

## Progression of Pregnancy Outcomes with Respect to the Location of Placenta Previa

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### Abstract

**Background:** Placenta Previa (PP) is linked to substantial use of healthcare resources due to its significant contribution to both foetal and maternal morbidity and death rates, particularly in poor nations. Complications include a range of possible adverse outcomes, such as the occurrence of excessive haemorrhaging and premature delivery, alongside the need for caesarean section. The objective of this research was to ascertain the prevalence, identify the risk factors, and examine the poor foeto-maternal outcomes associated with placenta previa. The present study employs various methodologies.

**Methods:** A retrospective cohort analysis was undertaken using the maternal medical data obtained from Jawaharlal Nehru Medical College and Hospital, Bhagalpur, in India covering the period from August 2021 to July 2023.

**Results:** The study comprised 128 individuals, ranging in age from 20 to 38 years, with an average age of  $28.6 \pm 4.5$  years. 66 (51.6%) of the pregnant women in the research were multipara, while 62 (48.4%) were primigravida. A 1% PP rate was detected. Approximately 60.2% of patients, or 77, experienced substantial postoperative problems, whereas 39.8%, or 51, had moderate postoperative problems. About 61% of moderate placenta previa (PP) cases- 31 of 51- are nulliparous. About half of placenta previa patients had a previous caesarean. 34 of 51 patients (66.6%) with minor postpartum haemorrhage (pph) and 59 of 77 (76.6%) with severe pp had antepartum haemorrhage.

**Conclusion:** The positioning of the placenta may have a significant role in influencing the outcome of a pregnancy. This research emphasises the need of comprehensive obstetrics care and timely identification of women who are at risk of developing placenta previa, since these measures have the potential to mitigate the occurrence of such issues.

**Keywords:** placenta positioning, maternal and fetal outcomes

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### Introduction

A restricted number of researchers have examined the relationship between placental implantation location and pregnancy outcome [1-3]. The distribution of blood flow to the uterus is not uniform. The precise location of implantation and subsequent placement of the placenta inside the uterus are likely significant factors in determining placental blood flow and, therefore, the outcome of pregnancy [4].

Extensive study has been conducted on the topic of poor placental implantation, primarily due to the significance of accurately identifying placenta previa. Limited research has been conducted on several dimensions of placental location and its potential influence on the outcome of pregnancy [5-

7]. The aforementioned research has shown that the positioning of the placenta may have significant consequences for adverse pregnancy outcomes, such as preterm delivery, small for gestational age, foetal malposition, malpresentation, and the onset of pre-eclampsia [6]. Theoretically, a lateral placental position may potentially increase the likelihood of intrauterine growth restriction in the foetus. Intrauterine growth restriction (IUGR) refers to a condition characterised by impaired foetal growth. A case-control study done in the United States found that women who have their placenta positioned in the fundus had a higher probability of experiencing preterm rupture of membranes, along with its associated negative outcomes [5]. Conflicting

findings have been reported regarding the connection between intrauterine growth restriction (IUGR) and placental sites, excluding placenta previa [1, 7, 8].

The objective of this research was to examine the correlation between placental position and the outcome of pregnancy for both the foetus and the mother.

### Methods

A retrospective cohort research was undertaken using maternal medical data obtained from Jawaharlal Nehru Medical College and Hospital, Bhagalpur, in India over the period of August 2021 to July 2023.

A cohort of 128 individuals who were identified with placenta previa by the use of ultrasonography were included in the study. The medical records of patients were subjected to a comprehensive scrutiny. Placenta previa is categorised as major when the placenta fully or partly obstructs the internal cervical os. Conversely, when the placenta only extends up

to the internal os or the margin is less than 3 cm above it, it is categorised as minor. The primary objective of the study was to investigate the correlation between placental position and the fate of the mother and foetus.

Quantitative data is often represented using the mean value accompanied by the standard deviation (SD), which provides a measure of variability. On the other hand, qualitative data is often presented in terms of frequency and percentage, offering insights into the distribution and relative proportions of different categories or attributes. The Student's t-test is often used in statistical analysis to compare the means of two groups, whereas the Chi-square test is utilised to compare categorical data. The threshold for statistical significance, denoted as  $P < 0.05$ , is often used in statistical analysis.

### Results

One hundred twenty-eight patients enrolled in this study. The mean age with standard deviation were  $28.6 \pm 4.5$  years (range: 20-38 years) (Table 1).

