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Original Research Article

An analysis of pregnancy outcomes in relation to the location of placenta previa

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ABSTRACT

Background: The improper implantation of the placenta above or near the cervical os is called placenta previa, and it causes significant maternal and newborn morbidity. Major placenta previa is more dangerous due to its larger cervical os placental covering. The study evaluated pregnancy outcomes in relation to the location of placenta previa, focusing on the differences between major and minor cases to inform optimal management strategies.
Methods: This retrospective cohort study comprised 200 pregnant women diagnosed with placenta previa. Patients were classified into major (n=120) and minor (n=80) placenta previa groups based on ultrasound findings. Data on maternal and neonatal outcomes were extracted from medical records and analyzed using statistical package for the social sciences (SPSS) version 23. A p value of <0.05 was deemed to be statistically significant.
Results: Major placenta previa was related with significantly higher rates of adverse outcomes compared to minor placenta previa. Preterm birth occurred in 50% of major cases compared to 30% in minor cases (p=0.01). Maternal hemorrhage was more frequent in the major group (40%) versus the minor group (20%) (p=0.002). Neonatal Apgar scores <7 at 5 minutes were observed in 30% of major cases compared to 10% of minor cases (p=0.001). Additionally, major placenta previa was linked to higher rates of placenta accreta, uterine atony, and the need for blood transfusions and hysterectomies.
Conclusions: Major placenta previa increases the likelihood of unfavourable mother and foetal outcomes compared to minor. These findings emphasise the necessity of early diagnosis and targeted care to improve health outcomes.

Keywords: Placenta previa, Maternal hemorrhage, Preterm birth, Neonatal outcomes, Obstetric complications

INTRODUCTION

The anomalous implantation of the placenta above or close to the cervical os, or placenta previa (PP), is a serious obstetric issue that is linked to high rates of morbidity and mortality in both mothers and newborns.[1] Major PP is the placenta covering the internal cervical os entirely or partially, and minor PP is the placenta reaching the internal os or lying within 3 cm above it.[2] Despite advancements in prenatal care and imaging techniques, PP continues to pose challenges for clinicians due to its potential for causing severe bleeding and other complications during pregnancy and delivery.

According to reports, PP affects 0.3% to 0.5% of births worldwide, with differences observed in communities and healthcare environments.[3,4] A number of risk factors have been found, such as smoking, multiparity, older mothers, and prior caesarean deliveries. PP is becoming more common due to the global increase in caesarean procedures, which is making the health outcomes for mothers and newborns even more difficult to manage.[5]

Recent studies have highlighted the importance of early diagnosis and management of PP to mitigate its adverse effects.[6] The use of transvaginal ultrasonography has become the gold standard for diagnosing PP, allowing for accurate localization of the placenta and better planning for delivery.[7] Early identification of the condition enables clinicians to implement appropriate interventions, such as scheduled cesarean delivery and preoperative planning for potential hemorrhage, thus improving maternal and neonatal outcomes.

Despite these advancements, the management of PP remains complex, particularly in cases of major PP, which are associated with higher risks of preterm birth, severe maternal hemorrhage, and the need for blood transfusions or hysterectomy. Studies have shown that pregnancies complicated by major PP have a higher likelihood of adverse outcomes compared to those with minor PP. For instance, a study reported that major PP is significantly associated with increased rates of preterm delivery and maternal morbidity, emphasizing the need for tailored management strategies.[8]

The present study aims to evaluate pregnancy outcomes in relation to the location of PP, focusing on the differences between major and minor cases.

METHODS

Study design

The study was a retrospective cohort study.

Study setting

This study was done over a period from June 2023 to July 2024 at Patna Medical College and Hospital.

Participants

The study included 200 pregnant women diagnosed with PP.

Inclusion criteria

Pregnant women diagnosed with PP during the study period were included.

Exclusion criteria

Patients with lacking medical records, and patients with other significant medical conditions that could affect pregnancy outcomes were excluded.

