Experimental
&
Clinical Article

Obstetrics; *Maternal Fetal Medicine and Perinatology*

Parity-Driven Disparities in Placenta Previa: A Comprehensive Analysis of Obstetric and Perinatal Factors

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ABSTRACT

OBJECTIVE: This retrospective cohort study aimed to investigate the incidence of known risk factors for placenta previa in primiparous patients and assess the maternal and fetal outcomes associated with this condition in a tertiary hospital setting.

STUDY DESIGN: Data were collected from electronic medical records of pregnant women with confirmed placenta previa who were monitored at our clinic and delivered between January 2016 and June 2024. Demographic characteristics, obstetric history, and perinatal outcomes were analyzed. Statistical analysis was conducted using SPSS version 22, and comparisons between multiparous and nulliparous women were made using appropriate tests.

RESULTS: A total of 674 pregnant women were included in the study, comprising 542 multiparous and 132 nulliparous women. Significant differences were observed between the two groups in terms of anesthesia type, transfusion rates, operation duration, and hemoglobin levels. Neonatal outcomes, including APGAR scores, showed variations between multiparous and nulliparous women. However, certain outcomes such as birth weight did not differ significantly between the groups.

CONCLUSION: This study provides valuable information on maternal and neonatal outcomes associated with placenta previa in multiparous and nulliparous women. The findings highlight the complex interplay between maternal parity, anesthesia choice, and clinical outcomes and underscore the importance of tailored management approaches in this population.

Keywords: Maternal parity; Obstetric risk factors; Perinatal outcomes; Placenta previa; Primiparous women

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Introduction

Placenta previa, characterized by placental tissue extending over the internal cervical os, poses significant clinical challenges in obstetric practice. In systematic reviews, the pooled prevalence of placenta previa is 4 to 5 per 1000 births but varies worldwide; the reasons for this variation are unclear (1,2). This condition is associated with a range of sequelae, including the necessity for cesarean birth and the potential for severe antepartum bleeding, preterm birth, and postpartum hemorrhage (3). Placenta previa represents a critical concern in obstetrics, necessitating prompt recognition and appropriate management to optimize maternal and fetal outcomes. Placenta previa, a condition with significant obstetric implications, is often influenced by various risk factors, including previous cesarean births and previous occurrences of the condition, which increase the risk by 47 to 60 percent (4,5). Previous placenta previa recurs in 4 to 8 percent of subsequent pregnancies (6). Multiple gestation pregnancies, particularly twins, exhibit a 40 percent higher prevalence of placenta previa compared to singleton pregnancies (7). Additionally, a range of interconnected factors, such as increasing parity and maternal age, contribute to the risk of placenta previa (8); however, the

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mechanisms by which advanced maternal age causes impaired placentation are not fully understood. One of the possible explanations is the increased percentage of sclerotic changes on intramyometrial arteries which reduce placental blood flow, the other is the increase in the number of recurrent pregnancies and curettage rates and consequent damage to the endometrial tissue by scarring and adhesion formation in the uterus (9,10). A study has shown that women older than 30 years of age have a 2.5 - fold higher risk for the development of placenta previa. In the same study, it was found to be significantly more frequent in women older than 35 years and significantly less frequent in women younger than 25 years (10).

Male fetuses and abortion, either spontaneous or induced are risk factors for placenta previa (8). Additionally, previous infertility treatment, contributes to the intricate pathogenesis of placenta previa, necessitating comprehensive risk assessment during prenatal care (8,11). Understanding these risk factors is pivotal for early detection and tailored management strategies in women at risk of placenta previa. Although the most common identifiable risk factor of placenta previa is a previous cesarean section, it has been shown that other risk factors play a role in the development of placenta previa in primiparous patients. In our study, we investigated the incidence of known risk factors for primiparous placenta previa in our patients and the maternal and fetal outcomes of our patients.