**Table 1: Age group distribution and type of placenta previa**

Maternal age	Minor PP	Major PP	Total	P value
15 – 24 years (%)	12 (23.5%)	18 (23.4%)	30 (23.4%)	0.667
25 – 34 years (%)	36 (70.6%)	51 (66.2%)	87 (68%)	
35 – 44 years (%)	3 (5.9%)	8 (10.4%)	11 (8.6%)	
Total	39.9%	60.1%	128 (100%)	

Moreover, a total of 31 (61%) minor placenta previa cases were seen in primigravida women, whereas 46 (60%) large placenta previa cases were found in multiparous women. A statistically significant association was observed between parity and the grade of placenta previa, with a p-value of less than 0.05. The observed frequency of PP was found to be 1%. During the caesarean section procedure, a total of five patients (representing 3.91% of the sample) were incidentally identified as placenta previa. Conversely, the majority of pregnant women, namely 123 patients (accounting for 96.09% of the sample), were discovered prenatally via the use of ultrasound imaging. There was no significant

association seen between the occurrence of placenta previa in ultrasound scans and a history of prior caesarean surgery. This finding was determined based on the analysis of a sample of 51 patients with minor placenta previa and 77 patients with major placenta previa, with a p-value greater than 0.05.

Approximately 66.6% of patients with moderate postpartum haemorrhage and 76.6% of patients with large postpartum haemorrhage had antepartum haemorrhage. In contrast, postpartum haemorrhage was seen in only 13.7% of patients with minor postpartum haemorrhage and 7.8% of patients with major postpartum haemorrhage (Table 2).

**Table 2: Distribution of patients according to hemorrhage time**

Hemorrhage	Major PP (n=77)	Minor PP (n=51)	P Value
Antepartum	59 (76.6%)	34 (66.6%)	0.020
Postpartum	6 (7.8%)	13 (25.4%)	

In comparison between the major and minor pp, there were no statistical difference between the two groups regarding history of evacuation and curettage, history of caesarean section, and interval between the last caesarean section and current pregnancy (Table 3).

**Table 3: Group distribution according to previous surgical procedure**

Type of previous surgery	Minor PP	Major PP	P value	
History of evacuation and curettage	11 (21.6%)	18 (23.4%)	0.233	
Previous Cesarean section	26 (51%)	44 (57.1%)	0.233	
Previous uterine surgery	26 (51%)	24 (31.2%)	0.025	
Interval between last C/S and current pregnancy	< 18 months	24 (47.1%)	26 (33.8%)	0.143
	>18 months	27 (52.9%)	51 (66.2%)	

Table 4 revealed that two third of the patient (major or minor PP) did not require blood transfusion. On the other hand, 18 patients with minor PP and 27 patients with major PP needed blood transfusion where some of them needed more than 4 units of blood. (Table 4).

**Table 4: Group distribution according to history of blood transfusion**

History of bloodtransfusion	Minor PP	Major PP	P Value
Non	33 (64.7%)	49 (64.5%)	0.966
< 4 units blood	6 (11.6%)	8 (10.5%)	
>4 units blood	12 (23.5%)	19 (25%)	

Regarding intraoperative complications: bowel injury occurred in 10 (7.8%) patients, 6 of them with minor PP whereas, 10 patients complicated by urinary bladder injury, and eight (80%) of them with major PP. In addition, five (3.9%) patients (2 minor pp and 3 major pp) end by caesarean hysterectomy. While, five (3 major pp and 2 minor pp) patients were died (4%) (Table 5).

**Table 5: Distribution of patients of the abnormal site of the placenta and intra and postoperative complications.**

Intra/Postoperative complication	Minor PP	Major PP	Total(128)	P Value
Massive bleeding	14(27.5%)	11(14.3%)	25(19.5%)	0.073
Bowel injury	6(11.8%)	4(5.2%)	10(7.8%)	0.195
Uterine artery ligation	2(3.9%)	3(3.9%)	5(3.9%)	0.994
Urinary bladder injury	2(3.9%)	8(10.4%)	10(7.8%)	0.313
Cesarean hysterectomy	3(5.9%)	2(2.6%)	5(3.6%)	0.387
Disseminated intravascularcoagulation	1(2%)	4(5.2%)	5(3.9%)	0.647
ICU admission	2(3.9%)	8(10.4%)	10(7.8%)	0.313
Death	2(3.9%)	3(3.9%)	5(3.9%)	0.944

In addition, there is no significance between gestational age at the time of delivery of patients and degree of placenta previa. ( $P > 0.05$ ) (Table 6).

**Table 6: group distribution according to gestational age**

Gestational Age	Minor PP	Major PP	P Value
Term	28(54.9%)	34(44.2%)	0.280
Preterm	23(45.1%)	43(55.8%)	

In addition, 63 (49.22%) of pregnant women had history of chronic diseases including diabetes and hypertension, which had no statistically significant relation with grade of placenta Previa. Furthermore, we have found that 42.9% of the patients were O<sup>+</sup> blood group, 38.3% A<sup>+</sup> blood group, 38.3% B<sup>+</sup> blood group, 10.9% B<sup>-</sup>, 0.8% AB<sup>+</sup> group, 4.7% A<sup>-</sup>

blood group 1.6% O<sup>-</sup> blood group 4.7% with no significant relationship with grade of placenta Previa.