Sample size

To calculate the sample size for this study, the following formula was used for estimating a proportion in a population, where n=sample size, Z=Z-score corresponding to the desired level of confidence, p=estimated proportion in the population, and E=margin of error.

$$n = \frac{Z^2 \times p \times (1-p)}{E^2}$$

Bias

To minimize bias, all eligible patients meeting the inclusion criteria within the study period were included. Data extraction and analysis were performed uniformly to ensure consistency.

Variables

The primary variable was the location of the PP, classified as major PP, minor PP. Secondary variables included feto-maternal outcomes such as maternal hemorrhage, preterm birth, and neonatal Apgar scores.

Data collection

Data were gathered from the medical records of patients diagnosed with PP. Information on placental location and pregnancy outcomes was extracted and recorded.

Procedure

PP was classified based on ultrasound findings. Major PP was defined as complete or partial coverage of the internal cervical os. Minor PP was defined as the placenta reaching the internal os or having a margin less than 3 cm above the internal cervical os.

Statistical analysis

The analysis of the gathered data was done with statistical package for the social sciences (SPSS) version 23. While frequency and percentage were used to convey qualitative data, mean±standard deviation (SD) was used for quantitative data. To compare means, the student's t-test was employed, whereas the Chi-square test was utilised to analyse categorical data. Less than 0.05 was the threshold for statistical significance.

Ethical approval

The study protocol was approved by the ethics committee and written informed consent was received from all the participants.

RESULTS

Out of the 200 participants, 120 were diagnosed with major PP, while 80 were diagnosed with minor PP. The mean age was similar across both groups, with a slight variation in gravidity and parity. The gestational age at diagnosis was comparable between the 2 groups.

Table 1: Demographic characteristics.

Characteristics	Major placenta previa (n=120)	Minor placenta previa (n=80)	Total (n=200)
Mean age (years)	29.4±5.2	28.6±4.8	29.1±5.0
Mean gravidity	2.3±1.1	2.1±0.9	2.2±1.0
Mean parity	1.8±1.0	1.6±0.8	1.7±0.9
Gestational age at diagnosis (weeks)	28.5±3.4	29.0±3.2	28.7±3.3

Major PP was associated with considerably poorer pregnancy outcomes compared to minor PP. The rate of preterm birth (<37 weeks) was notably higher in the major PP group (50%) compared to the minor group (30%), with a p value of 0.01. Similarly, maternal hemorrhage occurred more regularly in the major PP group (40%) compared to the minor group (20%), with a p value of 0.002. The rate of cesarean section was also higher in the major PP group (90%) compared to the minor group (80%), with a p value of 0.05. Neonates with an Apgar score <7 at 5 minutes were more common in the major PP group (30%) compared to the minor group (10%), with a p value of 0.001.

Table 2: Pregnancy outcomes.

Outcome	Major placenta previa (%)	Minor placenta previa (%)	P value
Preterm birth (<37 weeks)	60 (50)	24 (30)	0.01
Maternal hemorrhage	48 (40)	16 (20)	0.002
Cesarean section	108 (90)	64 (80)	0.05
Neonatal Apgar score <7 at 5 min	36 (30)	8 (10)	0.001

The average gestational age at delivery and birth weight were considerably lower in the major PP group. The average gestational age at delivery was 34.2±3.0 weeks in the major PP group, compared to 36.1±2.8 weeks in the minor group, with a p value of 0.0001. The mean birth weight was 2200±500 grams in the major group compared to 2700±400 grams in the minor group, with a p value of 0.0001. The mean duration of neonatal ICU stay was also longer in the major PP group (8.5±2.4 days) compared to the minor group (5.2±1.8 days), with a p value of 0.0001.

The study revealed notable variations in the timing of hemorrhage between the major and minor PP groups. Antepartum hemorrhage occurred in 30% of participants with major PP compared to 10% in those with minor PP, indicating a notable disparity (p=0.002). Similarly, intrapartum hemorrhage was observed in 20% of major PP cases, whereas only 10% of minor cases experienced this complication (p=0.05). Postpartum hemorrhage was significantly more common in the major PP group, with 40% of these patients affected, compared to 20% in the minor group (p=0.002).

