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ORIGINAL ARTICLE

Placenta previa and Placenta Accreta Spectrum (PAS): Obstetric risk factors and fetomaternal outcome at a Tertiary Care Hospital in Sialkot.

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ABSTRACT… Objective: To evaluate the obstetric risk factors associated with placenta previa and placenta accreta spectrum (PAS), and to assess fetomaternal outcomes among pregnant women presenting to a tertiary care hospital. **Study Design:** Retrospective Analytical Cohort study. **Setting:** Department of Obstetrics and Gynecology, Khawaja Muhammad Safdar Medical College / Allama Iqbal Memorial Teaching Hospital, Sialkot. **Period:** January 2024 to December 2024. **Methods:** All women presenting to the emergency department or outpatient clinic with a pre-operative or per-operative diagnosis of placenta previa or PAS were included. Diagnosis was established through transabdominal ultrasonography performed by a consultant radiologist. Demographic, obstetric, operative, and neonatal data were extracted from hospital records. Maternal outcomes included hemorrhage, transfusion requirements, hysterectomy, ICU admission, and mortality. Neonatal outcomes included birth weight, APGAR scores, NICU admission, and neonatal mortality. Data were analyzed using SPSS version 17. **Results:** A total of 48 women were included. The mean maternal age was 30 ± 3 years, and mean gestational age was 35.6 ± 3.9 weeks. Emergency cesarean section was performed in 64.6% of cases. Placenta accreta was diagnosed in 21 women (43.8%). Hysterectomy and maternal ICU admission were required in 41.7% of cases each. There were 2 maternal deaths and 7 neonatal deaths. Primary postpartum hemorrhage occurred in 52.1% of patients. Preterm delivery (<37 weeks) was observed in 50% of neonates, while 31.3% required NICU admission. **Conclusion:** Placenta previa and PAS are associated with significant maternal morbidity and adverse neonatal outcomes. Early diagnosis, vigilant antenatal monitoring, and timely multidisciplinary management are essential for optimizing fetomaternal outcomes.

Key words: Cesarean Section, Obstetric Hemorrhage, Placenta Accreta, Placenta Previa, Postpartum Hemorrhage, Pregnancy Complications, Retrospective Studies.

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INTRODUCTION

Placenta previa is a significant obstetric condition in which the placenta abnormally implants in the lower uterine segment, partially or completely covering the internal cervical os. It is a major cause of painless antepartum hemorrhage during the third trimester and one of the leading contributors to fetomaternal morbidity and mortality worldwide.[1,2] The global prevalence ranges from 0.3% to 2%, though substantial regional variation exists.[3] Higher incidences have been reported in South Asian countries, including Pakistan, where increasing cesarean section rates and variable antenatal care contribute to the rising burden.[4,5]

The etiology of placenta previa is multifactorial. Prior cesarean delivery remains the strongest and most consistently reported risk factor, with the likelihood of placenta previa increasing proportionally with the number of previous cesarean sections.[6] Other associated factors include multiparity, advanced maternal age, assisted reproductive technologies, prior uterine curettage, smoking, multiple gestations, and endometriosis.[7-9] As global cesarean delivery rates have risen sharply—from 12% in 2000 to approximately 32% in 2021—the incidence of placenta previa and related complications has increased correspondingly.[10]

Placenta accreta spectrum (PAS) is a closely related condition defined by abnormal adherence or invasion of placental tissue into the myometrium.

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The spectrum includes placenta accreta, increta, and percreta, representing increasing depths of invasion.[11] PAS has emerged as a major cause of severe obstetric hemorrhage, peripartum hysterectomy, urological injury, and maternal morbidity, particularly among women with placenta previa and previous uterine surgery.[12] Its incidence has risen more than tenfold over the past three decades due to increasing surgical interventions on the uterus.[13]

Women with placenta previa and PAS face significant intraoperative challenges, including excessive hemorrhage, blood transfusion requirements, uterine artery ligation, bladder injury, prolonged operative time, peripartum hysterectomy, and the need for maternal ICU admission.[14] Neonatal outcomes are also adversely affected, with higher rates of prematurity, low birth weight, low APGAR scores, NICU admission, and perinatal mortality.[15] In low- and middle-income countries, these complications are further amplified by late presentation, limited diagnostic capabilities, and inadequate access to specialized care.[16]

Early diagnosis remains critical for improving outcomes. Transabdominal and transvaginal ultrasonography are the primary diagnostic tools, with high accuracy for identifying placenta previa and ultrasonographic markers of PAS.[17] Early identification enables planned delivery in an appropriately equipped facility, availability of blood products, and involvement of a multidisciplinary team including obstetricians, anesthesiologists, neonatologists, and interventional radiologists.[18] Despite advancements in diagnostic imaging, many women in resource-limited settings continue to present late, contributing to higher morbidity and mortality.

