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Fetomaternal Outcome in Placenta Previa and Morbidity Adherent Placenta in A Tertiary Care Centre

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ABSTRACT

Placenta previa and Morbidly Adherent Placenta (MAP) are serious obstetric conditions associated with high maternal and neonatal morbidity. Placenta previa, where the placenta overlies or nears the cervical os, increases risks of hemorrhage, preterm birth and surgical delivery. The MAP-involving accreta, increta and percreta-entails excessive placental invasion, often necessitating hysterectomy. Rising cesarean rates have driven up the incidence of both conditions, highlighting the need to evaluate outcomes and optimize management. This 2024 prospective observational study at a tertiary care center enrolled 200 women ≥18 years diagnosed with placenta previa (n = 140) or MAP (n = 60) via ultrasound or MRI. Exclusions included multiple gestations, fetal anomalies and major maternal comorbidities. Data on demographics, surgical variables and neonatal outcomes were collected. Placenta previa was classified per FIGO guidelines; MAP was confirmed intraoperatively and by imaging. Primary outcomes included blood loss, transfusion, hysterectomy, ICU admission, gestational age, birth weight, NICU admission and perinatal mortality. Statistical analyses (chi-square, t-test, logistic regression) were performed in SPSS v26.0 with significance at $p<0.05$. MAP cases had higher mean blood loss (2200 vs. 1100 mL, $p<0.001$), transfusion rates (83% vs. 30%, $p<0.001$), hysterectomy rates (46% vs. 4%, $p<0.001$) and ICU admissions (33% vs. 9%, $p<0.001$) compared to placenta previa. Neonates from MAP pregnancies were more often preterm (<37 weeks: 83% vs. 40%, $p<0.001$), had lower birth weights (2.4 vs. 2.9 kg, $p<0.001$), higher NICU admissions (77% vs. 24%, $p<0.001$) and greater perinatal mortality (17% vs. 4%, $p=0.002$). Previous cesarean delivery was significantly associated with MAP (93% vs. 56%, $p<0.001$). MAP is linked to markedly worse maternal and neonatal outcomes than placenta previa alone, driven largely by prior cesarean deliveries. Early identification, multidisciplinary planning and scheduled delivery protocols are essential to mitigate risks in these high-risk pregnancies.

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Key Words
Fetomaternal, placenta previa, morbidity, tertiary care centre

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INTRODUCTION

Placenta previa and Morbidly Adherent Placenta (MAP) are significant obstetric complications associated with considerable maternal and fetal morbidity and mortality[1]. Placenta previa occurs when the placenta implants over or near the internal cervical os, leading to risks such as antepartum haemorrhage, preterm labour and the necessity for cesarean delivery. Morbidly Adherent Placenta (MAP) which encompasses placenta accreta, increta and percreta, refers to the abnormal invasion of the placenta into the uterine wall, hindering normal placental separation after delivery. The rising prevalence of these conditions is closely linked to increased cesarean section rates and prior uterine surgeries, which contribute to uteroplacental abnormalities.

The incidence of placenta previa varies globally, with a median prevalence of approximately 0.56% of pregnancies. Among women with placenta previa, the incidence of MAP is notably higher, with studies indicating that 11.1% of placenta previa cases are complicated by MAP[2]. The risk of developing MAP escalates with the number of prior cesarean deliveries; for instance, women with placenta previa and one previous cesarean delivery have a 3% risk of MAP, which increases to 11% with two prior cesareans and up to 67% with five or more[3].

Both conditions pose significant risks, including massive postpartum haemorrhage, hysterectomy, Intensive Care Unit (ICU) admission and increased neonatal morbidity due to preterm birth and low birth weight. Studies have reported that MAP is associated with high maternal morbidity but regular antenatal care and a multidisciplinary approach can reduce mortality[4].

Furthermore, placenta previa complicated by MAP has been linked to increased maternal and surgical morbidities, emphasizing the need for interventions to alleviate these adverse outcomes[5]. Advances in obstetric imaging, particularly Doppler ultrasonography and Magnetic Resonance Imaging (MRI), have enhanced the prenatal diagnosis of these conditions, facilitating planned delivery strategies and multidisciplinary management to mitigate adverse outcomes. Prenatal diagnosis of MAP has been associated with a significantly lower rate of emergency cesarean deliveries and reduced blood loss compared to cases without prenatal diagnosis[6].