Table 3: Quantitative data analysis.

Outcome	Major placenta previa	Minor placenta previa	P value
Gestational age at delivery (weeks)	34.2±3.0	36.1±2.8	0.0001
Birth weight (grams)	2200±500	2700±400	0.0001
Neonatal ICU stay (days)	8.5±2.4	5.2±1.8	0.0001

Table 4: Distribution of patients according to hemorrhage time.

Hemorrhage time	Major placenta previa (%)	Minor placenta previa (%)	P value
Antepartum hemorrhage	36 (30)	8 (10)	0.002
Intrapartum hemorrhage	24 (20)	8 (10)	0.05
Postpartum hemorrhage	48 (40)	16 (20)	0.002

Intraoperative and postoperative complications were more frequently observed in participants with major PP. Placenta accreta was diagnosed in 15% of major PP cases, compared to only 5% of minor cases (p=0.02). Uterine atony, a condition where the uterus fails to contract effectively after childbirth, was reported in 25% of major PP cases, significantly higher than the 10% observed in the minor group (p=0.01). The need for blood transfusions was also more prevalent among patients with major PP, affecting 40% of these patients compared to 20% of those with minor PP (p=0.002). Notably, 10% of patients with major PP required a hysterectomy, whereas none of the patients with minor PP needed this procedure (p=0.001).

Table 5: Distribution of patients by abnormal site of placenta and intraoperative and post-operative complications.

Complications	Major placenta previa (%)	Minor placenta previa (%)	P value
Placenta accreta	18 (15)	4 (5)	0.02
Uterine atony	30 (25)	8 (10)	0.01
Need for blood transfusion	48 (40)	16 (20)	0.002
Hysterectomy	12 (10)	0 (0)	0.001

The distribution of gestational age at delivery showed a substantial distinction between the two groups. Among patients with major PP, 30% delivered before 34 weeks of gestation, highlighting the increased risk of very preterm births in this group. In contrast, only 10% of minor PP cases delivered before 34 weeks. A larger proportion of minor PP cases delivered between 34 and 36 weeks (30%) compared to major cases (50%). Most notably, 60% of minor PP cases delivered after 36 weeks, which was significantly higher than the 20% observed in the major PP group.

Table 6: Group distribution according to gestational age.

Gestational age (weeks)	Major placenta previa (%)	Minor placenta previa (%)	Total
<34	36 (30)	8 (10)	44 (22)
34-36	60 (50)	24 (30)	84 (42)
>36	24 (20)	48 (60)	72 (36)

DISCUSSION

The study included 200 pregnant women who were diagnosed with PP, categorized into 120 cases of major PP and 80 cases of minor PP. The demographic data indicated no significant differences in age, gravidity, parity, or gestational age at diagnosis between the two groups. However, the outcomes associated with these two types of PP showed notable differences.

Major PP was considerably correlated with higher rates of adverse outcomes compared to minor PP. Preterm birth occurred in 50% of major PP cases, compared to 30% in minor cases, indicating a statistically significant difference (p=0.01). Maternal hemorrhage was more frequent in major PP, with 40% of these patients experiencing hemorrhage, compared to 20% in the minor group (p=0.002). Similarly, neonatal outcomes were poorer in the major PP group, with 30% of neonates having an Apgar score of <7 at 5 minutes, compared to 10% in the minor group (p=0.001).

The timing of hemorrhage also varied significantly between the groups. Antepartum hemorrhage was observed in 30% of major PP cases, compared to 10% in minor cases (p=0.002). Intrapartum hemorrhage occurred in 20% of major cases versus 10% of minor cases (p=0.05), and postpartum hemorrhage was seen in 40% of major cases compared to 20% of minor cases (p=0.002).

