



Concordance of Ultrasound and MRI Findings for Diagnosis of Placenta Accreta Spectrum

Harmehar Kohli, BA, Bijal Parikh, MD, Chaitali Korgaonkar-Cherala, MD, Tiffany Yang, MD, Emily Stetler, MD, Megan Gorman, MD, Diana Garretto, MD, David Garry, MD, Kimberly Herrera, MD, Cassandra Heiselman, DO, MPH

Department of Obstetrics & Gynecology, Stony Brook Hospital



Background and Introduction:

- Placenta accreta spectrum (PAS) is associated with increased risk of hemorrhage, length of hospital stay, hysterectomy, and maternal death.
- Early and accurate diagnosis of PAS is key for appropriate prenatal care and operative planning
- Although both prenatal ultrasound and MRI are used, the concordance of each imaging modality to each other and to placental pathology is unknown.

NORMAL PLACENTA VS. PLACENTA ACCRETA SPECTRUM (PAS)



NORMAL PREGNANCY

The placenta attaches to a temporary layer in the uterus that's shed at delivery



PLACENTA ACCRETA

When the placenta attaches too deeply into the uterine wall



PLACENTA INCRETA

When the placenta attaches into the uterine muscle



PLACENTA PERCRETA

When the placenta goes completely through the uterine wall, sometimes invading nearby organs like the bladder



Objectives

- What is the **concordance of ultrasound and MRI** for prenatal diagnosis of PAS?
- What **prenatal characteristics** were associated with **correct postnatal pathology**?

Methods:

- Retrospective cohort study
- Included women diagnosed with suspected antenatal PAS from January 2013 to December 2021 at a single academic institution
- Women were divided according to preoperative diagnosis: suspected abnormal placenta, focal accreta, accreta, increta, and percreta
- Maternal characteristics, clinical outcomes, imaging characteristics, and final placental pathology were abstracted from charts
- Statistical analysis included Fisher's Exact, Chi-square, and student t tests using SPSS with statistical significance of $p < 0.05$



Table 1. Antenatal Diagnosis versus Placental Pathology Diagnosis

Preoperative Diagnosis	Postoperative Diagnosis				
	Normal	Abnormal			
		Focal accreta	Accreta	Increta	Percreta
Suspected abnormal	1 (33.3)			1 (33.3)	
Focal accreta	5 (62.5)		1 (12.5)		
Accreta	7 (43.7)	1 (6.2)	5 (31.2)	2 (12.5)	
Increta			1 (11.1)	7 (77.8)	1 (11.1)
Percreta		1 (25.0)		2 (50.0)	1 (25.0)

Data presented as n(%)

*4 placental pathologies not collected

Results:

- 40 patients had a preoperative diagnosis of PAS
 - 3 (7.5%) suspected abnormal placentation
 - 8 (20.0%) focal accreta
 - 16 (40.0%) accreta
 - 9 (22.5%) increta
 - 4 (10.0%) percreta
- Correct diagnosis was associated with preoperative type of accreta (p=0.001) (Table 1)

Results:

- 11 (34.7%) patients had a correct preoperative diagnosis
- Women with increta or percreta were more likely to have concordant pathology (Figure 1)