Given significant variability in clinical profiles, risk factors, and outcomes across different healthcare systems, region-specific data are crucial for guiding management. Several South Asian studies report high maternal morbidity—including severe hemorrhage, transfusion needs, and peripartum hysterectomy—and neonatal complications related to prematurity and placental invasion severity.[4,5,16] However, there is limited literature from Sialkot and its surrounding regions addressing the risk factors, clinical presentation, and fetomaternal outcomes associated with placenta previa and PAS.

Therefore, this study was conducted to evaluate obstetric risk factors and assess maternal and neonatal outcomes among women diagnosed with placenta previa and PAS at a tertiary care hospital in Sialkot. Generating local evidence will support improved antenatal surveillance, better surgical preparedness, and enhanced multidisciplinary management aimed at reducing adverse outcomes.

METHODS

This retrospective analytical cohort study was conducted in the Department of Obstetrics and Gynecology, Khawaja Muhammad Safdar Medical College / Allama Iqbal Memorial Teaching Hospital, Sialkot, over a 12-month period from 1 January 2024 to 31 December 2024. Ethical approval was obtained from the Institutional Ethics Review Committee (ERC Approval No. 07/REC/KMSMC dated 08-03-2025). Informed consent for the use of anonymized clinical data was obtained from all participating patients at the time of admission.

All pregnant women presenting to the emergency department or outpatient clinic with a pre-operative or per-operative diagnosis of placenta previa or placenta accreta spectrum (PAS) were eligible for inclusion. The diagnosis of placenta previa was made using transabdominal ultrasonography performed by a consultant radiologist, following recommended imaging criteria.[17] PAS was identified based on characteristic ultrasonographic features such as multiple placental lacunae, loss of the retroplacental clear zone, and abnormal uterine-bladder interface, and confirmed intraoperatively when required.[18,19]

All singleton pregnancies diagnosed with any type of placenta previa (complete, partial, marginal, or low-lying) or PAS (placenta accreta, increta, or percreta) were included. These diagnostic categories align with established clinical guidelines.[17] Exclusion criteria included multiple gestations (except twins), placental abnormalities other than previa or PAS (e.g., placenta succenturiata or placental abruption), and other causes of antepartum hemorrhage such as cervical lesions, genital tract malignancies, or vasa

previa, consistent with previous methodological recommendations.[20]

A total of 48 patients met these criteria during the study period and were included using convenience sampling, a method commonly adopted in retrospective hospital-based studies.[21] As this was a complete census of all eligible cases within the specified time frame, a formal sample size calculation was not required.[22]

Data collected included maternal demographic details (age, parity, occupation, booking status), relevant obstetric history (previous cesarean deliveries, uterine curettage, assisted conception, subfertility, history of fibroids or endometriosis, smoking), gestational age at presentation, type and site of placenta previa, presence of PAS, mode of delivery, and intraoperative findings. Operative variables included estimated blood loss, transfusion requirements, postpartum hemorrhage, operative interventions (B-Lynch suture, internal iliac artery ligation), need for hysterectomy, and maternal ICU admission. Maternal mortality was also recorded.

Neonatal outcomes included sex, birth weight, APGAR scores at 1 and 5 minutes, congenital anomalies, NICU admission, preterm birth, and neonatal mortality. All data were entered into a predesigned proforma and analyzed using SPSS version 17. Quantitative variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between clinical risk factors and maternal or neonatal outcomes were assessed using chi-square tests, with a p-value <0.05 considered statistically significant.

RESULTS

A total of 48 women diagnosed with placenta previa or placenta accreta spectrum (PAS) were included in the analysis. The mean maternal age was 30 ± 3 years, and the mean gestational age at admission was 35.6 ± 3.9 weeks. Half of the women (50%) were unbooked, and 29.2% were grand multiparas (≥3 gravida). Previous cesarean delivery was noted in 77.1% of patients, while 35.3% had a prior dilatation and curettage. Placenta accreta spectrum was identified in 21 (43.8%) women. Baseline demographic and obstetric characteristics are presented in Table-I.