The optimal timing of delivery remains debated; however, most experts recommend elective cesarean delivery at 36-37 weeks for stable cases to balance the risks of prematurity and excessive haemorrhage. In cases of MAP, management options include conservative treatment with placental preservation, cesarean hysterectomy, or uterine artery embolization, depending on clinical presentation and surgical feasibility.

Neonatal outcomes in placenta previa and MAP are primarily influenced by gestational age at delivery, birth weight and Neonatal Intensive Care Unit (NICU) admission rates. Preterm birth is common, occurring in a significant proportion of cases, with associated complications such as respiratory distress syndrome, neonatal sepsis and intraventricular haemorrhage. A study reported that postpartum haemorrhage was observed in 41.4% of patients with MAP and perinatal mortality was 17.2%[7].

Despite advancements in diagnosis and management, these conditions remain major contributors to maternal morbidity, including massive transfusion requirements, prolonged hospitalization and ICU admission. Therefore, a comprehensive evaluation of maternal and fetal outcomes is essential to improve perinatal care and develop evidence-based management protocols. This study aims to evaluate the fetomaternal outcomes in cases of placenta previa and morbidly adherent placenta at a tertiary care center. By analyzing maternal complications, surgical interventions and neonatal morbidity and mortality, we seek to identify critical factors influencing outcomes and propose recommendations for improved clinical management.

MATERIALS AND METHODS

Study design and setting: This hospital-based prospective observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary care center over a six-month period in 2024. The study included pregnant women diagnosed with placenta previa and/or Morbidly Adherent Placenta (MAP) admitted for delivery.

Study population and sampling: Pregnant women aged 18 years and above, with a singleton pregnancy and diagnosed with placenta previa or MAP via ultrasonography or MRI were included in the study. Patients with multiple gestations, congenital fetal anomalies, or other significant maternal comorbidities affecting pregnancy outcomes (e.g., uncontrolled diabetes, hypertensive disorders) were excluded. A sample size of 200 participants was determined based on an estimated prevalence of placenta previa and MAP, with a confidence level of 95% and a margin of error of 5%.

Data collection and variables: A structured proforma was used to collect demographic, obstetric and clinical data. The primary variables included:

- **Maternal parameters:** Age, parity, gestational age at diagnosis and delivery, number of previous cesarean sections, history of uterine surgeries, antenatal complications and mode of delivery

- **Neonatal parameters:** Birth weight, gestational age at delivery, Apgar scores, NICU admission, perinatal mortality
- **Intraoperative and postoperative outcomes:** Intraoperative blood loss (estimated using surgical sponge count and suction volume), need for transfusion, duration of surgery, postoperative complications (postpartum hemorrhage, infection, ICU admission) and hysterectomy rates in cases of MAP

Diagnosis and classification: Placenta previa was classified based on ultrasonographic findings into complete, partial, marginal, or low-lying placenta previa according to FIGO guidelines. Morbidly Adherent Placenta (MAP) was diagnosed when the placenta showed abnormal adherence to the myometrium, confirmed intraoperatively and classified into placenta accreta (superficial invasion), increta (deep myometrial invasion), or percreta (serosal or bladder invasion) based on MRI and Doppler ultrasonography.

Management protocol: All cases were managed by a multidisciplinary team comprising obstetricians, anesthesiologists, neonatologists and intensivists. The mode and timing of delivery were decided based on clinical stability:

- **Stable cases:** Elective cesarean delivery at 36-37 weeks
- **Unstable cases (active bleeding, fetal distress):** Emergency cesarean delivery
- **Cases of MAP:** Prepared for possible cesarean hysterectomy and blood and blood products were arranged preoperatively to manage anticipated haemorrhage

Statistical analysis: Data were analyzed using SPSS version 26.0. Descriptive statistics (mean, standard deviation, frequency and percentage) were used to summarize maternal and neonatal characteristics. Chi-square tests were applied to assess categorical variables, while independent t-tests or Mann-Whitney U tests were used for continuous variables. A binary logistic regression model was used to determine factors associated with adverse maternal and fetal outcomes. A $p<0.05$ was considered statistically significant.

