FREQUENCY OF FETAL OUTCOMES IN PATIENTS WITH PREEXISTING PLACENTAL ABNORMALITIES. A PROSPECTIVE STUDY IN TERTIARY CARE HOSPITAL

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ABSTRACT

OBJECTIVES

This study aimed to access the various types of placental abnormalities and their impact on fetal well-being, including fetal admission to the nursery, complications, and outcomes.

METHODOLOGY

This cross-sectional study was conducted from September 1, 2022, to December 31, 2024, in the Obstetrics and Gynecology department of Ayub Medical Teaching Institute, Abbottabad, Pakistan. The sample size (n = 63) was calculated using the WHO calculator 1.1, with an estimated prevalence of placenta previa of 12%, an absolute precision of 8%, and a 95% confidence interval. Patients diagnosed with placental abnormalities on grey-scale sonography were followed until delivery and discharge. The non-probability convenient sampling technique was applied for the data collection. In the study, only 63 met the inclusion criteria. The different maternal and fetal parameters of morbidity and mortality were recorded on a predesigned written questionnaire. The data were analyzed using SPSS version 21. The statistical test, ANOVA and chi-square were used to determine the significance, and the significance value was kept below 0.05

RESULTS

Fifty-four per cent of individuals belonged to the 20-34 years age group, and this age group had the highest incidence of placental abnormalities, i.e., 54% (p = 0.002). The most common abnormalities were placenta previa (20/63). The mean weight of the baby was 2.3Kg±0.6. About 15% of newborns had congenital anomalies. Nearly half of the sample population's newborns needed admission to the NICU. The most common reason for admission to NICU was acute respiratory distress syndrome 14/28 (26%). About 6% of newborns suffer from hypoxemic ischemic encephalopathy (HIE). The newborn mortality was 19/63 (30%) and was high in previa and abruption with a significance of 0.00.

CONCLUSION

Although some congenital disabilities are difficult to detect in neonatal life but still careful observation of our cohort indicates that placental abnormalities increase the risk of congenital disabilities, adverse outcomes and mortality in newborns.

KEYWORDS: *Hypoxemic ischemic encephalopathy (HIE), Neonatal respiratory distress syndrome, Placenta Accrete Spectrum (PAS), Fetal congenital anomalies, APGAR score*

INTRODUCTION

During embryogenesis, the placenta is the first organ to develop, acting as a vascular interface between the mother and the fetus. Placental morphological development is crucial for preventing prenatal and perinatal complications in both the mother and fetus. Abnormal placentas, such as placenta accreta, placenta previa, placental abruption, and abnormal morphogenesis, are associated with both short-term and long-term complications for the mother and fetus. Some of these complications include preeclampsia, congenital disabilities, low birth weight, fetal distress, fetal growth restriction, and cardiovascular effects, which enhance the mortality and morbidity of mother and newborn. The estimated worldwide maternal mortality ratio for 2024 was 292 per 100,000 in rural areas and 100 per 100,000 in urban areas. In middle- and lower-income countries, the maternal mortality rate (MMR) in rural and urban areas is 199/100,000 and 144/100,000, respectively.[1] Peripartum hemorrhages in the placenta due to placental and uterine malformation are the

leading cause of maternal death in South Asia, contributing more than a third of the global burden of stillbirths.[2] An extensive literature review suggests that most of the stillbirths in low and middle-income countries probably occur secondary to fetal asphyxia with significant contribution of placental abruption and placental vascular malformation. In Asia, the placental, maternal or fetal blood vessel malformation was the primary placental cause of death in 47% of stillbirths, among which previa and abruption account for 15%. In Pakistan, 48% of stillbirths are due to vascular malformation, either maternal, fetal or placental and 14% of stillbirths are due to placental abruption or placenta previa.[3] In Khyber Pakhtunkhwa, a recent study reported a stillbirth rate of 8/1,000, among which placental abnormalities were implicated in 19.9% of stillbirths.[4] In Pakistan, 62% of deliveries happen at home, and untrained birth attendants assist the majority of them.[5] Hence, the substantial amount of cause of stillbirth remains unknown. This data reflects that placental abnormalities are a key cause of stillbirth. These placental abnormalities not only increase the high demands on health care resources, but these abnormalities are considerably associated with poor fetal outcomes and increased maternal mortality to several folds. Numerous studies have established that morphology, including volume, weight, thickness, and shape, significantly correlates with the birth weight of the fetus.[6,7] Based on ultrasound and Doppler flow, fetal growth restriction (FGR) can be determined as early as the late second trimester and third trimester. It has been postulated that asymmetric fetal growth restriction (FGR) is responsible for 70 to 80 per cent of fetal growth restriction and primarily arises due to disruption of the blood supply, leading to uteroplacental insufficiency.[8] In this study, we will determine the type of placental abnormalities and assess the fetus for any gross congenital anomalies. Moreover, this study will investigate newborn NICU admissions, complications during delivery, reasons for hospitalization, and the outcomes for the fetus. Maternal counselling will be conducted regarding the risk factors for placental abnormalities, and strategies for neonatal well-being will be explained to parents.