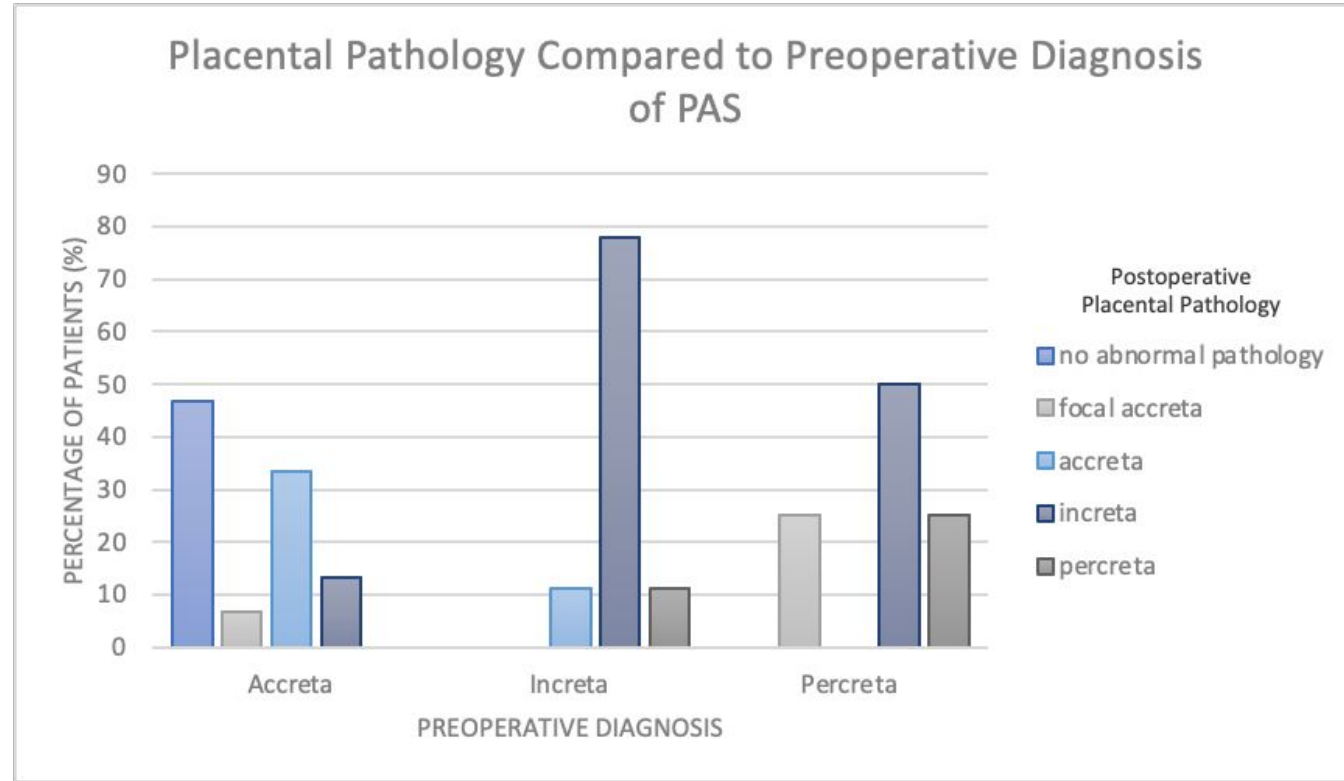


Figure 1. Placental Pathology Compared to Preoperative Diagnosis of PAS

Results:

- Maternal characteristics between persons with a correct versus incorrect preoperative diagnosis were similar except for parity and number of prior low transverse cesarean sections (Table 2)
- Correct diagnosis was associated higher parity ($p=0.03$) and higher number of prior LT cesareans ($p=0.03$)

Table 2. Maternal Characteristics and Correct Preoperative Diagnosis of PAS

	Correct Preoperative Diagnosis		
	Yes	No	p-value
Age (yrs.)	34.9 ± 4.7	34.9 ± 5.8	0.96
BMI (kg/m²)	33.2 ± 6.5	32.4 ± 5.8	0.63
Gravidity	4.6 ± 2.3	3.7 ± 1.8	0.11
Parity	2.5 ± 1.8	1.6 ± 1.2	0.03
Total no. prior of cesareans	1.9 ± 1.2	1.4 ± 1.0	0.06
No. of prior LT cesareans	1.8 ± 1.1	1.22 ± 1.0	0.03
Time from last cesarean (yrs.)	5.5 ± 1.1	5.2 ± 1.2	0.31
No. of prior D&C	0.5 ± 0.9	0.5 ± 1.0	0.89
Any maternal co-morbidity*	18 (72.0)	22 (52.4)	0.13

*Maternal comorbidities includes pregestational/gestational diabetes, chronic/gestational HTN, pre-eclampsia/eclampsia, asthma, CKD, cardiac disease, HIV, Other

**Data presented as n(%) or mean ± SD

Table 3. Placental Characteristics and Correct Preoperative Diagnosis of PAS

Results:

- No specific ultrasound finding were associated with accurate prenatal diagnosis, however MRI finding of uterine bulging was significantly predictive ($p=0.003$).
- Patients were more likely to have an incorrect preoperative diagnosis if they had normal placental location from os ($p=0.002$).

Correct Preoperative Diagnosis			
	Yes	No	p-value
Specific Ultrasound Findings			
Lacunar spaces	6 (27.3)	4 (22.2)	0.71
Loss of interface	6 (27.3)	8 (44.4)	0.33
Vascular invasion	2 (9.1)	1 (5.6)	1.00
Other	11 (50)	7 (38.9)	0.48
Specific MRI Findings (n=29)			
Intraplacental bands	4 (16.0)	6 (14.3)	1.00
Heterogeneity of signal	6 (24.0)	3 (7.1)	0.07
Uterine bulging	10 (40.0)	3 (7.1)	0.003
Other	9 (36.0)	7 (16.7)	0.09
Placental Location from Os			
Low lying	2 (8.0)	3 (7.7)	
Previa	19 (76.0)	14 (35.9)	
Not mentioned	4 (16.0)	22 (56.4)	0.002

Data presented as n(% within correct preoperative diagnosis)



Results

- 27.5 (11/40) patients had a discordance between MRI and ultrasound diagnosis
 - MRI was correct 82% (9/11) of cases
 - 6/11 had postoperative accreta for which MRI correctly diagnosed 66.7% (4/6) cases
 - 5/11 did not have postoperative accreta of which ultrasound incorrectly diagnosed accreta for all five (0%)
- Of those with discrepancy, MRI had a sensitivity of 100% and specificity of 71.4%



Results:

- Anterior placental location was the only factor associated with discordance between ultrasound and MRI findings ($p=0.026$) (Table 4).

Table 4. Placental Characteristics and Ultrasound/MRI Discordance

Ultrasound/ MRI Discordance			
	Yes	No	p-value
Placental Location			0.026
Anterior	10 (90.9)	17 (68.0)	
Posterior	0 (0)	8 (32.0)	
Lateral	1 (9.1)	0 (0)	

Data presented as n(% within MRI and Ultrasound discrepancy)



Conclusion:

- A positive MRI and positive ultrasound were both significantly correlated with correct preoperative diagnosis ($p < 0.001$).
- In cases of discordance between MRI and ultrasound findings, MRI was more likely to have an accurate prenatal diagnosis
- High but variable rate of accuracy between preoperative imaging findings of PAS and postoperative placental pathology
- Preoperative findings of increta or percreta on imaging along with women with previa/low lying placenta were more likely have a correct preoperative diagnosis of PAS
- Further studies are warranted to explore whether prenatal MRI or ultrasound diagnosis were comparatively more predictive

Contact Information



Harmehar Kohli, Medical Student Class of 2023
Renaissance School of Medicine at Stony Brook University

harmehar.kohli@stonybrookmedicine.edu

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