Ethical considerations: The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants after explaining the purpose, risks and benefits of the study. Confidentiality of patient data was maintained throughout.

RESULTS AND DISCUSSION

Maternal characteristics: A total of 200 pregnant women diagnosed with placenta previa (n = 140, 70%) and Morbidly Adherent Placenta (MAP) (n = 60, 30%) were included in the study. The mean maternal age was 30.5±4.8 years, with the majority being multigravida (68%). 67% of women had a history of previous cesarean section (C-section) and among them, 40% had two or more prior C-sections (Table 1).

Women with MAP had significantly higher rates of previous cesarean deliveries compared to those with placenta previa alone ($p<0.001$), highlighting the association between prior uterine surgeries and abnormal placentation.

Maternal and intraoperative outcomes: The mode of delivery was a cesarean section in all cases, with emergency C-sections performed in 35% of placenta previa cases and 60% of MAP cases due to antepartum haemorrhage. The mean estimated blood loss was 1100±450 mL in placenta previa cases and 2200±700 mL in MAP cases ($p<0.001$). About 46% of women with MAP required cesarean hysterectomy to control haemorrhage.

MAP cases had significantly higher rates of emergency C-section, postpartum hemorrhage, ICU admission and hysterectomy compared to placenta previa cases ($p<0.001$) (Table 2).

Neonatal outcomes: The mean gestational age at delivery was 36.5±2.1 weeks for placenta previa and 34.1±2.8 weeks for MAP ($p<0.001$). Preterm birth (<37 weeks) was observed in 52.8% of cases, with neonatal ICU (NICU) admission required in 40% of newborns. Perinatal mortality was significantly higher in MAP cases (16.7%) compared to placenta previa (4.3%) (Table 3).

Association between previous c-section and MAP: The Odds Ratio (OR) for MAP was 7.5 (95% CI: 3.8-14.8, $p<0.001$) in women with two or more previous

Table 1: Maternal demographic and obstetric characteristics

Variables	Placenta previa (n = 140)	MAP (n = 60)	Total (N = 200)	p-value
Maternal age (years) (Mean±SD)	29.8±4.6	31.4±5.0	30.5±4.8	0.0420
Multigravida (%)	64 (45.7%)	38 (63.3%)	102 (51%)	0.0290
Previous C-section (%)	78 (55.7%)	56 (93.3%)	134 (67%)	<0.001
≥2 prior C-sections (%)	38 (27.1%)	42 (70%)	80 (40%)	<0.001

Table 2: Intraoperative and maternal outcomes

Outcome	Placenta previa (n = 140)	MAP (n = 60)	p-value
Emergency C-section (%)	49 (35%)	36 (60%)	0.002
Estimated blood loss (mL) (Mean ± SD)	1100±450	2200±700	<0.001
Blood transfusion required (%)	42 (30%)	50 (83%)	<0.001
Cesarean hysterectomy (%)	6 (4%)	28 (46%)	<0.001
ICU admission (%)	12 (8.6%)	20 (33.3%)	<0.001
Postpartum hemorrhage (%)	30 (21.4%)	34 (56.6%)	<0.001

Table 3: Neonatal outcomes

Neonatal outcome	Placenta previa (n = 140)	MAP (n = 60)	p-value
Gestational age (weeks) (Mean ± SD)	36.5±2.1	34.1±2.8	<0.001
Preterm birth (%)	56 (40%)	50 (83.3%)	<0.001
Birth weight (kg) (Mean ± SD)	2.9 ± 0.6	2.4 ± 0.5	<0.001
Apgar score <7 at 5 min (%)	12 (8.6%)	18 (30%)	<0.001
NICU admission (%)	34 (24.3%)	46 (76.6%)	<0.001
Perinatal mortality (%)	6 (4.3%)	10 (16.7%)	0.002

Table 4: Association Between Previous C-Section and MAP

Variables	MAP present (n = 60)	MAP absent (n = 140)	p-value
Previous C-section (%)	56 (93.3%)	78 (55.7%)	<0.001
≥2 Prior C-sections (%)	42 (70%)	38 (27.1%)	<0.001

cesarean deliveries, highlighting a strong association between repeat C-sections and morbid placentation (Table 4).

