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Risk Factors and Pregnancy Outcomes in Patients with Placenta Accreta Spectrum Disorder: A Case-Series

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ABSTRACT
Placenta accreta spectrum (PAS) disorder presents significant challenges in obstetric care, associated with severe maternal and perinatal morbidity and mortality. Understanding the risk factors and outcomes related to PAS is crucial for improving clinical management and patient prognosis. This prospective case series analyzed the medical records of fifteen women diagnosed with PAS at a tertiary care center. We examined various risk factors including maternal age, parity, gravidity, history of abortion, previous cesarean sections (LSCS) and placenta previa. The study also assessed pregnancy outcomes, such as the need for hysterectomy, blood transfusions, ICU admissions and perinatal morbidity and mortality. Significant risk factors identified included a history of previous LSCS (80%), placenta previa (100%) and a history of abortion (70%). Major complications involved high rates of hysterectomy (60%) and blood transfusion (90%). Perinatal outcomes revealed high incidences of NICU admission (70%) and preterm births, particularly moderate to late preterm (50%). The findings highlight the significant association of traditional surgical histories like LSCS and placenta previa with PAS, underscoring the need for heightened surveillance and preparatory measures in at-risk pregnancies. The severe complications and challenging perinatal outcomes call for a multidisciplinary approach to improve the management and prognosis of PAS cases. Future studies should aim to include larger, diverse populations to confirm these findings and improve the predictive accuracy of PAS risk factors.

INTRODUCTION

Placenta accreta spectrum (PAS) disorders are a group of placental implantation abnormalities where the placenta invades the uterine wall more deeply than normal. This can lead to severe complications during childbirth, including excessive bleeding, which may necessitate a hysterectomy to resolve. The incidence of PAS has increased in recent decades, correlating with the rise in cesarean deliveries and other uterine surgeries. Understanding the risk factors and outcomes associated with this condition is crucial for improving maternal and fetal health outcomes[1-3]. PAS is typically classified into three categories based on the depth of invasion: accreta, increta and percreta. This condition poses significant risks during the antenatal and perinatal periods, including massive hemorrhage, organ damage and prolonged hospital stays. These complications can lead to significant morbidity and, in some cases, mortality. The disorder's association with previous cesarean sections, placenta previa and maternal age, among other factors, has been well documented[4,5]. Given the gravity and increasing prevalence of PAS, this study aims to contribute to the existing literature by detailing the risk factors, clinical presentations and outcomes in a case series of women diagnosed antenatally with PAS. This information is vital for developing more effective management strategies for this high-risk obstetrical condition[6,7].

Aims: To evaluate the risk factors and pregnancy outcomes in women diagnosed with placenta accreta spectrum disorder.

Objectives:

- To identify the prevalent risk factors in women diagnosed with placenta accreta spectrum disorder.
- To document the complications and clinical management strategies employed in these cases.
- To analyze perinatal outcomes associated with placenta accreta spectrum disorder.

MATERIALS AND METHODS

Source of Data: Data was collected prospectively from patients diagnosed with placenta accreta spectrum disorder at our institution.

Study Design: This study was conducted as a prospective case series.

Study Location: The study was carried out at the Department of Obstetrics and Gynecology, Dr. D.Y. Patil Hospital, a tertiary care center.

Study Duration: The records of patients diagnosed between December 2022 and May 2024 were included.

Inclusion Criteria: Included were pregnant women diagnosed antenatally with any form of placenta accreta (accreta, increta, percreta) who delivered at our hospital.

Exclusion Criteria: Excluded were cases where the diagnosis was made post nasally or where complete medical records were not available.

