



**Assessment of Maternal and Fetal Outcome in Patients with Placenta Accreta Spectrum Disorders**

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**Abstract**

**Introduction:** Placenta accreta is a clinical condition when part of the placenta or the entire placenta, invades and is inseparable from the uterine wall and accounts for a large percentage of maternal morbidity and mortality due to haemorrhage as a major complication. There is strong association between placenta previa, placenta accreta and prior caesarean section.

**Aims & Objectives:** To assess intraoperative procedure, management, post-operative complications among patients of placenta accreta spectrum disorders.

**Material & Methods:** It is a hospital based cross sectional study conducted prospectively in the Department of Obstetrics and Gynaecology, Gandhi Medical College, Bhopal for 18 months in all patients with Placenta Accreta Spectrum disorders.

**Result:** On comparing intraoperative findings, cases with placenta accreta had more operative time, blood loss, requirement of hysterectomy. Maternal drop in haemoglobin after surgery, postoperative hospital stay, ICU admission and blood requirement were more. Fetal and neonatal outcomes were not significantly affected by placenta accreta.

**Conclusion:** On comparing the fetomaternal outcomes in patients with the placenta accreta, we conclude that this condition adversely affects and is associated with maternal morbidity and mortality while fetal outcomes are not affected by this condition directly.

**Keywords:** Placenta Accreta Spectrum, Haematologists, Uterine Surgeries

## Introduction

Placenta Accreta Spectrum (PAS) is a severe obstetric condition characterized by abnormal placental invasion into the myometrium, often leading to life-threatening complications. It encompasses three categories: placenta accreta (superficial invasion), placenta increta (deep myometrial invasion), and placenta percreta (penetration beyond the uterine serosa and into adjacent organs). The incidence of PAS has risen significantly in recent decades, largely due to the increasing rate of cesarean deliveries, which is a major risk factor.

PAS arises due to defective decidualization at the endometrial-myometrial interface, often at sites of previous uterine trauma, such as cesarean scars, uterine surgeries, or curettage. This pathological adherence prevents normal placental separation following delivery, leading to severe hemorrhage, which poses substantial risks for maternal morbidity and mortality. Early diagnosis and meticulous surgical management are crucial to optimizing outcomes for affected women.

Clinical detection of PAS remains challenging. While ultrasound and magnetic resonance imaging (MRI) are valuable diagnostic tools, many cases are only identified intraoperatively. Management strategies range from cesarean hysterectomy—considered the definitive treatment—to conservative approaches aimed at preserving fertility. Emerging interventions, such as uterine artery embolization and the Triple-P procedure,

have shown promise in mitigating hemorrhage and reducing the need for hysterectomy.

Given the increasing prevalence and high-risk nature of PAS, a multidisciplinary approach involving obstetricians, anesthesiologists, hematologists, and neonatologists is essential. This study aims to evaluate the demographic characteristics, clinical presentations, management strategies, and maternal-fetal outcomes associated with PAS disorders, contributing to the growing body of evidence that informs best practices for diagnosis and treatment.

## Material and Methods

**Study Design:** A single centre, hospital-based, cross-sectional observational study conducted at the Department of Obstetrics & Gynecology at Gandhi Medical College, Bhopal (M.P.), India.

**Ethical Clearance:** The study protocol was reviewed and approved by the Institutional Ethics Committee before initiation. Voluntary written informed consent was obtained from all participants or their legally acceptable representatives.

**Study Duration:** The study was conducted over a period of 18 months, starting from the approval of the Institutional Ethics Committee.

**Study Outcomes:** The primary outcome measures included intraoperative management strategies, postoperative complications, and maternal outcomes associated with Placenta Accreta Spectrum (PAS) disorders.

**Definition of the Exposure/Intervention:** PAS was defined based on the depth of placental invasion, categorized as placenta accreta, increta, or percreta. Surgical interventions included cesarean section, cesarean hysterectomy, and conservative management

techniques such as uterine artery embolization and balloon tamponade.

**Study Participants:** Pregnant women diagnosed with PAS, either antenatally through imaging (ultrasound/MRI) or intraoperatively during cesarean delivery.

#### **Inclusion Criteria**

- Women diagnosed with PAS disorder (placenta accreta, increta, or percreta).
- Women who provided voluntary written informed consent.

