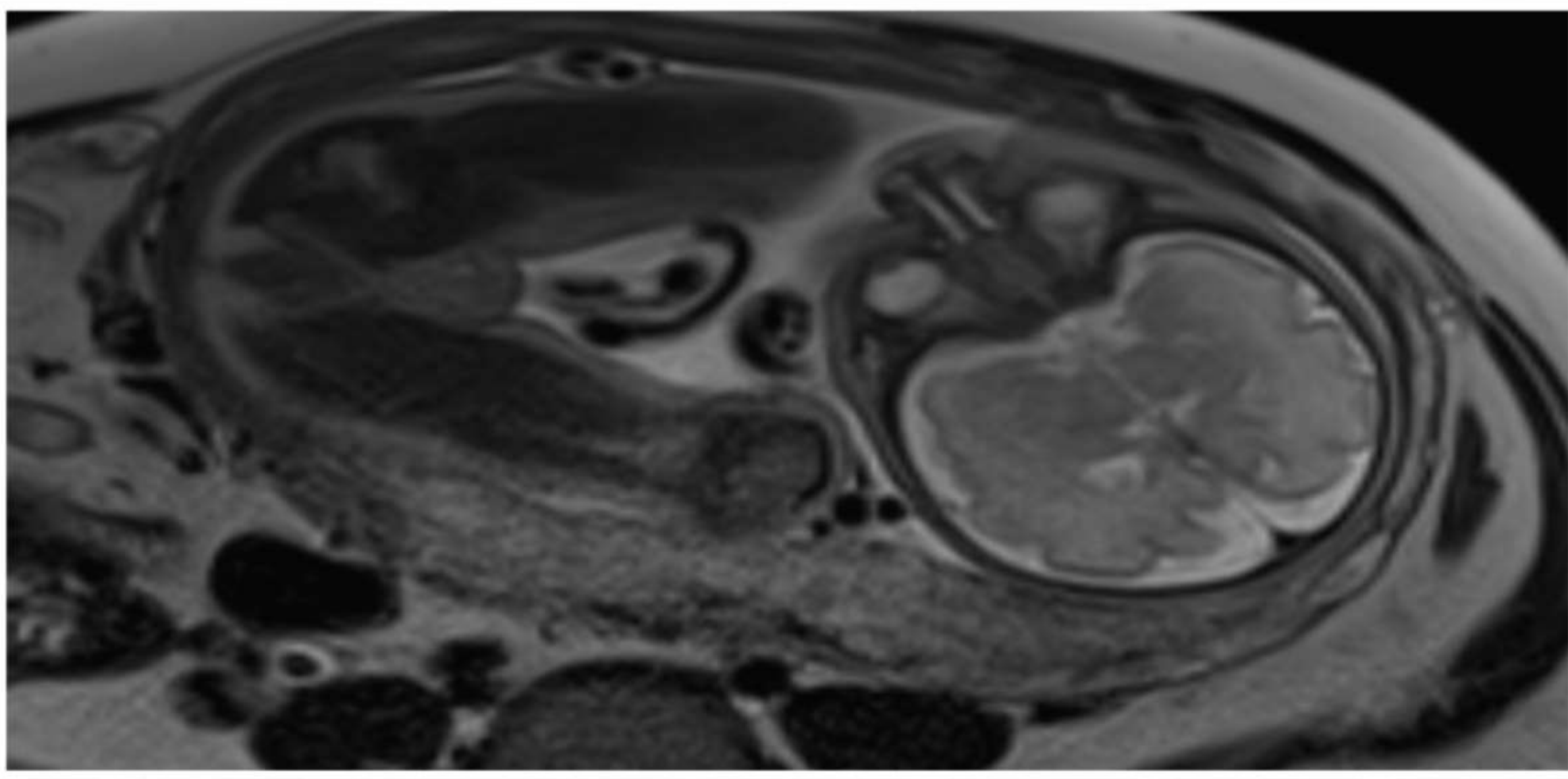


Figure 3: Axial T2-weighted MRI showing heterogeneous placental signal intensity with loss of the normal retroplacental clear zone.