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Comparison of Clinical Outcomes in Patients with a Pre-Operative vs Intrapartum Diagnosis of Placenta Accreta Spectrum: A Retrospective Cohort Study

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Introduction

Placenta accreta spectrum (PAS) disorders are an increasing obstetric complication globally. This is mostly due to the increase in the Caesarean section (CS) rate as the risk of PAS increases with the number of previous CS.[1, 2]

Operative complications of PAS include preterm birth, massive haemorrhage and hysterectomy, while evolving evidence shows that surviving PAS can be a traumatic event for patients.[3, 4]

Preoperative imaging with individualised tertiary obstetric ultrasound (US) +/- MRI is used to map expected abnormal placentation to surrounding structures to facilitate appropriate recruitment of multidisciplinary team (MDT) members, surgical logistics and resource utilisation, and to allow adequate patient counselling.

Current guidelines recommend all patients with a probable or confirmed diagnosis of PAS on ultrasound are reviewed and managed by an MDT.[3, 4, 5] The PAS team at King Edward Memorial Hospital is comprised of a MDT under whose care the patient is transferred to after diagnosis of PAS on antenatal imaging. This continuity of care model enables the patient to be appropriately antenatally optimised with an individualised plan for delivery based on their imaging findings and antenatal course.

Members of the team include a clinical psychologist, haematologist, radiologist, consultant sonologists and anaesthetists as well as clinical nurse specialists. It also includes obstetricians upskilled to specialise in complex pelvic surgery who are present at delivery of these patients, as well as being on call to attend when a patient with a PAS diagnosis (via pre-operative imaging or as an intraoperative finding) requires urgent delivery out-of-hours.

We hypothesise that accurate pre-operative diagnosis via tertiary medical imaging in patients with PAS improves their clinical outcomes (blood loss, blood product management, need for high level care and length of hospital inpatient stay).

Aim

Primary aim: To compare the clinical outcomes including blood loss, blood product management, need for high level care, length of hospital inpatient stay, for patients whose pre-operative tertiary imaging accurately diagnosed PAS, compared to those whose diagnoses was made intrapartum in a tertiary standalone maternity hospital.

Secondary aims: To assess the accuracy of tertiary pre-operative imaging in terms of diagnosis and extent of invasion compared to the intraoperative findings and histopathological diagnoses in patients with confirmed PAS.

Study Design

This was a retrospective cohort study of 107 patients suspected to have (PAS) via either antenatal imaging or intrapartum findings, with and without pre-operative medical imaging at King Edward Memorial Hospital from January 2018 – December 2024. Institutional ethics approval was granted via GEKO 56657.

Statistical methods

Descriptive summaries were median, interquartile range (IQR) and range (R) for continuous data, and frequency distributions for categorical data. Comparisons of continuous outcomes were conducted using Mann-Whitney tests and comparisons of categorical outcomes were made using Chi-square or Fisher exact tests. Diagnostic accuracy of pre-operative tertiary medical imaging compared with surgical findings and placental histopathology in terms of severity and any diagnosis of PAS were presented. IBM SPSS version 29 statistical software was used for statistical analysis.

Results

Of 107 patients, 84 (78.5%) had a clinical intra-operative diagnosis of PAS, 8 (6.6%) of which were diagnosed exclusively intrapartum. Seventy-one (84.5%) had a concordant histopathological diagnosis of PAS.

Patients with an antenatal diagnosis of PAS were more likely to have the PAS team present (97.4% vs 62.5%, p=0.005) and had a reduced median total blood loss {antepartum and intra-partum}(2,000 vs 3,000ml, p=0.047) compared with patients who had an intrapartum PAS diagnosis.

Antenatal US accurately diagnosed the presence of PAS in 92.8% of patients with an operative clinical diagnosis. The extent of PAS invasion was correctly identified between 47.6-55.6% of these cases. Eighty-nine percent had placenta praevia in the index pregnancy and 89.3% had at least one previous CS. When including any history of previous uterine surgery as a risk factor, 97.6% reported this.

Antenatal US accurately diagnosed the presence of PAS in 92.9% of histopathologically confirmed PAS. The extent of PAS invasion was correctly identified between 27.6-34.5% of these cases. Ninety percent 90% had placenta praevia in the index pregnancy and 92.9% had at least one previous CS. When including any history of previous uterine surgery as a risk factor, 100% reported this.

- **Antenatal ultrasound accurately diagnosed PAS in 92% of clinicopathologically and histopathologically confirmed cases**
- **Pre-operative diagnosis resulted in reduced median blood loss (2000 vs 3000mls, p=0.047)**

TABLE 1: Preoperative ultrasound findings compared to histopathological findings

	Histopathology findings*			
	No PAS* N=22	**Accreta N=13**	**Increta N=29**	**Percreta N=29**
	N (%)	N (%)	N (%)	N (%)
US findings (n=93)				
No PAS	3 (13.6)	4 (30.8)	1 (3.4)	0 (0.0)
Accreta	15 (68.2)	6 (46.2)	6 (20.7)	8 (27.6)
Increta	1 (4.5)	2 (15.4)	8 (27.6)	11 (37.9)
Percreta	3 (13.6)	1 (7.7)	14 (48.3)	10 (34.5)

*9 cases of no PAS likely had inaccurate histopathology as the maternal placental surface was incomplete.