#### **Exclusion Criteria**

- Women with other causes of antepartum, intrapartum, and postpartum hemorrhage.
- Women or their legally acceptable representatives who did not provide consent.

**Sample Size:** A total of 50 women diagnosed with PAS were included in the study.

**Sampling Methodology:** Patients were selected based on hospital admissions for PAS disorders.

**Participant Recruitment and Obtaining Informed Consent:** Women diagnosed with PAS disorders were recruited from hospital admissions after obtaining informed consent. All participants received detailed information about the study, its risks, benefits, and data collection procedures before signing the consent form.

**Data Collection Procedure:** The data collection for this study was carried out systematically to ensure accuracy and reliability. The process involved multiple stages, including patient identification, clinical assessment, diagnostic evaluation, intraoperative observations, and postoperative follow-up.

- Women diagnosed with Placenta Accreta Spectrum (PAS) disorders were identified from hospital admissions at Gandhi Medical College, Bhopal.

- Both antenatal cases (diagnosed via ultrasound/MRI) and intraoperative cases (diagnosed during cesarean section) were included in the study.
- Eligibility was determined based on the inclusion and exclusion criteria.
- Eligible patients were provided with detailed information about the study objectives, procedures, and potential risks before obtaining voluntary written informed consent.
- A structured proforma was used to collect sociodemographic data (age, socioeconomic status, education level, parity).
- Detailed obstetric history was obtained, including past pregnancies, previous cesarean deliveries, history of abortions, and any prior uterine surgeries (e.g., D&C, myomectomy).
- Patients underwent a thorough physical examination, including vital signs, abdominal examination, and assessment for anemia or signs of bleeding.
- Ultrasound and Doppler imaging were performed to assess placental location, depth of invasion, vascular abnormalities, and presence of previa.
- In selected cases, Magnetic Resonance Imaging (MRI) was done for further evaluation of suspected invasive placentation.
- Routine laboratory investigations were conducted.
- In cases requiring cesarean section, intraoperative findings were documented, including:
  - Degree of placental invasion (accreta, increta, percreta)
  - Estimated blood loss (EBL)
  - Need for blood transfusion (number of units transfused)

- Surgical interventions performed (uterine artery ligation, balloon tamponade, bladder repair, hysterectomy)
- Any intraoperative complications (e.g., bladder injury, excessive hemorrhage)

**Statistical Analysis Plan:** Data were analyzed using IBM SPSS Version 22. Descriptive statistics, including frequency and percentage distributions, were used. Inferential statistical tests (e.g., chi-square tests) were applied to determine associations between variables. Statistical significance was set at  $p < 0.05$ .

## Results

A total of 50 women diagnosed with Placenta Accreta Spectrum (PAS) disorders were included in this study. The majority of participants (72%) were in the age group of 21–30 years, followed by 22% in the 31–40 years age group. Only 4% of the participants were aged  $\leq 20$  years, and 2% were above 40 years. The mean age of the study population was  $28.30 \pm 5.16$  years, with a range of 20 to 43 years (Table 1). Most of the participants (98%) were referred cases from other healthcare facilities, while only 2% of the women were booked cases who had received antenatal care at the study center. A significant proportion of the study participants (60%) were primiparous (Para-1), while 18% were Para-2, 14% were Para-3, and 8% were Para-4. This indicates that PAS disorders were more prevalent among women with fewer previous pregnancies. A history of abortion and D&C was present in 34% of the participants, while 66% had no prior history of abortion or surgical uterine procedures. These findings suggest that prior uterine interventions might be a contributing factor in the development of PAS disorders. Among the study participants, 50% were illiterate, and 38% had only completed primary school education. Only 6% had

attained high school education, and another 6% had completed higher secondary education.

Ultrasound findings revealed that the anterior placenta was the most common placental position, observed in 58% of cases. Other placental locations included fundo-anterior (16%), posterior (10%), fundal (8%), fundo-posterior (6%), and low-lying (2%). The predominance of anterior placentation is significant as it is often associated with previous cesarean scars, increasing the risk of PAS disorders. Antenatal diagnosis of PAS using ultrasound and MRI was achieved in 36% of cases, whereas the majority of cases (64%) were diagnosed intraoperatively at the time of cesarean delivery.

