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Original Research Article

A prospective observational study on maternal and perinatal outcomes in patients with placenta previa at a tertiary care centre

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ABSTRACT

Background: Placenta previa is a leading cause of antepartum hemorrhage associated with significant maternal and perinatal morbidity. Rising rates of cesarean sections have contributed to increasing prevalence. This study evaluates maternal and perinatal outcomes in placenta previa patients managed at a tertiary care centre. This study aimed to assess maternal complications (hemorrhage, anemia, blood transfusion, surgical interventions) and perinatal outcomes (preterm birth, low birth weight, NICU admission, neonatal mortality) in patients with placenta previa.
Methods: A prospective observational study of 90 pregnant women diagnosed with placenta previa at GGMC and Sir JJ Hospital, Mumbai over a 14-month period (January 2022 to February 2023). Data on demographics, risk factors, comorbidities, maternal interventions, and neonatal outcomes were systematically collected and analyzed using descriptive statistics and chi-square tests.
Results: The mean maternal age was 30.44±6.25 years. Previous uterine surgery was the predominant risk factor, present in 88.9% of patients. Antenatal hemorrhage occurred in 37.8% of cases. Maternal morbidity was substantial: 75.6% required blood transfusion, 48.9% required ICU admission, and 11.1% underwent obstetric hysterectomy. Placenta accreta spectrum (PAS) was identified in 13.3% of patients. Perinatal outcomes were significantly compromised: 53.3% of neonates were delivered early preterm (<34 weeks), 63.3% had low birth weight (<2.5 kg), 32.2% required NICU admission, and neonatal mortality was 11.1%. A statistically significant association was found between antenatal registration status and gestational age at delivery (χ^2=19.437, p<0.001), with unregistered patients demonstrating markedly higher rates of early preterm delivery.
Conclusions: Placenta previa remains a high-risk obstetric condition with considerable maternal and perinatal morbidity. Previous cesarean delivery is the most important risk factor. Early antenatal registration significantly improves gestational age at delivery and is associated with better perinatal outcomes. Multidisciplinary management in well-equipped tertiary centres, including blood bank preparedness, skilled surgical interventions, and NICU support, is essential for improving outcomes.

Keywords: Antepartum hemorrhage, Maternal morbidity, Neonatal mortality perinatal outcomes, Placenta accreta spectrum, Placenta previa, Tertiary care

INTRODUCTION

Placenta previa is a critical obstetric condition characterised by abnormal implantation of the placenta in the lower uterine segment, partially or completely covering the internal cervical os.[1] It is one of the primary causes of antepartum haemorrhage and is associated with significant maternal and perinatal morbidity and mortality.[2] The classical clinical presentation includes sudden-onset painless vaginal bleeding during the second or third trimester of pregnancy, often occurring without an obvious precipitating factor.[3] Early detection and characterization using first-trimester and second-trimester ultrasound play a crucial role in predicting and managing

complex presentations.[4] The global incidence of placenta previa is estimated at approximately 0.3% to 0.5% of all pregnancies, with an average incidence of approximately 1 in 300 deliveries.[5] The incidence increases with advancing maternal age and parity, with women above 35 years having a significantly higher risk.[6] Several risk factors have been identified, including previous cesarean section, multiparity, previous uterine surgeries such as dilation and curettage, assisted reproductive techniques, smoking during pregnancy, and a history of placenta previa.[7] Among these, previous cesarean delivery is considered one of the most significant contributors, with the risk increasing progressively with the number of prior cesarean deliveries.[8] Altered vascularization and endometrial damage at the previous surgical scar site impair normal blastocyst implantation, causing lower segment attachment.[9] Maternal complications associated with placenta previa include severe antepartum hemorrhage, postpartum hemorrhage, anemia, hemorrhagic shock, increased need for blood transfusion, and emergency operative interventions such as cesarean hysterectomy.[10] In recent years, the growing global incidence of Placenta Accreta Spectrum (PAS) disorders associated with prior cesarean scar sites has dramatically elevated maternal morbidity and resource utilization during delivery.[11] In addition to maternal complications, placenta previa significantly affects perinatal outcomes, with preterm delivery being the most common adverse fetal outcome.[12] Preterm birth increases the risk of neonatal complications such as respiratory distress syndrome, low birth weight, neonatal sepsis, and perinatal mortality.[13] Despite improvements in obstetric care over recent decades, placenta previa continues to pose a major clinical challenge, particularly in developing countries and low-middle-income regions where healthcare resources and access to emergency surgical care vary widely.[14] Structured antenatal registration and routine prenatal care have proven essential for mitigating these risks and improving overall perinatal outcomes.[15] Prompt prediction of peripartum complications using ultrasound, alongside a coordinated multidisciplinary surgical team, is essential for optimal management. The present study was undertaken to evaluate maternal and perinatal outcomes in patients diagnosed with placenta previa at a tertiary care hospital, with the aim of contributing to better understanding and management of this condition.

