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HISTOPATHOLOGICAL CORRELATION OF PLACENTA ACCRETA SPECTRUMWITH CLINICAL AND INTRAOPERATIVE FINDINGS

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Abstract

Background: Placenta accreta spectrum (PAS) comprises abnormal placental adherence and/or invasion and is associated with major maternal morbidity, especially obstetric hemorrhage, transfusion and urinary tract injury. Antenatal imaging is central to diagnosis and operative planning, while histopathology provides tissue-based confirmation when hysterectomy or uterine resection specimens are available.

Aim: To evaluate the histopathological spectrum of PAS and correlate pathological findings with antenatal imaging, risk factors and intraoperative findings in a 100-case cohort.

Methods: One hundred women with suspected or clinically diagnosed PAS who underwent cesarean hysterectomy or uterine resection were done. Maternal age, parity, previous cesareans, placenta previa/low-lying placenta, antenatal ultrasound/MRI impression, estimated blood loss, transfusion and urologic injury were recorded. Histopathology assessed the placental implantation site and depth of villous invasion. Descriptive statistics and cross-tabulation were used.

Results: Mean maternal age was 31.9 ± 5.0 years. Previous cesarean delivery occurred in 92%, placenta previa/low-lying placenta in 78%, and both in 74%. Antenatal imaging suspected PAS in 91%. Histopathology classified 34% as accreta, 42% as increta and 24% as percreta. Median estimated blood loss was 1800 mL. Packed red-cell transfusion occurred in 63%, massive transfusion (≥4 units) in 27%, and bladder injury in 12%. Percreta had the highest frequency of major blood loss, transfusion and bladder injury.

Conclusion: PAS demonstrates clinically meaningful correlation among antenatal risk factors, imaging, intraoperative severity and histopathological depth of invasion. Standardized pathology reporting complements multidisciplinary antenatal planning and allows clinicopathological audit.

Keywords: placenta accreta spectrum; placenta accreta; placenta increta; placenta percreta; histopathology; cesarean hysterectomy; placenta previa; obstetric hemorrhage

Introduction

Placenta accreta spectrum is characterized by abnormal placental implantation with varying degrees of adherence and invasion into the uterine wall. The spectrum includes accreta, increta and percreta, with increasing depth of villous invasion. Previous cesarean delivery and placenta previa are the major clinical risk factors.[1–6]

Severe PAS can cause massive obstetric hemorrhage, transfusion, coagulopathy, urinary tract injury and intensive-care admission. Antenatal diagnosis therefore permits planned delivery at an experienced multidisciplinary center.[1–5]

Ultrasonography is the primary imaging modality. Common signs include placental lacunae, loss or irregularity of the retroplacental clear zone, myometrial thinning, abnormal subplacental vascularity and abnormalities of the uterovesical interface. MRI is useful in selected cases when ultrasound is inconclusive or posterior/deep invasion requires further characterization.[2,7–10]

Histopathology provides definitive tissue-based evidence when hysterectomy or resection specimens include the implantation site. Accreta is characterized by abnormal attachment at the superficial myometrial interface, increta by villous invasion into myometrium, and percreta by extension through the myometrium to serosa or adjacent organs. Adequate sampling is essential because invasion may be focal.[11–16]

This study was designed as an OBG–Pathology collaborative study to correlate risk factors, antenatal imaging, intraoperative observations and final histopathological depth of invasion.

2. Aim and Objectives

Aim: To study the histopathological spectrum of PAS and correlate it with clinical, antenatal imaging and intraoperative findings.

- Describe demographic and obstetric risk factors.
- Determine the frequency of accreta, increta and percreta.
- Correlate antenatal ultrasound/MRI with histopathology.
- Correlate pathological depth with operative findings.
- Assess blood loss and transfusion by PAS subtype.
- Document bladder and ureteric injuries.
- Identify clinicopathological discordance.

3. Materials and Methods

3.1 Study design

Hospital-based observational clinicopathological study done on 100 PAS cases.

3.2 Setting and period

Department of Obstetrics & Gynaecology in collaboration with Pathology at a Maheshwara Medical College and Hospital in Telangana; from February 2023 – August 2023.

3.3 Sample size

100 cases.

3.4 Inclusion criteria

Suspected/confirmed PAS with cesarean hysterectomy or uterine resection and tissue submitted for histopathology; adequate clinical, imaging and operative records.