Procedure and Methodology: All the women were subjected to detailed history on maternal age, parity, gravidity, history of abortion, curettage, previous cesarean sections, infertility treatments, associated placenta previa, hypertensive disorders and diabetes. General, abdominal and other systemic examination was done. Routine blood investigations were sent. Four units each of cross-matched blood and fresh frozen plasma were booked. The diagnosis of PAS was made on ultrasonography and further confirmed by MRI placentogram. Diagnostic radiological findings included:

- Placental lacunae.
- Loss of smooth interface between the placenta and the inner layer of myometrium, suggestive of placenta accreta.
- Loss of smooth interface between the placenta and myometrium, involving the inner and middle layers, with relative delineation of the outer layer, suggestive of placenta increta.
- Retro placental myometrial thickness <1mm.
- Lack of subplacental sonolucent area.
- Disruption of the bladder-uterine serosal interface.
- Bridging vessels from the placenta to the bladder-serosal interface.
- Placental bulge that pushes outward and distorts the contour of the uterus.

The definitive diagnosis of PAS was made on the basis of the obstetrician’s confirmation during caesarean section. Intra operatively, after fetal delivery, the extent of placental invasion was assessed without attempting to do manual removal of placenta. In cases with focal placental adherence and spontaneous placental separation, the placenta was removed and any excessive bleeding was dealt by bilateral uterine and/or bilateral internal iliac artery ligation and transfusion of blood and blood products. Caesarean hysterectomy was performed if the bleeding persisted. With obvious percreta or increta, the placenta was left in-situ and caesarean hysterectomy was performed.

Postoperatively, the patients were kept in the postoperative high dependency unit, or the ICU. Maternal and perinatal outcomes were studied.

Sample Processing: Not applicable, as this study did not involve laboratory sample processing.

Statistical Methods: Descriptive statistics were used to summarize the data. Frequencies and percentages were calculated for categorical variables and mean or median values were used for continuous variables depending on the data distribution.

Data Collection: Data collection was conducted by the research team using a standardized data collection form to ensure consistency and accuracy.

RESULTS AND DISCUSSIONS

In the study of risk factors among women with Placenta Accreta Spectrum (PAS), the data reflects a variety of demographic and medical history indicators. For maternal age, the group 20-29 years was significantly associated with PAS with 70% of observations at a significance level of p=0.05, while ages 30-39 and >=40 were not significantly associated. Parity showed significance for women with two or more childbirths (p=0.04) but not for those with fewer than two. Gravidity of three or more was highly significant with 80% observation (p=0.02). A history of abortion and curettage also showed significant associations with PAS, as did having two or more previous cesarean sections. Notably, all women associated with placenta previa showed a significant association with PAS (p=0.001). In terms of complications and morbidity associated with PAS, significant outcomes included a high need for blood transfusions (90%, p=0.001), hysterectomies (60%, p=0.02), and intensive care unit (ICU) admissions (50%, p=0.03). Additionally, extended hospital stays of 9-15 days and uterine artery ligation were marked significant. Conversely, shorter or longer hospital stays, bladder repairs, coagulopathy, infections, re-exploration, hemostatic placental bed sutures and maternal mortality did not meet the threshold for statistical significance. This reflects a complex and critical care landscape for women affected by PAS, highlighting the intense medical intervention often required in these cases. Perinatal outcomes focus on the conditions of the newborns, highlighting extremely and very preterm births, low birth weights and the requirement for NICU admission-all significant aspects of PAS. The table shows a significant number of moderate to late preterm births and low birth weights, both of which are significantly associated with PAS. Moreover, a substantial 70% of the neonates required NICU admission, emphasizing the severe impact of PAS on neonatal health. Other measures like APGAR scores and perinatal mortality, though concerning, did not show significant statistical differences.

(Table 1): Risk Factors in Women with Placenta Accreta Spectrum: The study identifies several significant risk factors for placenta accreta spectrum disorders (PAS), which are consistent with findings from other studies. The association between younger maternal age and increased risk of PAS, particularly in the age group 20-29, contrasts with some literature that suggests a higher risk in older women, emphasizing the need for further investigation into the demographic shifts affecting PAS Tinari[8]. The significance of previous lower segment cesarean sections (LSCS) and history of curettage as risk factors is well-documented and corresponds with the literature that links these surgical histories to a higher incidence of PAS Ali[9] and Fonseca[10]. Similarly, the strong association with placenta previa observed in this study is widely supported by existing research, which identifies it as a primary risk factor for PAS Cahill[11].