METHODS

Study design and setting

This prospective observational study was conducted at the Department of Obstetrics and Gynaecology, GGMC and Sir JJ Hospital, Mumbai, from January 2022 to February 2023. The hospital served as a tertiary referral centre and provided comprehensive obstetric services, including antenatal care, emergency obstetric management, operative facilities, blood transfusion services, and neonatal intensive care support.

Study population

Participants were selected using a consecutive sampling method. All eligible pregnant women admitted to the obstetrics department with a confirmed diagnosis of placenta previa during the study period were considered.

Inclusion criteria

Inclusion criteria comprised pregnant women diagnosed with placenta previa on ultrasonography, women presenting with antepartum hemorrhage due to a low-lying placenta after 28 weeks of gestation, patients whose diagnosis was confirmed either by ultrasound examination or intraoperatively during delivery, and women who provided written informed consent.

Exclusion criteria

Exclusion criteria comprised vaginal bleeding occurring before 28 weeks of gestation, vaginal bleeding due to local non-placental causes such as carcinoma cervix, cervical polyps, or local trauma, placenta previa associated with co-morbid medical conditions such as pre-eclampsia, eclampsia, gestational diabetes mellitus, or bleeding disorders, medico-legal cases, and patients who did not provide informed consent.

Data collection

Written informed consent was obtained from all participants, and the study was approved by the Institutional Ethics Committee. All relevant information was collected using a pre-designed case record form (CRF). Maternal parameters evaluated included maternal age, parity, obstetric history, gestational age at diagnosis, type of placenta previa, episodes of antepartum hemorrhage, comorbidities, hemoglobin levels, intraoperative blood loss, blood transfusion requirement, surgical interventions, ICU admission, and maternal morbidity or mortality. Perinatal parameters included gestational age at delivery, birth weight, NICU admission, neonatal complications, and neonatal death. Patients were managed according to standard obstetric protocols followed at the institution. During antenatal follow-up, patients were monitored for episodes of bleeding, hospital admissions, medical interventions, and ultrasound findings. At delivery, detailed information regarding mode of delivery, intraoperative findings, blood loss, and maternal complications was recorded. Neonatal outcomes were documented following delivery.

Statistical analysis

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Continuous variables were expressed as Mean±Standard deviation. Categorical variables were presented as frequencies and percentages. Associations between categorical variables were evaluated

using Chi-square tests, with $p<0.05$ considered statistically significant.

RESULTS

Demographic characteristics

A total of 90 patients were included in the study. The age of patients ranged from 19 to 43 years, with a mean age of 30.44±6.25 years. The majority of patients belonged to the 18-30 years age group (53.3%), followed by the 31-40 years group (41.1%) and those above 40 years (5.6%). According to the Modified Kuppuswamy socioeconomic scale, most patients belonged to the upper-lower socioeconomic class (51.1%), followed by upper-middle (17.8%), lower-middle (16.7%), and lower (14.4%) socioeconomic classes.