The vast majority of women (86%) underwent emergency cesarean section due to complications arising from PAS. Elective cesarean section was performed in 12% of cases, while only 2% of the participants had a normal vaginal delivery. These findings reinforce the high likelihood of requiring surgical intervention in PAS cases to prevent severe maternal and fetal complications.

Table 1: Demographic and Clinical Characteristics

Characteristic	Categories	Frequency (n=50)	Percentage (%)
Age Group (Years)	$\leq 20$	2	4.0
	21–30	36	72.0
	31–40	11	22.0
	$> 40$	1	2.0
Booking Status	Booked	1	2.0
	Referred	49	98.0
Parity	Para 1	30	60.0
	Para 2	9	18.0
	Para 3	7	14.0
	Para 4	4	8.0
History of Abortion & D&C	Present	17	34.0
	Absent	33	66.0
Educational Status	Illiterate	25	50.0
	Primary school	19	38.0
	High school	3	6.0
	Higher secondary	3	6.0

## Maternal Outcomes

The study assessed various maternal outcomes associated with Placenta Accreta Spectrum (PAS) disorders. The findings revealed significant maternal morbidity, primarily due to excessive blood loss, the need for surgical interventions, and prolonged hospital stays.

## Hematological Complications and Blood Transfusion

- Anemia (Hb < 9 g/dL) was observed in 14% of the participants, indicating significant blood loss during delivery.
- A large proportion of women required blood transfusions, with 58% receiving 1–4 units and 40% receiving 5–10 units of blood. This highlights the substantial hemorrhagic risk associated with PAS disorders.

## Surgical Interventions

- Uterine artery ligation was performed in 66% of cases as a measure to control bleeding.
- Balloon tamponade, a technique used to manage postpartum hemorrhage, was required in 58% of cases.
- Bladder repair was necessary in 8% of cases, indicating the extent of placental invasion leading to organ damage.
- Obstetric hysterectomy was performed in 28% of cases, underscoring the severity of PAS and the frequent need for definitive surgical management.

## Critical Care and Recovery

- ICU admission was required for 72% of patients, reflecting the critical nature of PAS-related complications.
- Prolonged hospital stay (>5 days) was observed in 100% of cases, further demonstrating the severity of maternal morbidity.

- Wound gaping occurred in 2% of cases, though no instances of sepsis were reported.
- Importantly, no maternal deaths were recorded in the study.

Table 2: Maternal Outcomes in Women with Placenta Accreta Spectrum Disorders

Maternal Outcome	Frequency (n=50)	Percentage (%)
Anemia (Hb < 9 g/dL)	7	14.0
Blood Transfusion		
1–4 units	29	58.0
5–10 units	20	40.0
Surgical Interventions		
Uterine artery ligation	33	66.0
Balloon tamponade	29	58.0
Bladder repair	4	8.0
Obstetric hysterectomy	14	28.0
Critical Care & Recovery		
ICU admission	36	72.0
Prolonged hospital stay (>5 days)	50	100.0
Wound gaping	1	2.0
Sepsis	0	0.0
Mortality	0	0.0

## Discussion

Placenta Accreta Spectrum (PAS) disorders pose significant maternal health risks due to abnormal placental invasion, often leading to life-threatening hemorrhage, increased surgical interventions, and prolonged recovery. The findings of this study highlight the high burden of maternal morbidity associated with PAS and emphasize the importance of early diagnosis, appropriate surgical management, and multidisciplinary care.

One of the most critical outcomes in this study was the high incidence of severe hemorrhage, necessitating blood transfusions in 98% of cases. Specifically, 58% of women required 1–4 units of blood, while 40% required 5–10 units, indicating substantial blood loss. Hemorrhage remains one of the most dangerous complications of PAS, as previously reported in studies by Jauniaux et al. (2019) and Baloch et al. (2022), where significant transfusion requirements were documented. The need for blood transfusion correlates with the depth of placental invasion and intraoperative management strategies. Studies have emphasized the importance of

preoperative planning, including antenatal diagnosis and preparation of adequate blood products, to minimize maternal morbidity.