Intraoperative and postoperative complications were more common in the major PP group. Placenta accreta was diagnosed in 15% of major cases versus 5% of minor cases (p=0.02). Uterine atony was noted in 25% of major cases compared to 10% of minor cases (p=0.01). The need for blood transfusion was notably greater in the major group (40%) compared to the minor group (20%) (p=0.002). Notably, 10% of major PP cases required a hysterectomy, whereas no hysterectomies were needed in the minor group (p=0.001).

The gestational age at delivery was also considerably different among the groups. Major PP was associated with earlier deliveries, with 30% of these cases delivering before 34 weeks, compared to 10% in the minor group. Conversely, 60% of minor PP cases delivered after 36 weeks, compared to only 20% in the major group.

The results indicate that major PP is associated with a substantially higher risk of adverse maternal and neonatal outcomes compared to minor PP. The increased frequency of preterm births, maternal hemorrhage, and neonatal complications in major PP cases underscores the need for vigilant prenatal care and timely intervention. The higher rates of placenta accreta, uterine atony, and the need for blood transfusions in major PP cases highlight the importance of preparing for potential complications during delivery.

Overall, these findings suggest that careful monitoring and management strategies are crucial for pregnancies complicated by major PP to mitigate risks and improve outcomes for both mothers and infants.

The location of the PP affects pregnancy outcomes; recent research has examined this relationship and shed light on the therapeutic importance of placental attachment sites. A 678-case research assessed the placentation site in women with PP. In comparison to lateral/posterior wall placentas, it was discovered that placental attachment to the anterior wall was linked to lower birth weight, shorter gestational age, lower Apgar scores, greater prenatal bleeding rate, increased postpartum haemorrhage, longer hospital stays, higher blood transfusion rates, and higher rates of hysterectomy. Complete PP and placenta accreta spectrum (PAS) disorders were shown to be substantially more common when placental attachment occurred at the location of a previous caesarean surgery.[9]

324 women with PP were retrospectively analysed in a study, and they were divided into anterior and posterior groups as well as full and partial PP groups. It was discovered that compared to women with incomplete PP, those with complete PP experienced a greater incidence of premature labour. Furthermore, compared to the posterior group, the anterior group experienced a greater incidence of premature labour.[10]

A study that looked at 105 PP patients. Shorter gestational ages, low birth weights, greater risks of postpartum haemorrhage, blood transfusions, and hysterectomy have all been associated with anterior wall placentation. The incidence of total PP was raised when an attachment was made to the site of a prior caesarean incision, but other pregnancy outcomes were not significantly impacted.[11]

A cohort study examined into the relationship between pregnancy outcomes and placental position other than

previa. It was discovered that unfavourable pregnancy and newborn outcomes were linked to placental sites other than previa.[12]

After 24 weeks of gestation, the association between PP and pregnancy results was examined in a cross-sectional study involving 77 participants. Negative outcomes and caesarean deliveries were substantially correlated with higher grades of PP.[13]

In another study, the placental histopathological lesions between anterior and posterior PP were studied, along with the results for mothers and newborns. It was discovered that longer mother hospital stays and greater rates of newborn blood transfusions were linked to anterior PP.[14]

A study analyzed the relationship between placental location and perinatal outcomes in 1000 pregnant women. It found that lateral placental locations were associated with a higher rate of adverse outcomes such as preterm birth and intrauterine growth restriction (IUGR) compared to other placental positions.[15]

A study examined the histopathological differences in placentas from pregnancies complicated by PP compared to controls. It found significant associations between PP and maternal underperfusion, including increased rates of villous infarction and intervillous fibrin deposition, which can lead to adverse perinatal outcomes.[16]

Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

CONCLUSION

The study demonstrates that major PP is associated with considerably higher risks of adverse feto-maternal outcomes compared to minor PP. The findings underscore the importance of careful monitoring and management of pregnancies complicated by major PP to improve maternal and neonatal outcomes.

Recommendations

Enhanced prenatal care and timely intervention are crucial for pregnancies complicated by major PP. Further research is recommended to explore preventive measures and advanced management techniques for reducing the incidence and severity of complications.

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