Our study's findings align with and expand upon existing research regarding the fetomaternal outcomes associated with placenta previa and Morbidly Adherent Placenta (MAP).

Maternal outcomes: We observed a significant association between prior cesarean deliveries and the incidence of MAP, with 70% of MAP cases having two or more previous cesarean sections. This finding is consistent with the study by Khan *et al*.[8] which reported that 92% of placenta previa cases were delivered via Lower Segment Cesarean Section (LSCS), highlighting the correlation between cesarean deliveries and abnormal placentation.

The increased risk of Postpartum Haemorrhage (PPH) in MAP cases (56.6%) compared to placenta previa cases (21.4%) in our study mirrors the results reported by Tahir *et al*.[9] who found that MAP is associated with a higher risk of severe bleeding post-delivery.

Furthermore, our study noted a cesarean hysterectomy rate of 46% in MAP cases, which is comparable to the findings of a study published in the Journal of the Society of Obstetricians and Gynaecologists of Pakistan, where cesarean hysterectomy was performed in 40% of cases with morbidly adherent placenta[9].

Neonatal outcomes: The higher incidence of preterm births in MAP cases (83.3%) compared to placenta previa cases (40%) in our study is in line with the study by Khan *et al*.[8] which reported that the peak incidence of bleeding in placenta previa cases occurred around 34-36 weeks, leading to preterm deliveries.

Additionally, our finding of increased NICU admissions (76.6% in MAP cases) is consistent with the study by Tahir *et al*.[9] which reported significant neonatal complications associated with MAP, including higher rates of NICU admissions.

The perinatal mortality rate of 16.7% in MAP cases observed in our study also aligns with existing literature indicating increased perinatal mortality associated with morbidly adherent placenta[10].

Strengths and limitations: A notable strength of our study is the prospective design, which allowed for comprehensive data collection and minimized recall bias. However, limitations include the single-center setting, which may affect the generalizability of the findings. Additionally, the sample size, while adequate, may not capture all variations in outcomes associated with placenta previa and MAP.

Clinical implications: Our findings underscore the critical need for meticulous antenatal surveillance in women with a history of cesarean deliveries or uterine surgeries, given their heightened risk for placenta previa and MAP. Early identification of these conditions is imperative to facilitate timely referral to tertiary care centers equipped with multidisciplinary teams capable of managing potential complications. The substantial rates of PPH and cesarean hysterectomy associated with MAP highlight the importance of preparedness for massive transfusion protocols and surgical interventions. Furthermore, the elevated incidence of preterm births necessitates readiness for neonatal intensive care support.

Future directions: Further multicenter studies with larger sample sizes are warranted to validate these findings and explore additional risk factors contributing to adverse outcomes in placenta previa and MAP cases. Investigating the efficacy of various management strategies in improving maternal and neonatal outcomes would also be beneficial.

CONCLUSION

Our study corroborates existing evidence that placenta previa and MAP are associated with significant maternal and neonatal morbidity and mortality. A history of multiple cesarean sections markedly increases the risk of developing these conditions. Proactive antenatal management and delivery planning are essential to mitigate adverse outcomes.

RECOMMENDATIONS

Based on our study findings, we strongly recommend early antenatal identification and close monitoring of women at high risk for placenta previa and Morbidly Adherent Placenta (MAP), particularly those with a history of multiple cesarean sections or uterine surgeries. Regular ultrasonographic screening, including the use of Doppler studies and MRI in suspected cases of MAP, should be integrated into routine obstetric care to allow for timely diagnosis and risk stratification. Multidisciplinary management involving obstetricians, anesthetists, neonatologists and transfusion medicine specialists is essential to ensure optimal maternal and neonatal outcomes. Hospitals should implement standardized protocols for managing placenta previa and MAP, including blood transfusion preparedness, surgical contingency planning and advanced neonatal care facilities. Future research should focus on evaluating conservative management strategies, including uterine-sparing techniques, to reduce the need for peripartum hysterectomy while ensuring maternal safety.

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