TABLE-I

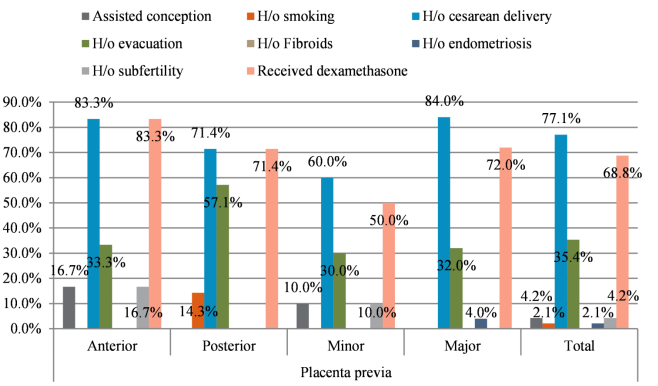
Maternal demographic and obstetric characteristics (n = 48)

Variable	n (%) or Mean ± SD
Age (years)	30 ± 3
<30 years	20 (41.7%)
≥30 years	28 (58.3%)
Gestational age (weeks)	35.6 ± 3.9
Booking Status	
Booked	24 (50.0%)
Unbooked	24 (50.0%)
Referred cases	14 (29.2%)
Gravida	
<3	14 (29.2%)
≥3	34 (70.8%)
Previous cesarean section	37 (77.1%)
History of D&C / evacuation	17 (35.3%)
Assisted conception	2 (4.2%)
Subfertility	2 (4.2%)
Endometriosis	1 (2.1%)
Fibroids	1 (2.1%)
Smoking	1 (2.1%)
Placenta accreta spectrum	21 (43.8%)

Various obstetric features and associated risk factors according to type of placenta previa are described in Figure-1.

FIGURE-1

History of obstetric features in women with placenta Previa



Elective cesarean delivery was performed in 17 (35.4%) patients, while 31 (64.6%) underwent emergency cesarean section. The mean estimated blood loss was 1567 ± 815 mL. The mean pre-

operative hemoglobin level was 10.6 ± 1.4 g/dL, and the mean post-operative hemoglobin level was 9.4 ± 1.0 g/dL. Among the 48 patients, 25 (52.1%) experienced primary postpartum hemorrhage, and 44 (91.7%) required blood transfusion. Operative and intraoperative parameters are summarized in Table-II.

TABLE-II

Intraoperative and perioperative parameters

Variable	Mean ± SD or n (%)
Type of cesarean delivery	
Elective	17 (35.4%)
Emergency	31 (64.6%)
Estimated blood loss (mL)	1567 ± 815
Primary postpartum hemorrhage	25 (52.1%)
Blood transfusion required	44 (91.7%)
Pre-operative hemoglobin (g/dL)	10.6 ± 1.4
Post-operative hemoglobin (g/dL)	9.4 ± 1.0
Additional interventions	
B-Lynch sutures	15 (31.3%)
Internal iliac artery ligation	1 (2.1%)
Combined procedures	12 (25.0%)

Regarding maternal outcomes, hysterectomy was required in 20 (41.7%) patients, maternal ICU admission occurred in 20 (41.7%), and there were 2 maternal deaths (4.2%). Additional surgical interventions included B-Lynch suturing in 15 cases and combined B-Lynch plus internal iliac artery ligation in 12 cases. One patient required isolated internal iliac artery ligation. Maternal outcome details are shown in Table-III.

TABLE-III

Maternal outcomes

Outcome	n (%)
Hysterectomy	20 (41.7%)
Maternal ICU admission	20 (41.7%)
Maternal mortality	2 (4.2%)
PPH (primary)	25 (52.1%)
Transfusion	44 (91.7%)
Operative complications	
Bladder/adjacent organ injury	0

A total of 27 (56.3%) male and 21 (43.8%) female neonates were delivered. Preterm birth (<37 weeks) occurred in 24 (50%) cases, and 14 newborns (29.2%) had low birth weight (<2.5 kg). APGAR scores <7 at 5 minutes were recorded in 35 (72.9%) neonates. Fifteen (31.3%) neonates required NICU admission, and there were 7 neonatal deaths (14.6%). Neonatal outcomes are summarized in Table-IV.

TABLE-IV

Neonatal outcomes

Variable	n (%)
Neonatal Sex	
Male	27 (56.3%)
Female	21 (43.8%)
APGAR score at 1 minute <7	35 (72.9%)
APGAR score at 5 minutes <7	35 (72.9%)
Preterm birth (<37 weeks)	24 (50.0%)
Low birth weight (<2.5 kg)	14 (29.2%)
NICU admission	15 (31.3%)
Neonatal mortality	7 (14.6%)

DISCUSSION

This study evaluated obstetric risk factors and fetomaternal outcomes among women diagnosed with placenta previa and placenta accreta spectrum (PAS) at a tertiary care hospital. The findings demonstrate a substantial burden of maternal morbidity and adverse neonatal outcomes associated with these conditions. Our observations are consistent with global evidence showing that placenta previa and PAS remain among the most high-risk obstetric complications worldwide.[1,23]

The mean maternal age in our cohort was 30 years, which aligns with regional studies indicating that placenta previa is more common in the later reproductive years, although advanced maternal age (>35 years) is a stronger reported risk factor in many international cohorts.[2,3] In our population, younger women also experienced significant disease burden, which is consistent with previous reports from Pakistan and South Asia showing similar age-related patterns.[4,24]