Risk factors

Previous uterine surgery was present in 88.9% of patients overall. A history of three previous LSCS was noted in 22.2% of patients, two previous LSCS in 20.0%, and one previous LSCS in 17.8%. Previous curettage was present in 13.3%, and IVF conception in 10.0%. A previous history of placenta previa was present in 36 patients (40.0%) (Table 1).

Table 1: Distribution of risk factors among patients with placenta previa (n=90).

Risk factor	Number	Percent
History of uterine surgery	27	30.0
Previous 2 LSCS	18	20.0
Previous 1 LSCS	16	17.8
Primigravida	11	12.2
History of curettage	9	10.0
IVF conception	9	10.0

Table 2: Distribution of comorbidities among patients with placenta previa (n=90).

Comorbidity	Number	Percent
Anemia (Hb < 11 g/dL)	36	40.0
Gestational hypertension	27	30.0
Gestational diabetes mellitus	9	10.0
Rheumatic valvular disease	6	6.7
Hypothyroidism	4	4.4
No comorbidity	8	8.9

Antenatal presentation

Antepartum hemorrhage was present in 34 patients (37.8%), while 56 patients (62.2%) had no antepartum hemorrhage. Regarding antenatal registration, 53 patients (58.9%) were registered for antenatal care, while 37 patients (41.1%) were unregistered.

Comorbidities

Hemoglobin values ranged from 7.6 to 12.3 g/dL, with a mean of 10.06±1.02 g/dL (Table 2).

Maternal outcomes and interventions

Blood loss ranged from 300 ml to 2000 ml, with a mean of 687.22±432.22 ml (Table 3).

Table 3: Maternal outcomes and surgical interventions (n=90).

Outcome/intervention	Number	Percent
Blood transfusion required	68	75.6
ICU admission	44	48.9
Obstetric hysterectomy	10	11.1
Bilateral uterine artery ligation + Ashokanand stitch	32	35.6
B-Lynch sutures	16	17.8
Bilateral uterine artery ligation + Ashokanand stitch + bilateral internal iliac artery ligation	14	15.6
Bilateral uterine artery ligation alone	13	14.4
No intervention	5	5.6

Placenta accreta spectrum

Among the 90 cases, 12 patients (13.3%) were diagnosed with Placenta Accreta Spectrum (PAS). Of the 12 PAS cases, placenta accreta was the most common subtype (7 cases, 58.3%), followed by placenta increta (3 cases, 25.0%) and placenta percreta (2 cases, 16.7%).

Table 4: Perinatal outcomes (n=90).

Parameter	Value, N (%)
Mean gestational age at delivery (weeks)	32.39±3.33
Early preterm (<34 weeks)	48 (53.3%)
Late preterm (34-37 weeks)	42 (46.7%)
Mean birth weight (kg)	2.24 ± 0.72
Low birth weight (<2.5 kg)	57 (63.3%)
Normal birth weight (≥ 2.5 kg)	33 (36.7%)
NICU admission required	29 (32.2%)
Neonatal death	10 (11.1%)
Neonates survived	80 (88.9%)

Perinatal outcomes

Perinatal outcomes were significantly compromised, with a mean gestational age at delivery of 32.39±3.33 weeks. Early preterm delivery (<34 weeks) occurred in over half of cases (53.3%), and low birth weight (<2.5 kg) was seen in nearly two-thirds of neonates (63.3%). NICU admission was required in 32.2% of neonates, and the neonatal

mortality rate was 11.1%, with 88.9% of neonates surviving (Table 4).

Statistical associations

The most clinically significant finding was the strong association between antenatal registration status and gestational age at delivery ($p<0.001$). Among 37 unregistered patients, 30 (81.1%) delivered early preterm and 7 (18.9%) delivered late preterm. Among 53 registered patients, 18 (34.0%) delivered early preterm and 35 (66.0%) delivered late preterm. This demonstrates that antenatal registration is associated with a substantially higher likelihood of reaching a later gestational age before delivery.

