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Original Research Article

Evaluation of Maternal and Perinatal Outcomes in Relation to placenta previa Location: A Retrospective Study from a Tertiary Care Centre

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Abstract

Background and Objective: One of the main causes of antepartum haemorrhage and a major contributor to the morbidity and mortality of mothers and newborns is placenta previa (PP). The risk and severity of complications vary with the location of placental implantation. This study aimed to evaluate the association between maternal and perinatal outcomes and the location of PP in a tertiary care center.

Methods: This retrospective observational study was done in the Department of Obstetrics and Gynaecology at JLNMCH, Bhagalpur, Bihar during a period of October 2024 to September 2025. All pregnant women with ultrasonographically confirmed PP and gestational age ≥28 weeks who delivered at the institution were included. A total of 75 cases were analyzed. Patients were categorized into low-lying/marginal PP and major PP based on ultrasonographic and intraoperative findings. Maternal outcomes assessed included blood transfusion, postpartum haemorrhage, ICU admission, obstetric hysterectomy, and maternal mortality. Prematurity, NICU hospitalization, stillbirth, and early neonatal death were among the fetal outcomes. After the data were analyzed using the appropriate statistical tests, a p-value of less than 0.05 was considered statistically significant.

Results: Out of 75 cases of PP, obstetric hysterectomy was performed in 8 patients (10.7%). Maternal mortality occurred in 3 cases (4%) and was primarily associated with massive postpartum haemorrhage and hemodynamic instability. A total of 18 fetal deaths (24%) were recorded, mainly due to extreme prematurity and severe fetal compromise. A Compared to low-lying or marginal PP, major PP was associate to substantially greater incidence of postpartum haemorrhage, blood transfusion need, preterm delivery, obstetric hysterectomy, and perinatal mortality.

Conclusion: A significant risk of serious maternal and neonatal problems is linked to PP, especially in major group early diagnosis, appropriate antenatal surveillance, planned delivery in equipped tertiary care centres, and readiness for massive transfusion and surgical intervention are crucial to reducing maternal and perinatal mortality.

Keywords: NICU, PP.

Introduction

The implantation of the placenta in the lower uterine segment so that it covers or situated near the internal cervical os is known as placenta previa (PP). It still poses a significant risk to the lives of mothers and newborns and is one of the most dangerous causes of antepartum haemorrhage. Although improvements in antenatal ultrasonography and peripartum care have enabled earlier diagnosis and better planning of delivery, PP still accounts for significant obstetric emergencies. Its occurrence is closely associated with prior cesarean delivery, increased parity, advancing maternal age, and previous uterine instrumentation. With the global rise in operative deliveries, the incidence of PP has shown a gradual upward trend, making it an increasingly important public health concern [1,2].

The severity of complications in PP is largely determined by the extent and location of placental attachment in relation to the cervical os. Low-lying and marginalPP generally carry a more favorable prognosis, while partial and complete PP are associated with substantially higher maternal risk.

Major PP predisposes women to repeated episodes of heavy bleeding, emergency caesarean section, massive postpartum hemorrhage, and a greater likelihood of surgical hemostatic procedures. When bleeding cannot be controlled by conservative measures, obstetric hysterectomy becomes the final life-saving option, reflecting the most extreme form of maternal morbidity and a permanent loss of fertility [3,4].

The impact of PP extends beyond maternal complications and significantly affects fetal outcome. Recurrent bleeding often necessitates early delivery to safeguard maternal life, leading to a high incidence of prematurity. Preterm infants born to mothers with PP are at increased risk of respiratory distress, sepsis, prolonged NICU admission, and early neonatal death. In settings with limited neonatal intensive care facilities, these risks translate into higher perinatal mortality. Although improved neonatal care has enhanced survival in developed regions, developing countries continue to report disproportionate fetal loss due to delayed presentation, poor antenatal supervision, and inadequate referral systems [5.6].