Given the severe bleeding risk, surgical interventions were frequently required in this study. Uterine artery ligation was performed in 66% of cases as a hemostatic measure, while balloon tamponade was used in 58% of cases to control hemorrhage. Similar findings were observed in research by Lubis et al. (2020), where uterine artery ligation and balloon tamponade were recommended as primary conservative management options<sup>6</sup>. However, despite conservative efforts, 28% of women required obstetric hysterectomy, demonstrating that PAS often necessitates radical surgical intervention, particularly in cases of placenta increta and percreta. The hysterectomy rate in this study aligns with findings from Rani et al. (2021), who reported high rates of peripartum hysterectomy due to the severe invasiveness of PAS disorders.

The severity of PAS-related complications was further demonstrated by the high ICU admission rate (72%), reflecting the need for intensive monitoring and postoperative management. Additionally, all patients (100%) had prolonged hospital stays (>5 days), indicating significant recovery challenges. The high rate of ICU admissions is consistent with findings from Kasraeian et al. (2021), who observed a similarly high burden of critical care requirements for PAS patients. Early diagnosis and planned delivery at tertiary centers with specialized maternal-fetal medicine teams have been shown to improve outcomes by reducing emergency hysterectomy rates and overall maternal morbidity.

PAS disorders, particularly placenta percreta, are associated with a high risk of bladder invasion, leading

to complex surgical procedures. In this study, 8% of patients required bladder repair, emphasizing the need for careful intraoperative assessment to prevent urological complications. Similar findings were reported by Zakherah et al. (2018), where bladder injuries were common among women with deeply invasive PAS<sup>6</sup>. The use of preoperative cystoscopy and intraoperative bladder dissection techniques has been suggested as a preventive measure to reduce the risk of bladder injury.

Importantly, this study reported zero cases of maternal mortality, highlighting the effectiveness of early diagnosis, well-coordinated surgical management, and availability of critical care services. This finding contrasts with older studies where PAS-related maternal mortality rates were significant, particularly in settings with limited access to multidisciplinary care. Improved surgical expertise, enhanced imaging techniques for antenatal diagnosis, and evidence-based management protocols have significantly contributed to reducing maternal mortality in PAS cases.

### **Clinical Implications and Recommendations**

The findings from this study reinforce the need for:

- Early antenatal diagnosis through ultrasound and MRI to allow for planned delivery and risk assessment.
- Multidisciplinary surgical planning involving obstetricians, anesthesiologists, urologists, and hematologists to ensure optimal intraoperative management.
- Use of conservative techniques such as uterine artery ligation and balloon tamponade to minimize the need for hysterectomy when feasible.
- Preoperative blood preparation and intensive care support to manage severe hemorrhagic complications effectively.

Previous research has established that uterine trauma caused by procedures such as surgical abortions, repeated D&C, and uterine curettage can lead to defects in the endometrial-myometrial interface, increasing the risk of abnormal placental invasion. According to Jauniaux et al. (2019), damage to the decidua basalis disrupts normal trophoblastic invasion, predisposing women to placenta accreta, increta, or percreta in subsequent pregnancies.

Uterine curettage can cause Asherman syndrome, a condition characterized by intrauterine adhesions and fibrosis, which can impair normal placental implantation. The endometrial damage from abortion procedures may lead to defective decidual formation, which is a crucial barrier that normally prevents excessive placental invasion. Studies suggest that vascular remodeling defects post-abortion may contribute to PAS, as placental attachment occurs in areas with deficient vasculature.

Several studies have confirmed that a history of induced abortion or D&C significantly increases the risk of PAS. A retrospective study by Lubis et al. (2020) found that women with a history of two or more surgical abortions had a threefold increased risk of PAS compared to those without prior abortion. Rani et al. (2021) demonstrated that prior uterine instrumentation, including curettage for incomplete miscarriage, was a key predictor of PAS, particularly when combined with other risk factors like placenta previa. Slate and Shell et al. (2019) reported a case of PAS following recurrent D&C procedures, emphasizing the role of cumulative uterine trauma.

### Conclusion

The study underscores the high burden of maternal morbidity associated with PAS, including severe hemorrhage, the need for blood transfusions, ICU

admissions, and complex surgical interventions. While no maternal deaths were reported, the findings emphasize the critical importance of early diagnosis, multidisciplinary management, and tertiary-level care in optimizing maternal outcomes. Future research should focus on refining conservative treatment approaches and identifying strategies to reduce the incidence of PAS through improved obstetric care practices.

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