TABLE 2: Preoperative US findings compared to operative clinical findings

	Operative findings			
	No PAS N=22	**Accreta N=26**	**Increta N=21**	**Percreta N=36**
	N (%)	N (%)	N (%)	N (%)
US findings (n=105)				
No PAS	8 (36.4)	4 (15.4)	2 (9.5)	0 (0.0)
Accreta	13 (59.1)	14 (53.9)	5 (23.8)	9 (25.0)
Increta	0 (0.0)	5 (19.2)	10 (47.6)	7 (19.4)
Percreta	1 (4.5)	3 (11.5)	4 (19.0)	20 (55.6)

TABLE 3: Clinical outcomes by pre-operative and intraoperative diagnosis of PAS

Characteristic	Pre-operative PAS diagnosis N=76	Intraoperative PAS diagnosis N=8	p-value
Gestational age (w) (median, IQR, R)			
At diagnosis	30.3 (24.2-34.1; 18.0-36.3) N=17	N/A	Not tested
At delivery	34.7 (32.5-36.1; 17.0-37.9)	36.6 (31.1-37.6; 28.6-38.0)	0.244
Delivery (n,%)			
In hours	65 (85.5)	6 (75.0)	0.603
Out of hours	11 (14.5)	2 (25.0)	
PAS team present	**74 (97.4)**	**5 (62.5)**	**0.005**
Total blood loss (ml) (median, IQR, R)	**2000 (1225-2711; 500-7000)**	**3000 (1975-6300; 1000-7800)**	**0.047**
Operative blood loss (ml) (median, IQR, R)	2000 (1000-2500; 500-7000)	2750 (1350-4550; 1000-7800)	0.131
Blood products given	43 (56.6)	6 (75.0)	0.459
PRBC transfused	34/43 (79.1)	6/6 (100.0)	0.341
Cell salvage process	63 (82.9)	6 (75.0)	0.629
Cell salvage transfer	58/63 (92.1)	6/6 (100.0)	1.000
Admission to ASCU, HDU or ICU	76 (100.0)	7 (87.5)	0.095
Length of postpartum stay in ASCU, HDU or ICU (d) (median, IQR, R)	2 (1-4; 1-10)	2 (R:1-5) N=7	0.845
Length of postpartum hospital stay (d) (median,IQR,R)	6 (5-7; 2-18)	6 (4-8; 3-8)	0.766

PAS-placenta accreta spectrum, PRBC-packed red blood cells, ASCU-adult special care unit, HDU-high dependency unit, ICU-intensive care unit.

Discussion

In concordance with current literature our study found all patients with a clinical or histopathological diagnosis of PAS had a history of previous uterine surgery.[3,6]

Our clinical findings diagnosed more severe grades of PAS compared to their histopathology which is also reflected in the literature.[6] The clinical findings were also more in keeping with pre-operative US findings.

The sensitivity of antenatal tertiary ultrasound was 92% for confirming the presence of PAS (whether diagnosis was histopathological or intraoperative). The extent of invasion was less sensitive to antenatal tertiary imaging making it difficult to predict which is in keeping with current literature.[7]

The PAS team was present at delivery in almost all antenatally confirmed cases as this formed part of their planned care. Reduced total blood loss being statistically significant in patients with pre-operative diagnosis is likely associated with the PAS team specifically upskilling their surgeons in view of the evidence that the extent of invasion may be more severe than predicted on imaging.[7] This agrees with current evidence that patients with antenatal suspicion of PAS have better clinical outcomes under the care of a specialist PAS MDT.[4, 6, 8]

Admission rates to ASCU/HDU/ICU postpartum were higher in patients with a pre-operative diagnosis compared to an intrapartum diagnosis as this was a routine part of their delivery planning, regardless of their clinical status at the end of their delivery.

The strengths of the study include that it was a single centre study where cases were managed by a dedicated PAS team.

There are several findings that are not statistically significant in this study including gestational age at delivery, blood products given, length of postpartum hospital stay. This is likely due to low case numbers. We were unable to access contemporaneous data from other units to compare outcomes. An ongoing prospective study may provide further evidence supporting this.

Conclusion

Antenatal tertiary imaging identification of PAS facilitates the deployment of appropriate staff and resources and reduces haemorrhage volume. Whilst accurately diagnosing the presence of PAS, difficulties appreciating the extent of invasion still exist. This supports the presence of an experienced team who can respond to more extensive disease. This research adds further evidence supporting the formation of a dedicated multidisciplinary PAS teams at other maternity units with a similar model of care.

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