Material and Method

This retrospective cohort study was conducted at a tertiary hospital of Necmettin Erbakan University Faculty of Medicine Obstetrics and Gynecology from January 2016 to June 2023 following approval from the university ethics committee (Number: 2023 / 4521, Application ID: 15496) and in accordance with the principles outlined in the Declaration of Helsinki. The study included pregnant women with confirmed placenta previa who were monitored and delivered at our clinic during the study period, with complete data available. The diagnosis of placenta previa was confirmed by transvaginal ultrasonography in patients who were thought to have placenta previa in transabdominal ultrasonography performed at 28–32 weeks of gestation, and patients with a low-located placenta were not included in the study.

Exclusion criteria comprised autoimmune diseases, malignancies, acute or chronic infections, chronic kidney or liver diseases, hematological disorders, recent blood product transfusions, twin pregnancies, fetal anomalies, inadequate data follow-up during pregnancy, and deliveries conducted at other clinics.

Data including demographic characteristics, treatment details, laboratory results, pregnancy follow-up information, and perinatal outcomes were collected from electronic medical records.

Maternal age, gravidity, parity, and history of miscarriage were meticulously documented for all pregnant women. Gestational age was determined based on the last menstrual period or first-trimester ultrasonography records.

The assessment included scrutiny of gestational age, mode of delivery, neonatal birth weight, 5th-minute APGAR scores, rates of neonatal intensive care unit (NICU) admission, and incidences of stillbirth. Additional outcomes evaluated included preeclampsia, placental abruption, uterine atony, small-for-gestational-age (SGA) neonates, preterm birth, and rates of premature rupture of membranes (PPROM).

Statistical analysis

SPSS version 22 was used for data analysis. The normality of data distributions was assessed using the Kolmogorov-Smirnov test, Shapiro-Wilk test, and histograms. Independent samples t-tests were performed for continuous data that fit the normal distribution and results were presented as mean ± SD. For continuous data that did not fit the normal distribution, comparisons between two groups were made using the Mann-Whitney U test and results were expressed as median (minimum-maximum). Categorical data were compared using the chi-squared test or Fisher's exact test and results are presented as n (%). The significance level was set at a two-tailed P value of 0.05.

Results

Demographic and obstetric characteristics: A total of 674 pregnant women (542 multiparous and 132 nulliparous) with placenta previa were included in the study. The mean age of the multiparous women was significantly higher than that of the nulliparous women (36.44 ± 5.17 years vs. 31.30 ± 4.91 years, p = 0.001) (Table I).

Maternal and obstetric outcomes: A higher proportion of multiparous women received general anesthesia compared to nulliparous women (54.2% vs 44.7%, p = 0.049). The main causes of labor such as bleeding, contractions, fetal distress, elective labor, and pre-eclampsia did not differ significantly between the two groups. Transfusion rates were significantly higher in multiparous women (29.5% vs. 9.8%, p = 0.001) and the median number of transfusion units required was also higher (range 0-6 vs. 0-3, p = 0.001). The duration of surgery also differed significantly, with multiparous women having longer operations on average (60 minutes, range 30-240 minutes vs. 55 minutes, range 25-90 minutes, p = 0.001). Pre- and postoperative hemoglobin levels were significantly lower in multiparous women (11.56 ± 1.39 g / dL vs. 12.24 ± 1.40 g / dL preoperatively, p = 0.001 and 10.74 ± 1.54 g / dL vs. 11.53 ± 1.54 g / dL postoperatively, p = 0.001). The median length of hospital stay was the same in both groups (2 days), but the range was wider in multiparous women (1-59 days versus 1-19 days, p = 0.001) (Table II).

Neonatal outcomes: Gestational age at birth and birth weight were similar between groups (p = 0.137 and p = 0.101, respectively). The proportion of neonates with a first-minute APGAR score <7 did not differ significantly (47.4% in multiparous versus 42.4% in nulliparous women, p = 0.302). The proportion of neonates with a fifth-minute APGAR score <7 was significantly higher in multiparous women (21.2% vs 12.1% , p = 0.018). Neonatal hospitalization rates and sex distribution were not significantly different between groups (p = 0.199 and p = 0.245, respectively). Rates of fetal growth restriction were similar (10.9% in multiparous versus 14.4% in nulliparous, p = 0.259) (Table III).