3.5 Exclusion criteria

No suitable tissue; hysterectomy unrelated to PAS without implantation-site assessment; incomplete records.

3.6 Clinical assessment

Age, parity, previous cesareans, previous curettage/myomectomy, placenta previa/low-lying placenta, bleeding, gestational age, ultrasound, MRI when performed, hemoglobin and planned multidisciplinary care were recorded.

3.7 Intraoperative assessment

Placental separation difficulty, abnormal placental bulge/hypervascularity, suspected invasion, bladder involvement, urologic assistance, estimated blood loss and blood-product transfusion were recorded.

3.8 Histopathology

Specimens were fixed in 10% neutral buffered formalin, grossly examined and routinely processed. H&E sections were evaluated for villous attachment/invasion, myometrial and serosal involvement and associated lesions.

3.9 Classification

Accreta: abnormal villous attachment at the superficial myometrial interface; increta: villi invading myometrium; percreta: invasion through full myometrium to serosa/adjacent organ.

3.10 Statistics

Mean ± SD or median/IQR for continuous variables and frequencies/percentages for categorical variables. Cross-tabulation was used.

3.11 Ethics

IEC approval and appropriate consent/waiver has been acquired and documented.

4. Results

The cohort contained 100 women. Mean maternal age was 31.9 ± 5.0 years and mean gestational age 35.1 ± 2.1 weeks. Previous cesarean delivery was present in 92%, placenta previa/low-lying placenta in 78%, and both risk factors in 74%. Histopathology demonstrated accreta in 34, increta in 42 and percreta in 24 cases.

Table 1. Demographic profile (n=100)

Variable	Number (%) / value
Mean maternal age	31.9 ± 5.0 years
<25 years	6 (6%)
25–29 years	20 (20%)
30–34 years	39 (39%)
35–39 years	27 (27%)
≥40 years	8 (8%)
Mean gestational age	35.1 ± 2.1 weeks
Primigravida	2 (2%)
Multigravida	98 (98%)

Table 2. Major obstetric risk factors

Risk factor	Number (%)
Previous cesarean delivery	92 (92%)
1 previous cesarean	24 (24%)
2 previous cesareans	38 (38%)
≥3 previous cesareans	30 (30%)
Placenta previa/low-lying placenta	78 (78%)
Previous uterine curettage	31 (31%)
Previous myomectomy/uterine surgery	8 (8%)
Previous cesarean + placenta previa/low-lying placenta	74 (74%)

Table 3. Antenatal imaging findings

Finding	Number (%)
PAS suspected on ultrasound	91 (91%)
Placental lacunae	72 (72%)
Retroplacental clear-zone abnormality	68 (68%)
Myometrial thinning	64 (64%)
Bridging vessels/subplacental hypervascularity	58 (58%)
Uterovesical interface abnormality	39 (39%)
MRI performed	28 (28%)
PAS suspected on MRI	25/28 (89.3%)

Table 4. Histopathological classification

Diagnosis	Number (%)
Placenta accreta	34 (34%)
Placenta increta	42 (42%)
Placenta percreta	24 (24%)

Total	100 (100%)

Table 5. Intraoperative findings

Finding	Number (%)
Difficult placental separation/not attempted	88 (88%)
Placental bulge/lower-segment hypervascularity	71 (71%)
Dense bladder adhesions	46 (46%)
Gross invasion beyond myometrium suspected	28 (28%)
Bladder involvement suspected	13 (13%)
Urologist assisted	22 (22%)

Table 6. Maternal operative outcomes

Outcome	Number (%) / value
Median EBL (IQR)	1800 mL (1200–2800)
EBL <1000 mL	11 (11%)
EBL 1000–1999 mL	47 (47%)
EBL 2000–2999 mL	25 (25%)
EBL ≥3000 mL	17 (17%)
Packed RBC transfusion	63 (63%)
Massive transfusion ≥4 units RBC	27 (27%)
ICU admission	19 (19%)
Bladder injury	12 (12%)
Ureteric injury	2 (2%)
Re-laparotomy	4 (4%)

Table 7. Histopathological subtype versus estimated blood loss

EBL	Accreta	Increta	Percreta	Total
<1000 mL	8	3	0	11
1000–1999 mL	22	20	5	47
2000–2999 mL	4	15	6	25
≥3000 mL	0	4	13	17
Total	34	42	24	100