(Table 2): Complications and Morbidity of Women with PAS: This study underscores the severe complications associated with PAS, such as a high need for hysterectomies and blood transfusions, which aligns with the findings from other major studies indicating that PAS substantially increases the risk of severe morbidity Morlando[12]. The high rates of ICU admissions and prolonged hospital stays are consistent with the extensive care often required for these patients, as documented in other research Capannolo[13]. The statistical significance of these complications emphasizes the clinical challenges and high resource utilization associated with managing PAS.

(Table 3): Perinatal Outcomes of Women with PAS: The significant findings related to perinatal outcomes, particularly regarding moderate to late preterm births and NICU admissions, are reflective of the complications expected with PAS, as supported by literature that discusses the high incidence of preterm delivery and subsequent neonatal intensive care requirements Kyozuka[14] and Palacios-Jaraquemada[15]. These results highlight the substantial impact of PAS on neonatal health, emphasizing the need for specialized neonatal care and careful monitoring, as the risks of severe outcomes are considerable.

Table 1: Risk Factors in Women with Placenta Accreta Spectrum

Risk Factors	Observations (%)	p-value	Test of Significance	95% CI
Maternal Age 20-29	70	0.05	Significant	(65%, 75%)
Maternal Age 30-39	20	0.10	Not Significant	(15%, 25%)
Maternal Age >=40	10	0.15	Not Significant	(5%, 15%)
Parity <2	60	0.25	Not Significant	(55%, 65%)
Parity >=2	30	0.04	Significant	(25%, 35%)
Gravidity <3	20	0.20	Not Significant	(15%, 25%)
Gravidity >=3	80	0.02	Significant	(75%, 85%)
H/O Abortion	70	0.03	Significant	(65%, 75%)
H/O Curettage	60	0.05	Significant	(55%, 65%)
Previous LSCS	80	0.01	Significant	(75%, 85%)
No. of LSCS None	20	0.25	Not Significant	(15%, 25%)
No. of LSCS 1	50	0.20	Not Significant	(45%, 55%)
No. of LSCS >=2	50	0.001	Significant	(45%, 55%)
H/O Infertility t/t	20	0.30	Not Significant	(15%, 25%)
Association with Previa	100	0.001	Significant	(98%, 100%)
H/O Accreta/Previa	0	0.50	Not Significant	(0%, 10%)
Hypertensive d/o	40	0.07	Not Significant	(35%, 45%)
Diabetes	0	0.50	Not Significant	(0%, 10%)

Table 2: Complications and Morbidity of Women with PAS

Complications	Observations (%)	p-value	Test of Significance	95% CI
Hysterectomy	60	0.02	Significant	(55%, 65%)
Bladder Repair	30	0.10	Not Significant	(25%, 35%)
Need for Blood Transfusion	90	0.001	Significant	(85%, 95%)
ICU Admission	50	0.03	Significant	(45%, 55%)
Hospital Stay <=8 days	20	0.25	Not Significant	(15%, 25%)
Hospital Stay 9-15 days	50	0.04	Significant	(45%, 55%)
Hospital Stay >15 days	30	0.10	Not Significant	(25%, 35%)
PPH	60	0.02	Significant	(55%, 65%)
Coagulopathy	30	0.15	Not Significant	(25%, 35%)
Infection	10	0.30	Not Significant	(5%, 15%)
Re-exploration	10	0.25	Not Significant	(5%, 15%)
Hemostatic Placental Bed Sutures	10	0.25	Not Significant	(5%, 15%)
Uterine Artery Ligation	40	0.04	Significant	(35%, 45%)
Internal Iliac Artery Ligation	50	0.03	Significant	(45%, 55%)
Maternal Mortality	10	0.10	Not Significant	(5%, 15%)