India continues to face a substantial burden of maternal mortality from obstetric hemorrhage, and PP remains a major contributor to this preventable loss of life. Tertiary hospitals frequently receive critically ill patients referred late in pregnancy after recurrent bleeding and severe anemia, often in unstable condition. Despite this, region-specific data correlating placental location with maternal and perinatal outcomes are limited, particularly from Eastern India. Jawaharlal Nehru Medical College, Bhagalpur, Bihar serves as a key referral center for surrounding districts and manages a large volume of high-risk obstetric cases. The present study was conducted to evaluate maternal and perinatal outcomes in relation to the location of PP, with the aim of identifying disease patterns, recognizing high-risk groups, and strengthening strategies for early intervention and referral [7,8].

Method

Design and Setting: This record-based retrospective analysis was carried out in the Department of Obstetrics and Gynaecology at JNMC in Bhagalpur, Bihar a tertiary care teaching hospital that gets high-risk obstetric referrals from nearby rural and semi-urban districts. Deliveries conducted between October 2024 and September 2025, a full year, were included in the study.

Study Population: All pregnant women diagnosed with PP on ultrasonography and who delivered at the institution during the study period were eligible for inclusion. A total of 75 women with confirmed PP were identified and included after review of hospital records. Among these, 8 women required obstetric hysterectomy, 3 maternal deaths were recorded, and 18 fetal deaths occurred during the study period.

Eligibility Criteria

Inclusion Criteria were:

- Ultrasonographically confirmed placenta previa
- Gestational age of ≥28 weeks
- Delivery conducted at the study institution
- Availability of complete obstetric and neonatal records

Exclusion Criteria were:

- Multiple pregnancy
- Pregnancy with medical disorders
- Major congenital fetal anomalies
- Incomplete or missing hospital records

Classification of placenta previa: PP was classified based on antenatal ultrasonography and operative findings at the time of delivery. For analytical purposes, cases were grouped into:

- **Low-lying or marginal placenta previa**, and
- **Major placenta previa**, which included partial and complete coverage of the internal cervical os.

Data Collection: Data were obtained from labor room registers, operation theatre records, blood bank logs, intensive care unit admission registers, and neonatal unit records. Information was extracted using a predesigned structured data collection form.

The following variables were recorded:

- **Maternal characteristics:** Age, parity, socio economic, prior caesarean section, and gestational age at delivery
- **Clinical variables:** Episodes of antepartum bleeding, mode of delivery, estimated intraoperative blood loss
- **Maternal outcomes:** Maternal mortality, obstetric hysterectomy, ICU admission, postpartum hemorrhage, and the necessity for blood and blood product transfusions.

- **Fetal outcomes:** birth weight, gestational age, prematurity, NICU admission, stillbirth, and early neonatal death

Outcome Measures: Thematernal outcome was severe maternal morbidity, defined as the occurrence of postpartum hemorrhage requiring transfusion, admission to intensive care, obstetric hysterectomy, or maternal death. The perinatal outcome was perinatal mortality, which included stillbirth and early neonatal death occurring within the first seven days of life.

Statistical Analysis: The data was entered and analyzed using standard statistical tools. Categorical data was summarized using frequencies and percentages, whereas continuous variables were represented by means and standard deviations. The Chi-square test or, when appropriate, Fisher's exact test were used to evaluate the relationship between PP location and maternal and perinatal outcomes. Statistical significance was defined as a p-value of less than 0.05.

Ethical Approval: The Institutional Ethics Committee granted the study prior clearance. As this was a retrospective analysis of hospital records, informed consent was waived. Strict confidentiality of patient information was maintained throughout the study.

Results

Baseline Distribution of PP: During the one-year study period, 75 women with ultrasonographically confirmed PP were managed at the study centre. Based on placental location, 30 women (40%) had low-lying or marginal PP, while 45 women (60%) had major PP. The majority of patients were multigravidas, and a substantial proportion had a history of previous cesarean delivery. Emergency cesarean section was the most common mode of delivery, particularly among women with major PP.