METHODOLOGY

This was a cross-sectional study conducted in the Obstetrics and Gynecology department of Ayub Medical Teaching Institute, Abbottabad, Pakistan. The hospital's ethics committee approved the study with reference number No. RC-2022/EA-01/74. The study duration was from September 1, 2022, to December 31, 2024. The data of the study were collected using a predesigned written questionnaire. A non-randomized convenience sampling technique was used for data collection. The placental abnormalities were diagnosed using grey-scale sonography (Curvilinear 5 MHz frequency probe, Toshiba Xario 100) and further ascertained by visual examination during the cesarian section. The level of a sonographer is an assistant professor or above. The placental abruption was classified from class 0 to class 3 based on severity. The International Federation of Gynecology and Obstetrics (FIGO) classification was used to classify the placenta accreta spectrum (PAS). The placenta previa was graded from I to IV (RCOG Grading). The patients with placental abnormalities were followed till the delivery of the fetus. The APGAR score of 7-10 is reassuring, 4-6 is moderately low, and 0-3 is low. Moreover, after delivery of the fetus, the baby was accessed for congenital anomalies, complications, admission to NICU, diagnosis in NICU, blood transfusion and birth weight. The patients with epilepsy, severe eclampsia, maternal Folic acid and vitamin B12 deficiency, severe anemia, previous history of the neural tube, cleft lip, club foot or other congenital disabilities were excluded from the current study. The sample size (n = 63) was calculated using the WHO calculator 1.1, with an estimated prevalence of placenta previa of 12%, an absolute precision of 8%, and a 95% confidence interval. The qualitative data were expressed in terms of frequencies and percentages, while the quantitative data were presented as means, medians, and modes. The normality of the data was assessed using the Shapiro-Wilk test, along with statistical tests such as the Chi-square test and one-way ANOVA. The software for data analysis was SPSS version 21. The level of significance was maintained at a 95% confidence interval (CI) or a p-value less than 0.05.

RESULTS

Among 83 mothers, only 63 met the inclusion criteria (n = 63); the remaining proformas were incompletely filled and excluded from the current study. Fifty-four per cent of individuals (34) belonged to the 20-34 years age group, and this age group had the highest incidence of placental abnormalities at 54% (p = 0.002). The most common abnormalities were placenta previa (20/63), abruption (8/63), accreta (4/63), and percreta (2/63). The mean weight of the baby was 2.3 kg ± 0.6, as shown in Fig. 01. Preterm newborns were 37. The demographic details and placental characteristics are shown in detail in Table 01.

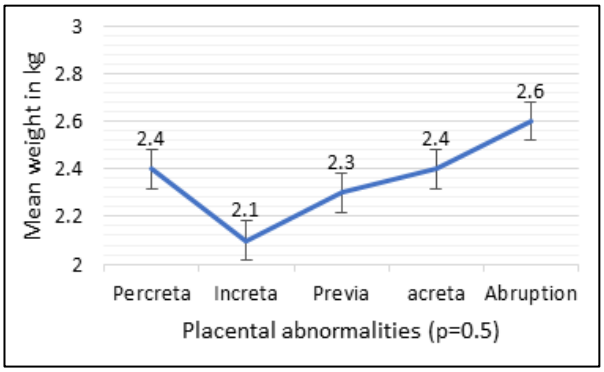

Figure 1: Correlation of fetal birth weight versus placental abnormalities

Table: 1 Demographic characteristics of patients presented with different types of placental abnormalities