Table 5: Statistical associations evaluated in the study.

Association	Chi-squared	df	P value	Significant?
Gestational age category vs. NICU admission	1.312	1	0.252	No
Birth weight category vs. NICU admission	1.519	1	0.218	No
Hemoglobin category vs. blood transfusion	0.361	1	0.548	No
Antepartum hemorrhage vs. blood transfusion	0.025	1	0.875	No
Registration status vs. gestational age category	19.437	1	< 0.001	Yes
Registration status vs. NICU admission	3.494	1	0.062	No
Registration status vs. blood transfusion	2.303	1	0.129	No

DISCUSSION

This prospective observational study of 90 patients with placenta previa demonstrates that placenta previa remains a major high-risk obstetric condition associated with significant maternal and perinatal morbidity. The findings are consistent with and extend the existing literature on placenta previa outcomes in tertiary care settings.

The mean maternal age of 30.44 years in our cohort is comparable to previous reports. Sarella et al documented a mean age of 29 years among placenta previa cases, while Prasanth et al reported the highest incidence in the 20-29 years age group.[16,17] Kumari et al also found maximum prevalence in the 20-30 years age group.[18] Previous uterine surgery emerged as the most important risk factor, present in 30% of our patients. This finding is consistent with the literature establishing that scarred endometrium from previous cesarean deliveries and uterine instrumentation significantly increases the risk of abnormal placental implantation.[19] Faiz et al identified previous cesarean delivery and abortion as important risk factors in their meta-analysis of observational studies.[7] Lad et al reported previous cesarean birth as the most common risk factor in 29.8% of cases.[20] The predominance of previous LSCS in our cohort reinforces the clinical imperative of judicious decision-making regarding primary cesarean sections.[21]

Antepartum hemorrhage was observed in 37.8% of our patients, which is lower than the 65.57% reported by Sarella et al but higher than the 24% reported by Kothapalli et al.[16,22] These differences may be related to variations in referral patterns, booking status, severity of placenta previa, and institutional protocols. Notably, our finding that antepartum hemorrhage was not significantly associated with blood transfusion requirement ($p=0.875$) suggests that intraoperative blood loss and surgical complexity are stronger determinants of transfusion need than antenatal bleeding episodes alone. The high rate of blood transfusion (75.6%) and ICU admission (48.9%) in our study reflects the substantial hemorrhagic risk associated with placenta previa. These rates are comparable to Sarella et al (80.32% transfusion) and Mahmoud Abdelwhab et al.[16,23] (75% transfusion in major placenta previa). The 11.1% obstetric hysterectomy rate is higher than several previous studies (Sarella et al, 3.27%, Prasanth et al, 1.14%, Kumari et al, 2.85%) but lower than the 28.8% reported by Mahmoud Abdelwhab et al.[16-18,23] for major placenta previa. This difference likely reflects the higher proportion of complex cases, including PAS, referred to tertiary centres.[24]

The 13.3% incidence of PAS in our study is clinically significant. Placenta accreta was the most common subtype (58.3% of PAS cases), consistent with the literature where it represents the commonest form of abnormal placental adherence.[25] Early antenatal diagnosis of PAS is crucial for multidisciplinary planning, as these cases carry an increased risk of massive obstetric hemorrhage, blood transfusion, cesarean hysterectomy, and intensive care admission.[26] Perinatal outcomes were adversely affected, with a mean gestational age of 32.39 weeks and a high rate of early preterm delivery (53.3%). The low birth weight rate of 63.3% is consistent with the high rate of preterm delivery.[27] Sarella et al reported NICU hospitalization in 24.56%, while our rate was 32.2%, reflecting the high burden of prematurity in our cohort.[16] The neonatal mortality rate of 11.1% is higher than several previous studies (Sarella et al, 6.6%, Prasanth et al, 1.72%) but lower than Kumari et al (19.99%).[16-18] These variations may be due to differences in gestational age at delivery, birth weight, NICU availability, and severity of placenta previa.[28]