Table I: *Comparison of demographic and obstetric characteristics between multiparous and nulliparous women with placenta previa.*

	Multiparous (n = 542)	Nulliparous (n = 132)	p
Age	36.44 ± 5.17	31.30 ± 4.91	0.001
Gravity	3 (2 - 16)	1 (1 - 1)	0.001
Parity	2 (0 - 6)	0 (0 - 0)	0.001
C/S count	1 (0 - 4)	0 (0 - 0)	0.001
Previous C/S History	330 (60.9 %)	0 (0.0 %)	0.001
Previous PP History	3 (0.6 %)	0 (0.0 %)	0.392

C/S: cesarean section, PP: Placenta previa

Table II: *Comparison of maternal and obstetric characteristics of the groups*

Variable		Multiparous (n = 542)	Nulliparous (n = 132)	p
Anesthesia Type	General	294 (54.2%)	59 (44.7 %)	0.049
	Regional	248 (45.8%)	73 (55.3 %)	
Reason for Birth	Hemorrhage	74 (13.7%)	19 (14.4 %)	0.561
	Contraction	390 (72.0%)	92 (69.7 %)	
	Fetal distress	15 (2.8%)	7 (5.3 %)	
	Elective labor	53 (9.8%)	13 (9.8 %)	
	Preeclampsia	10 (1.8%)	1 (0.8 %)	
Maternal Diabetes mellitus		42 (7.7%)	5 (3.8 %)	0.109
Maternal Hypertension		4 (0.7%)	0 (0.0 %)	0.322
Placenta accreta spectrum		33 (6.1%)	4 (3.0 %)	0.167
Transfusion rate		160 (29.5%)	13 (9.8 %)	0.001
Transfusion unit		0 (0-6)	0 (0-3)	0.001
Operation Time (Min)		60 (30 - 240)	55 (25-90)	0.001
Preoperative hemoglobin		11.56 ± 1.39	12.24 ± 1.40	0.001
Postoperative hemoglobin		10.74 ± 1.54	11.53 ± 1.54	0.001
Maternal Intensive Care Unit hospitalization		1 (0.2%)	0 (0.0%)	0.621
Number of days of hospitalization		2 (1 - 59)	2 (1-19)	0.001

Table III: *Comparison of neonatal outcomes in multiparous and never-labored women with placenta previa*

		Multiparous (n = 542)	Nulliparous (n = 132)	p
Birth week (Week)		36 (20-40)	36.5 (29-40)	0.137
Birth weight (Gram)		2840 (190-4120)	2960 (1110-4680)	0.101
Neonatal APGAR Score <7 (1st min)		257 (47.4%)	56 (42.4%)	0.302
Neonatal APGAR Score <7 (5th min)		115 (21.2%)	16 (12.1%)	0.018
Neonatal Hospitalization Rate		162 (29.9%)	32 (24.2%)	0.199
Neonatal Gender	Female	294 (54.2%)	79 (59.8%)	0.245
	Male	248 (45.8%)	53 (40.2%)	
FGR Rate		59 (10.9%)	19 (14.4 %)	0.259

FGR: Fetal Growth Retardatıon

Discussion

The findings of our study indicate several key observations. Firstly, this study provides valuable insights into maternal and neonatal outcomes associated with placenta previa in multiparous and nulliparous women. The findings highlight the complex interplay between maternal parity, anesthesia choice, and clinical outcomes, underscoring the importance of tailored management approaches in this population.

Placenta previa has been reported to be associated with serious maternal morbidity, mortality, and adverse neonatal outcomes (12). A prospective observational cohort study involving 30,132 women undergoing cesarean delivery without labor across 19 academic centers over four years revealed a significant correlation between the number of cesarean deliveries and increased maternal morbidity (13).