Regarding neonatal outcome, there were no statistical difference between groups regarding admission to NICU, sex of newborn, birth weight and Apgar score 1 minute and 5 minutes ( $p > 0.05$ ) (Table 7).

**Table 7: Neonatal outcome according to the types of PP**

Outcome	Minor PP	Major PP	P Value
Newborn	Male	45.5%	0.367
	Female	55%	
Admission to NICU (%)	11(21.3%)	21(27.3%)	0.535
Birth weight in grams, means $\pm$ SD	2470 $\pm$ 715.3	2513.1 $\pm$ 763.6	
Apgar score 1 minute $\pm$ SD	5.423 $\pm$ 1.64	5.13 $\pm$ 1.13	
Apgar score 5 minutes $\pm$ SD	7.39 $\pm$ 1.62	8.04 $\pm$ 1.76	

## Discussion

The increased susceptibility to postpartum haemorrhage in women diagnosed with placenta previa might perhaps be attributed to the presence of placental implantation in a prior caesarean scar, resulting in a deeper attachment that hinders

placental detachment. In the present investigation, it was observed that over 50% of the patients in the cohort had a documented history of prior uterine surgery. The inadequate constriction of the maternal blood supply by the lower segment may result in significant haemorrhage both during and after birth.

In addition, it was shown that women diagnosed with placenta previa exhibited a ten-fold increase in the likelihood of undergoing a Caesarean birth.

The findings of our research indicate that a majority of placenta cases, namely 68% of patients, were seen in individuals aged between 25 and 34 years. A prevalence rate of 39.9% was observed among individuals diagnosed with placenta Previa mild. A statistically significant difference was seen between the primigravida population in the PP minor group, which accounted for 61%, and the multiparous population in the PP major group, which accounted for 60% ( $p < 0.05$ ).

It has been observed that a significant proportion of women diagnosed with placenta previa, namely 24.2%, required a blood transfusion of more than 4 units. These results exhibit similarity with prior research [8]. This research revealed that the diagnosis of placenta previa occurred incidentally after caesarean section in a mere five individuals, accounting for a prevalence rate of 3.91%. A total of 123 pregnant women, accounting for 96.09% of the sample, received their diagnosis during prenatal care appointments. This might be attributed to the fact that ultrasonography is a commonly used diagnostic procedure, which can be valuable in identifying women who are at a higher risk of developing placenta previa. This early diagnosis can contribute to the implementation of preventive measures aimed at reducing the occurrence of unfavourable birth outcomes, such as infants with Apgar scores of less than  $5.13 \pm 1.13$  at both the first and fifth minute after birth. One potential explanation for these observations is that the occurrence of bleeding in cases of placenta previa may contribute to the occurrence of preterm births, hypoxia, and intrauterine growth restriction.

Numerous studies have shown that problems such as obstetric caesarean hysterectomy and severe haemorrhage are prevalent concerns associated with placenta previa. Furthermore, it has been seen that surgical procedures might result in damage to the bladder, colon, and ureters [9]. Our research findings indicate that 19.5% of cases had complications related to significant haemorrhaging, while 7.8% experienced injuries to the bowel and urinary bladder.

The findings of our research indicate that a total of five patients (3.9%) had caesarean hysterectomy. Among these patients, two had moderate placenta previa, while three had large placenta previa. It is worth noting that this incidence is lower than the figures reported in existing literature, which suggests that about 10-11.1% of patients with placenta previa need caesarean hysterectomy [10,11]. A total of five patients, accounting for 3.9% of the sample, experienced fatality. Emjower et al. [11] conducted a study revealing a maternal

mortality rate of 1.25%. Additionally, other studies have shown varying rates of maternal mortality in cases with placenta previa, ranging from less than 1% to as high as 5% [12]. Furthermore, it was seen that 66 children, accounting for 51.5% of the total, who were born to mothers diagnosed with placenta previa, were delivered prematurely. Additionally, it was found that 50.7% of these newborns were of male gender. MacGillivray et al. [13] demonstrated a higher male-to-female sex ratio at delivery among women diagnosed with placenta previa, with a special emphasis on multiparous individuals. There is no statistically significant difference in birth weight between the two forms of postpartum. A total of 32 out of 128 infants, accounting for 25% of the sample, were admitted to the neonatal intensive care unit (NICU), which aligns with findings reported in existing literature [9, 14]. Among these infants, 65.6% were delivered to mothers with significant perinatal pathology (PP) and exhibited an Apgar score of less than  $5.13 \pm 1.13$  at both the first and fifth minutes after birth. One potential explanation for these phenomena is that the occurrence of bleeding in cases of placenta previa may contribute to the preterm birth of infants, as well as the development of hypoxia and intrauterine growth limitation.

### Conclusion

The positioning of the placenta may have a significant role in influencing the outcome of a pregnancy. This research emphasises the need of comprehensive obstetrics care and timely identification of women who are at risk of developing placenta previa, since these measures have the potential to mitigate the occurrence of such issues.

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