The most significant statistical finding of this study was

the strong association between antenatal registration status and gestational age at delivery (p<0.001). Unregistered patients had a markedly higher rate of early preterm delivery (81.1%) compared to registered patients (34.0%). This finding has important clinical and public health implications.[29] It demonstrates that early antenatal registration facilitates planned management, including timely ultrasound diagnosis, correction of anemia, planned admission, blood arrangement, and delivery at an appropriate gestational age.[30] The association between registration status and NICU admission approached significance (p=0.062), suggesting a trend toward better neonatal outcomes with antenatal registration.

The prospective observational design allowed systematic data collection during the course of patient management, reducing dependence on incomplete retrospective records. The study assessed both maternal and neonatal outcomes comprehensively, including association analyses between selected parameters. The inclusion of operative interventions and PAS cases provides practical insight into surgical morbidity and resource requirements in placenta previa management.

This study has few limitations. The study was conducted at a single tertiary care centre, and the results may reflect the patient profile and referral patterns of that institution. The sample size of 90, while adequate for descriptive analysis, may have limited statistical power for detecting associations in subgroup analyses. The study did not provide detailed classification of placenta previa into types (low-lying, marginal, partial, complete), which can strongly influence outcomes. Detailed information regarding the number of antenatal bleeding episodes, emergency versus elective delivery, Apgar scores, and causes of neonatal death was not included. Long-term maternal and neonatal follow-up was not performed.

CONCLUSION

This prospective observational study of 90 patients with placenta previa demonstrates that placenta previa remains a major high-risk obstetric condition associated with significant maternal and perinatal morbidity. Previous cesarean delivery emerged as the most important risk factor, highlighting the strong association between uterine scarring and abnormal placentation. The high prevalence of anemia (40%), hypertensive disorders (30%), and previous placenta previa (40%) emphasizes the need for meticulous antenatal surveillance.

Maternal morbidity was substantial, with blood transfusion required in 75.6% of patients, ICU admission in 48.9%, and obstetric hysterectomy in 11.1%. The presence of Placenta Accreta Spectrum in 13.3% of patients further increased the risk of massive hemorrhage and complex surgical management. Perinatal outcomes were adversely affected, with 53.3% of deliveries occurring early preterm, 63.3% of neonates having low birth weight, 32.2% requiring NICU admission, and an 11.1% neonatal mortality rate.

The statistically significant association between antenatal registration and gestational age at delivery (p<0.001) is the most important finding of this study, underscoring the critical role of early antenatal care in improving outcomes. Overall, the study concludes that early antenatal registration, routine ultrasound diagnosis, correction of anemia, planned delivery in a tertiary care centre, blood bank preparedness, skilled obstetric surgery, ICU availability, and NICU support are essential for improving outcomes in patients with placenta previa. Furthermore, reducing unnecessary primary cesarean sections may play a crucial role in decreasing the future burden of placenta previa and its associated complications.

Recommendations

All pregnant women should be encouraged to register early for antenatal care, as registration status significantly impacts gestational age at delivery. Routine antenatal ultrasound should be used for early placental localization, especially in women with risk factors such as previous LSCS, uterine surgery, prior curettage, history of placenta previa, or IVF conception. Women diagnosed with placenta previa should be classified as high-risk pregnancies with clear counseling regarding warning signs. Correction of anemia should be prioritized during antenatal care. Delivery should be planned at a tertiary care centre with round-the-clock blood bank, operation theatre, senior obstetricians, anesthesiologists, ICU, and NICU facilities. Blood should be arranged before surgery, as transfusion is required in the majority of cases. A multidisciplinary team should be prepared for conservative hemostatic procedures and emergency obstetric hysterectomy. Neonatal care preparedness, including antenatal corticosteroids for anticipated preterm delivery, is essential. Peripheral health centres should be trained to identify placenta previa early and refer patients before severe bleeding develops.

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