Variables		Frequency (%)
Maternal age	<20 Years	13(21%)
	20-34 Years	34(54%)
	35-40 Years	10(16%)
	>40 Years	06(10%)
Birth history	Term	26(41.3%)
	Preterm	37(58.7%)
Placental abnormalities	Abruption	14(22%)
	Accreta	04(6.3%)
	Increta	04(6.3%)
	Percreta	06(9.5%)
	Previa	35(55.6%)
Placental abruption	Class 1	04(6.3%)
	Class 2	10(16%)
Placenta previa	Grade1	04(6.3%)
	Grade2	04(6.3%)
	Grade3	06(9.5%)
Fetal Anomalies	Club foot	02(3.2%)
	Down syndrome	04(6.4%)
	Hydrocephalous	02(6.4%)
	Pulmonary HTH	02(6.4%)
Diagnosis in NICU	ARDS	16(26%)
	Anemia	02(3.2%)
	Congenital heart disease	02(3.2%)
	Down syndrome	04(6.4%)
	Hypoxic Ischemic Encephalopathy	04(6.4%)
Placenta accrete spectrum	Type1	02(3.2%)
	Type2	08(13%)
	Type3	00(0%)
	Type4	25(40%)
Discharge status of newborn	Died	19(30%)
	Improved	22(35%)
	Stationary	08(13%)

Congenital anomalies were observed in 10 newborns, and the most common placental morphologies associated with congenital anomalies were increta and percreta (placenta accrete spectrum), with a p-value of 0.000. Almost half of the newborns (30/63) needed NICU admission, among which 28 had serious diagnoses, and the most common reason for admission to NICU was acute respiratory distress syndrome 14/28 (26%) followed by hypoxic-ischemic encephalopathy (6.4%). Only two newborns needed a blood transfusion in the NICU, while 24 were fed on an N/G tube. The mortality rate was 19/63, which was high in cases of previa and abruption, with a significance level of 0.00. The details of placental morphologies with respect to newborn morbidities and mortality are shown in Table 02. The mean hospital stay was 3 days ± 2. Details are shown in Fig 02.

Table 2: Stratification of Placental morphologies to newborn morbidities and mortality

Variable		Abruption (n=14)	Increta spectrum (n=14)	Previa (n=35)	Significance values
Preterm		06	12	19	0.04
APGAR 1min	7-10	04	02	16	0.003
	4-6	02	10	10	
	0-3	08	02	09	
APGAR 10min	7-10	06	12	18	0000.05
	4-6	02	0	08	
	0-3	06	02	09	
Anomalies		0	10	0	0.000
NICU admission		02	12	16	0.018
Neonatal mortality		04	02	13	0.000

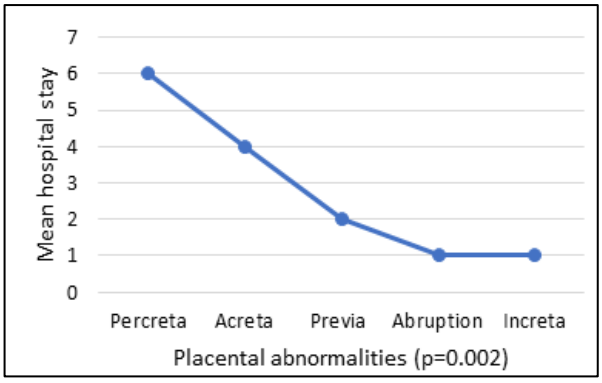

Figure 2: Hospital Stay of the Patient in Various Placental Abnormalities

DISCUSSION

In the present study, we observed that the most common age group with abnormal placental morphologies was the 20 -34-year age group. A recent study by Khan et al. highlighted the most common age group, 20-34 years, in patients with placenta previa.[9] A retrospective multicenter study by Jauniaux et al. reported a mean age of 34 years. The slight difference could be due to demography as most of the patients were Caucasian.[10] R. Moeini et al. reported a mean age of 32 years in the placental abnormalities group.[11] Many cohort studies have reported age as an independent factor associated with placental abnormalities.[12] The most common anomaly seen was placenta previa, but no fetal birth anomalies were observed in this group, but complications were commonly observed in neonates. A recent case-control