Maternal Outcomes: Postpartum hemorrhage (PPH) emerged as the most frequent and serious maternal complication. A significantly higher proportion of women with major PP experienced PPH requiring blood transfusion compared to those with low-lying placenta.

Obstetric hysterectomy was required in 8 patients (10.7%), primarily due to uncontrolled hemorrhage following cesarean delivery. Of these, 7 cases occurred in the major PP group, while only one case belonged to the low-lying placenta group, indicating a strong association between major PP and severe hemorrhagic morbidity.

Three maternal deaths (4%) were recorded during the study period, all in women with major PP who presented with massive hemorrhage, profound anemia, and hemodynamic instability following delayed referral. No maternal mortality was observed in the low-lying PP group. Admission to the intensive care unit was required more frequently in patients with major PP due to the severity of blood loss and coagulation abnormalities.

Perinatal Outcomes: Adverse fetal outcomes were more prominent in the major PP group. Preterm delivery occurred in a large proportion of women with major PP, often following recurrent antepartum bleeding or emergency surgical intervention.

A total of 18 fetal deaths (24%) were recorded in the entire cohort. These included both stillbirths and early neonatal deaths. Four fetal deaths occurred in the low-lying placenta group, whereas fourteen fetal deaths were documented among women with major PP, reflecting the significantly higher perinatal risk associated with major placental location.

Low birth weight and NICU admission were also more frequently observed among neonates delivered to mothers with major PP, largely due to prematurity and perinatal asphyxia

Table 1: Comparison of Maternal and Perinatal Outcomes According to PP Location (n = 75)

Outcome	Low-lying / Marginal (n=30)	Major PP (n=45)	p-value
Postpartum hemorrhage requiring transfusion	10 (33.3%)	32 (71.1%)	0.002
Obstetric hysterectomy	1 (3.3%)	7 (15.6%)	0.04
Maternal death	0 (0%)	3 (6.7%)	0.11
Preterm delivery (<37 weeks)	12 (40.0%)	30 (66.7%)	0.02
Perinatal death	4 (13.3%)	14 (31.1%)	0.06

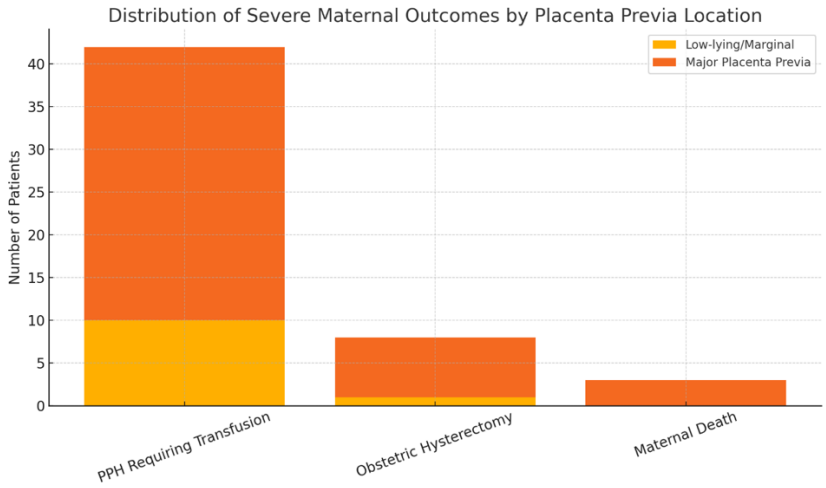

Figure 1: Distribution of severe maternal outcomes by placenta previa location

Discussion

The present study demonstrates a clear and clinically meaningful association between placental location and pregnancy outcome. Women with major PP experienced significantly higher rates of severe maternal morbidity and adverse perinatal outcomes compared with those with low-lying or marginal PP. The concentration of obstetric hysterectomies, maternal deaths, and fetal losses in the major PP group highlights the disproportionate burden carried by this subgroup. These findings confirm that placental location is not merely an anatomical description but a critical determinant of disease severity and outcome [9,10].