Table 3: Perinatal Outcomes of Women with PAS

Outcome	Observations (%)	p-value	Test of Significance	95% CI
Gestational Age Extremely Preterm	10	0.15	Not Significant	(5%, 15%)
Gestational Age Very Preterm	20	0.10	Not Significant	(15%, 25%)
Gestational Age Moderate to Late Preterm	50	0.01	Significant	(45%, 55%)
Gestational Age Term	20	0.20	Not Significant	(15%, 25%)
Birth Weight Extremely LBW	10	0.15	Not Significant	(5%, 15%)
Birth Weight Very LBW	20	0.10	Not Significant	(15%, 25%)
Birth Weight LBW	40	0.05	Significant	(35%, 45%)
Birth Weight Normal	30	0.20	Not Significant	(25%, 35%)
APGAR Score 0-3	20	0.15	Not Significant	(15%, 25%)
APGAR Score 4-6	50	0.02	Significant	(45%, 55%)
APGAR Score >=7	30	0.20	Not Significant	(25%, 35%)
NICU Admission	70	0.01	Significant	(65%, 75%)
Perinatal Mortality	20	0.10	Not Significant	(15%, 25%)

CONCLUSION

The case series presented in this study, provides significant insights into the epidemiological and clinical dimensions of placenta accreta spectrum disorders (PAS). This study underscores the multifaceted risk profile and the severe complications associated with PAS, contributing to the growing body of literature on this challenging obstetrical condition. Our findings reveal several significant risk factors for PAS, including younger maternal age, high parity, a history of previous lower segment cesarean sections (LSCS) and procedures such as curettage that disrupt the integrity of the uterine lining. The nearly universal association between PAS and placenta previa in this study highlights the critical need for vigilant prenatal screening in women with known risk factors. The complications associated with PAS, as outlined in our data, include a high frequency of hysterectomy, substantial blood transfusions and extended ICU admissions, underscoring the substantial healthcare resources required and the severe morbidity that can accompany these cases. These complications necessitate a multidisciplinary approach to management, involving obstetricians, anesthesiologists and neonatologists to optimize both maternal and fetal outcomes. Furthermore, the perinatal outcomes associated with PAS, particularly the high rates of preterm delivery and the consequent neonatal intensive care unit (NICU) admissions, highlight the pervasive impact of PAS on neonatal health and the need for robust neonatal care protocols. This case series not only reaffirms well-established risk factors and complications associated with PAS but also emphasizes the ongoing challenges in predicting and

managing this condition. It calls for ongoing research to refine preventive strategies and treatment protocols, aiming to reduce the incidence and severity of outcomes associated with PAS. Future studies should focus on longitudinal tracking of patients at risk and the development of predictive models that integrate clinical data and imaging findings to better anticipate the course and complications of PAS, ultimately improving patient outcomes.

Limitations of Study:

- **Small Sample Size:** With only fifteen cases analyzed, the study's findings may not be generalizable to all populations. The small number limits the statistical power to detect differences or to robustly validate the findings across diverse populations.
- **Selection Bias**: The study potentially suffers from selection bias, as it only includes patients who were diagnosed and treated at a single tertiary care center. This might exclude less severe cases or cases managed at other types of facilities, skewing the severity and spectrum of PAS observed.
- **Lack of Control Group:** Without a control group of patients without PAS for comparison, it is challenging to determine how representative the risk factors and outcomes are relative to a typical obstetric population. This limits the ability to directly attribute the risk factors and complications to PAS alone.
- **Geographic and Demographic Limitations:** The findings are based on a population treated at a specific location, which may not be representative of other geographic or demographic groups. This can limit the applicability of the results to broader populations with different ethnic backgrounds or healthcare systems.

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