study highlighted the prevalence of placenta previa, with a frequency of 47%.[11] A recent meta-analysis included seven high-quality studies that reported a significant association between congenital anomalies and placenta previa. The risk of fetal anomalies increased to 6.3% in placenta previa as compared to normal placenta.[13]A recent multicentered study reported congenital fetal anomalies with frequency of 5%.[14] All the cases in this study belong to PAS (placenta accreta spectrum). We also observed that all congenital anomalies were associated with PAS (specifically increta and percreta). The mean weight of newborns with placental anomalies was recorded as 2.3, which is less than the standard weight of a baby. The lowest weight of 2.1 kg was observed in patients with placenta increta. A study conducted in Finland by Riihimäki O et al. reported a 2.5 kg birth weight in patients with placenta abruption. However, other national studies conducted in Karachi reported that 12.58% of individuals with placenta previa had very low birth weight, while 10.8% of patients with placental abruption had very low birth weight.[15,16] A study conducted by R. Moeini et al. reported a statistically significant difference in the mean weight of 2.7 kg in the abnormal placentation group versus 3.3 kg in the control group, with a p-value of < 0.00.[11] In patients with placental abruption, the 1-minute and 10-minute APGAR scores were recorded as low, and this difference was statistically significant. Research studies have reported that the APGAR score of neonates can be low if placental abnormalities are managed in an emergency.[17,18] Roksana Moeini et al. also reported a statistical difference in the 5-minute APGAR score between the abnormal and normal placentation groups, with a p-value of less than 0.001.[11] The NICU admission rate was 47% and significantly high in patients with placenta increta. This could be due to a high rate of congenital anomalies. R. Moeini et al. reported that 49% of abnormal placentations require NICU admission, which is consistent with our observations.[11] In our cohort, 54% of the neonates were preterm, whereas Siddiqui SA et al. reported 51%, which is slightly lower. The difference could be due to a larger sample size. R. Moeini et al. reported an average age of 35 weeks for newborns with placental abnormalities, which was significantly lower than that of the normal placentation group ($p < 0.001$). It is important to reduce the risk of stillbirth with placental abnormalities. There is a paucity of information, and we did not observe any cases in our study. The hospital stay for patients with placenta accreta spectrum was 6 days, which is similar to the case group reported by R. Moeini et al. The neonatal mortality was high (30%) in patients with placenta previa, which is consistent with the result reported by Siddiqui SA et al.[13] R. Moeini et al. reported a mortality of 1.2%. The difference in mortality could be due to the difference in the distribution of types of placental abnormalities, as 84% of cases belong to PAS, while we observed high mortality in the placenta previa group. The majority of confounding variables, like the previous history of congenital anomalies, vitamin B12, folic acid deficiency, neural tube defects, severe maternal anemia, and teratogenic drugs used, were controlled.

LIMITATIONS

The study has no comparison group. The study was conducted in single centred. Mother complications and mortality were not recorded. Some maternal confounding variables, such as parity and smoking status, were missed. The morbidities of the first and second trimesters were not assessed.

CONCLUSIONS

Placental abnormalities increase the risk of congenital anomalies. There is an increased risk of low birth weight, NICU admission and premature deliveries, but we did not observe any risk of stillbirths with placental abnormalities. It is necessary to screen such patients early and deliver them to a hospital equipped with a NICU facility. The neonatal morbidity increased the importance of antifibrinolytics in early maternal hemorrhage, maternal prophylactic antibiotics and steroids for fetal lung maturity.

CONFLICT OF INTEREST: None

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AUTHORS CONTRIBUTION

Niama Khan - *Concept & Design; Data Acquisition; Drafting Manuscript; Final Approval*
Mohsin Khan - *Concept & Design; Data Analysis/ Interpretation; Drafting Manuscript; Final Approval*
Faiza Khan - *Concept & Design; Data Acquisition; Critical Revision; Drafting Manuscript; Final Approval*
Muhammad Kashif Rafiq - *Concept & Design; Data Acquisition; Drafting Manuscript; Final Approval*
Kiran Khushal - *Concept & Design; Data Acquisition; Drafting Manuscript; Final Approval*
Ahtezaz Hussain - *Concept & Design; Data Acquisition; Drafting Manuscript; Final Approval*
Fatima Akhtar Khan - *Concept & Design; Data Acquisition; Drafting Manuscript; Final Approval*

The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.