Postpartum hemorrhage emerged as the dominant maternal complication in this cohort and was strongly linked to major PP. The excessive blood loss observed in these patients can be attributed to extensive placental separation from the poorly contractile lower uterine segment and increased surgical difficulty during placental removal. The significantly higher transfusion requirement among women with major PP in this study reflects the magnitude of hemorrhage encountered during delivery. This emphasizes the importance of anticipating massive transfusion in such cases and ensuring uninterrupted availability of blood and blood products at centers managing these high-risk pregnancies[11,12].

The requirement for obstetric hysterectomy in more than one-tenth of the study population underscores the severity of hemorrhagic morbidity associated with PP. Almost all hysterectomies occurred in women with major PP, indicating that conservative surgical measures were insufficient in controlling hemorrhage in these cases. The relatively high hysterectomy rate in this study likely reflects delayed presentation, advanced blood loss at admission, and limited opportunity for stepwise conservative interventions in emergency situations. Beyond its immediate life-saving role, hysterectomy represents a devastating outcome with permanent reproductive consequences and long-term psychological impact [13,14].

Maternal mortality in the present series was confined exclusively to women with major PP and was uniformly associated with massive hemorrhage and hemodynamic collapse at presentation. These deaths reflect a combination of late referral, severe antepartum anemia, and rapid progression to irreversible shock before definitive surgical control could be achieved. While modern obstetric practice has reduced maternal deaths from PP in well-resourced settings, the persistence of mortality in this study points to systemic challenges in emergency obstetric care, particularly at the peripheral level, where early stabilization and timely transfer remain inconsistent[15,16].

Perinatal mortality was high in this cohort and was predominantly observed among pregnancies complicated by major PP. Prematurity played a central role in poor neonatal survival, as recurrent bleeding frequently necessitated emergency preterm delivery to safeguard maternal life. Preterm neonates are inherently vulnerable to respiratory failure, sepsis, and neurological complications, all of which contributed to early neonatal deaths in this study. In addition, repeated hypoxic episodes secondary to maternal hemorrhage likely reduced

fetal tolerance to labor and surgical stress, further compounding perinatal risk [17].

The significantly higher frequency of preterm birth among women with major PP observed in this study mirrors the clinical reality that many of these pregnancies cannot be continued to term due to uncontrolled bleeding. Emergency cesarean delivery following acute hemorrhage remains the principal indication for iatrogenic prematurity in this condition. Although advances in neonatal intensive care have improved outcomes for preterm infants, limited access to advanced neonatal support in public-sector institutions continues to restrict survival gains, particularly for extremely low birth weight babies [18].

The findings of this study reinforce the practical importance of structured antenatal risk stratification and planned institutional delivery for women with major PP. Early identification of high-risk cases must be followed by correction of maternal anemia, arrangement of blood products, and delivery planning in centers equipped with intensive care and surgical expertise. The multidisciplinary involvement of obstetricians, anesthesiologists, neonatologists, and transfusion services is central to optimizing outcomes. Although the retrospective design and single-center setting limit generalizability, the study provides strong region-specific evidence that major PP carries a substantially higher risk of catastrophic maternal and perinatal outcomes, largely driven by hemorrhage and prematurity.

Conclusion

In this retrospective study, major PP was associated with a substantially higher risk of severe maternal and perinatal adverse outcomes compared with low-lying or marginal PP. Postpartum hemorrhage requiring transfusion, obstetric hysterectomy, maternal mortality, preterm delivery, and perinatal death were concentrated predominantly among women with major placental involvement. These findings underscore the critical importance of early antenatal detection of placental location and appropriate risk stratification. Planned delivery in a well-equipped tertiary care center with immediate access to blood products, intensive care facilities, and multidisciplinary expertise is essential to improve outcomes. Strengthening referral pathways, optimizing maternal anemia prior to delivery, and ensuring institutional preparedness remain key strategies to reduce preventable morbidity and mortality. Focused surveillance and timely intervention in women with major PP can significantly improve both maternal survival and neonatal outcomes in resource-limited settings.

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