General anesthesia for cesarean section is unsuccessful compared with regional anesthesia complications such as endotracheal intubation, aspiration of gastric contents, hypoxia 17 times, and maternal death the risk increases by 1.7 times (14,15). General anesthesia is preferred more often in multiparous patients due to the increased risk of bleeding compared to nulliparous patients. Longer operation times and increased intervention may be required due to the increased risk of intraabdominal adhesions due to the high rate of previous cesarean sections (15). However, there is a risk of hemodynamic instability due to major hemorrhage such as placenta previa general anesthesia is more preferred in patients. Hypotension due to sympathetic block, the inability to titrate the level of anesthesia after administration, and the possibility of prolonged operation time. Spinal and epidural anesthesia are used less frequently in PP cases. In addition, massive hemorrhage and coagulation disorders caused by transfusion increase the risk of epidural or spinal hematoma (16). Therefore, general anesthesia is preferred as the anesthetic method in PP cases. Although there is insufficient evidence regarding the type of primary anesthesia (17,18), general anesthesia is preferred in multiparous PP cases.

The findings of our study shed light on the importance of anesthesia selection in women with placenta previa. The significantly higher proportion of multiparous women undergoing delivery under general anesthesia compared to nulliparous women highlights the potential impact of parity on anesthesia choice. While the reasons behind this discrepancy require further investigation, it suggests that multiparous women with placenta previa may present with different clinical considerations or preferences influencing anesthesia decisions.

Placenta previa can cause profuse maternal hemorrhage and markedly increase the risk of blood transfusion (19,20). When massive bleeding is expected, a discussion among multidisciplinary experts, including maternal-fetal medicine specialists, anesthesiologists, and transfusion medicine physicians, is needed regarding the management of the patient (21). In this study, estimated blood loss was significantly higher in non-primigravida compared to primigravida. The lower blood loss observed in primigravidae may be attributed to the lower prevalence of placenta accreta. In addition, studies have shown that uterine contractions in the postpartum period are better in primigravida compared to non-primigravida. Uterine contractions have played a very important role as a protective mechanism against intraoperative blood loss (22).

One of the notable findings of our study is the substantially higher transfusion rate observed in multiparous women compared to nulliparous women. This disparity underscores the complex nature of managing hemorrhage in women with placenta previa, particularly in those with a history of multiple births. The longer operation times and lower hemoglobin levels in multiparous women further emphasize the challenges associated with surgical interventions in this population. These findings emphasize the importance of meticulous perioperative planning and close monitoring to minimize the risk of hemorrhage and optimize maternal outcomes.

Neonatal complications associated with placenta previa in previous studies include preterm birth, low birth weight, respiratory depression at birth, RDS, intraventricular hemorrhage, anemia, and low APGAR scores (23,24). None of those studies controlled for maternal age, gestational age, and congenital anomalies.

While certain neonatal outcomes such as birth weight did not differ significantly between multiparous and nulliparous women, the higher incidence of low APGAR scores five minutes after birth in multiparous women raises important clinical considerations. This discrepancy may reflect underlying differences in maternal health status, intraoperative management, or fetal response to delivery, warranting further investigation. However, other neonatal outcomes, including hospitalization and fetal growth restriction rates, did not differ significantly between the groups, suggesting overall comparable neonatal outcomes irrespective of maternal parity.

The findings of this study have several clinical implications for the management of placenta previa in multiparous and nulliparous women. Tailoring anesthesia choices and perioperative management strategies based on parity status may help optimize maternal outcomes and reduce the risk of complications such as hemorrhage. Additionally, identifying disparities in neonatal outcomes underscores the need for comprehensive maternal-fetal care and vigilant monitoring during delivery. Further research is warranted to explore the underlying factors contributing to these disparities and to develop targeted interventions aimed at improving outcomes in this high-risk population.

However, it is important to acknowledge the limitations of our study. We conducted this retrospective analysis at a single

tertiary facility, which may limit the generalizability of the findings to larger populations. Future prospective studies with larger cohorts are necessary to clarify the impact of parity on fetal and maternal outcomes in placenta previa cases.

Conclusion

In conclusion, this study provides valuable insights into the maternal and neonatal outcomes associated with placenta previa in multiparous and nulliparous women. The findings highlight the complex interplay between maternal parity, anesthesia choice, and clinical outcomes, underscoring the importance of tailored management approaches in this population. By addressing these disparities and implementing evidence-based interventions, clinicians can strive to improve outcomes and enhance the quality of care for women with placenta previa.

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