A high prevalence of multiparity and previous uterine procedures was noted, with prior cesarean delivery being the most dominant risk factor (77.1%). This finding mirrors global literature showing a

dose-dependent increase in abnormal placental implantation with rising numbers of previous cesarean deliveries.[5,6,25,26] The incidence of PAS in our study (43.8%) was significantly higher than that reported in many international series (10–30%).[1,6,23] This elevated frequency likely reflects the referral nature of the tertiary-care center where complex and advanced cases are transferred. High PAS rates have also been reported in regional studies, attributed to increasing cesarean section trends and limited antenatal surveillance in low-resource settings.[4,24,27]

Emergency cesarean delivery was performed in 64.6% of cases. Comparable studies report emergency rates of 60–75% due to recurrent antepartum hemorrhage and maternal instability.[7] Sudden bleeding episodes and delayed referral often contribute to these emergency interventions, particularly in resource-limited settings.[24]

Hemorrhage-related complications were prominent in this cohort. The mean estimated blood loss was 1567 mL, and more than half of the women experienced primary postpartum hemorrhage. These results confirm the strong association between placenta previa, PAS, and severe obstetric hemorrhage.[8] PAS is recognized as a leading cause of massive transfusion and life-threatening bleeding in pregnancy.[23,28] Blood transfusion was required in 91.7% of our cases, which is higher than in non-PAS placenta previa but consistent with PAS cohorts described in recent studies.[9,28,29]

Hysterectomy was required in 41.7% of the women, similar to reports from centers managing high PAS caseloads.[6,9,29] Peripartum hysterectomy remains a lifesaving intervention when conservative management is not feasible or would result in further morbidity. Maternal ICU admissions (41.7%) reflect the severity of surgical complexity and hemorrhage encountered. A maternal mortality rate of 4.2% was observed, which, although low, is consistent with mortality trends in comparable low-resource regions where delayed presentation and limited critical care facilities contribute to increased risk.[10,30]

Neonatal outcomes in this study reflected the compounded effects of abnormal placentation, recurrent bleeding, and early delivery. Preterm birth occurred in 50% of neonates, consistent with global data identifying prematurity as the most frequent neonatal complication in placenta previa and PAS.[11,31] Low APGAR scores at 5 minutes were seen in 72.9% of neonates, and 31.3% required NICU admission. These findings align with regional evidence linking neonatal compromise to maternal hemorrhage severity and suboptimal perinatal care resources.[24,32] Neonatal mortality (14.6%) was higher than that reported in high-resource settings but comparable to South Asian studies reporting 10–15% mortality.[12,31]

Collectively, these findings emphasize the need for early diagnosis, adequate antenatal follow-up, and coordinated multidisciplinary management to improve fetomaternal outcomes. International guidelines strongly recommend referral to specialized PAS centers, early identification through ultrasound, optimization of maternal hemoglobin, and planned delivery around 34–36+6 weeks for confirmed PAS.[1,17,23] Strengthening these practices in local settings could significantly reduce maternal and neonatal complications.

CONCLUSION

Placenta previa and placenta accreta spectrum (PAS) remain major contributors to severe maternal morbidity and adverse neonatal outcomes. In this study, a high prevalence of emergency cesarean delivery, significant hemorrhage, transfusion requirements, hysterectomy, and ICU admission highlight the critical nature of these conditions. Neonatal complications, including prematurity, low APGAR scores, NICU admission, and increased neonatal mortality, further emphasize their substantial impact on perinatal health. Early identification through ultrasound, vigilant antenatal follow-up, and coordinated multidisciplinary planning are essential to improving outcomes. Strengthening referral pathways and optimizing delivery preparation, particularly in high-risk cases, may substantially reduce morbidity and mortality. Continued efforts toward prevention—especially by reducing unnecessary cesarean sections—are vital for mitigating the rising burden of PAS and placenta previa in our region.

LIMITATIONS

This study has certain limitations. As a retrospective analysis, it relied on the accuracy and completeness of medical records, introducing potential information bias. The sample size was relatively small and drawn from a single tertiary-care hospital, limiting the generalizability of findings. Long-term neonatal outcomes and detailed intraoperative variables such as extent of placental invasion confirmed on histopathology were not available. Despite these limitations, the study contributes important insight into the local burden and outcomes of placenta previa and PAS.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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2	**Nosheen Bano:** Data collection, manuscript drafting.
3	**Faizan Kashif:** Data contribution.
4	**Hina Javed:** Data collection, literature review.
5	**Aqsa Hussain:** Data entry.
6	**Tayyaba Iftikhar:** Clinical data provision.
7	**Neeta Maheshwary:** Analysis support.
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