Table 8. Histopathological subtype versus transfusion

Transfusion	Accreta	Increta	Percreta	Total
None	18	16	3	37
1–3 units RBC	13	17	6	36
≥4 units RBC	3	9	15	27
Total	34	42	24	100

Table 9. Histopathological subtype versus bladder injury

Bladder injury	Accreta	Increta	Percreta	Total
Absent	33	39	16	88
Present	1	3	8	12
Total	34	42	24	100

Table 10. Imaging impression versus final diagnosis

Imaging	Accreta	Increta	Percreta	Total
PAS suspected	31	39	21	91
PAS not suspected	3	3	3	9
Total	34	42	24	100

Table 11. Clinicopathological concordance

Comparison	Concordant	Discordant	Concordance
Imaging vs PAS presence/absence	91	9	91%
Clinical/operative suspicion vs histology	89	11	89%
Operative depth impression vs histological depth	76	24	76%

The most severe morbidity occurred in the percreta group. Thirteen of the 17 cases with estimated blood loss ≥3000 mL were percreta, and 15 of 27 women requiring ≥4 units of packed red cells had percreta. Bladder injury was also concentrated in percreta (8/12 cases).

5. Discussion

Previous cesarean delivery and placenta previa are the dominant clinical risk factors for PAS. The 92% prevalence of prior cesarean and 78% prevalence of placenta previa/low-lying placenta in this series reflect the high-risk population in which targeted PAS screening is most important.[1–6]

Ultrasound suspected PAS in 91% of cases. Lacunae, retroplacental interface abnormalities, myometrial thinning and abnormal vascularity were the commonest signs, consistent with established ultrasound criteria.[2,7–10] MRI was used selectively and should be regarded as an adjunct rather than a universal replacement for expert ultrasound.

Histopathology demonstrated accreta in 34%, increta in 42% and percreta in 24%. Increasing invasion depth correlated with blood loss and transfusion. This is clinically plausible because deeper invasion is frequently accompanied by extensive neovascularization and distorted tissue planes.

Percreta was associated with the greatest operative morbidity, particularly major blood loss and bladder injury. Multidisciplinary PAS guidance recommends planned delivery at experienced centers with blood-bank, anesthesia, surgical and urologic resources appropriate to anticipated severity.[1–5,17–20]

Pathological confirmation depends on adequate sampling of the implantation site. Focal invasion may be missed in limited tissue, and the pathologist should be given placental location and operative findings to guide sampling. Standardized pathological classification improves communication and audit.[11–16]

Imaging and operative findings cannot always predict exact microscopic depth. Therefore, discordance should be expected in a subset of cases and should not be interpreted as failure of one specialty. The value of an OBG–Pathology study is precisely in documenting where clinical, radiological, operative and microscopic information agree or differ.

Conservative/uterus-preserving management is an option in selected cases but requires careful patient selection, specialist expertise and prolonged surveillance. The histopathological component of such cases varies depending on whether placental tissue is intentionally left in situ, limiting direct pathological classification.[18]

Overall, the findings support a multidisciplinary pathway in which OBG teams document risk factors and imaging, operative teams document anatomical severity and Pathology provides standardized tissue-based assessment when adequate specimens are available.

6. Strengths

- Direct OBG–Pathology collaboration.
- Standardized PAS depth classification.
- Correlation with blood loss, transfusion and urinary tract injury.
- Multiple clinically useful correlation tables.

7. Limitations

- Focal invasion may be missed when sampling is limited.
- Imaging was not independently re-reviewed by blinded expert radiologists.
- MRI was performed selectively.
- Rare complications are underpowered for statistical inference.
- Long-term maternal outcomes were not done.

8. Conclusion

Placenta accreta spectrum is a multidisciplinary obstetric and pathological condition. In this 100-case cohort, previous cesarean delivery and placenta previa/low-lying placenta were the principal risk factors. Increasing histopathological depth of invasion was associated with greater blood loss, transfusion and bladder injury, with the greatest morbidity in percreta. Antenatal imaging, operative assessment and histopathology should therefore be viewed as complementary components of diagnosis and quality improvement. Standardized pathological reporting is particularly valuable for documenting the final depth and focality of invasion and for clinicopathological audit.

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