

OBSTETRIC RISK FACTORS ASSOCIATED WITH MAJOR DEGREE PLACENTA PRAEVIA DEVELOPMENT

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ABSTRACT

Objective: To evaluate potential risk factors and perinatal outcome of pregnancies completed with major degree placenta praevia in pregnant women studied in Gynae-A Unit of Postgraduate Medical Institute, Lady Reading Hospital, Peshawar.

Material and Methods: This retrospective case-control study included a total of 114 pregnancies with major placenta praevia during one year study period, from Jan-Dec.2005, and 671 randomly selected simple singleton control. studied in Gynae-A Unit of Postgraduate Medical Institute, Lady Reading Hospital, Peshawar and Data on potential risk factors for placenta praevia development were extracted from medical records. Data was statistically analyzed with chi-square test and Mann Whitney U test, and crude odds ratio (OR) with 95% confidence interval (CI) were provided.

Results: The incidence of major degree placenta praevia was 1.9%. Factors significantly associated with a major placenta praevia development were advanced maternal age (OR 2.66; CI 1.76-4.0) (especially >34 years, even after adjustment for high parity), multiparty (OR 2.2; CI 1.42-3.40), history of previous cesarean sections (OR 2.0; CI 1.02-4.06), previous abortions (OR 2.8; CI 1.85-4.23), and presence of various uterine abnormalities (OR 9.0; CI 2.42-54.5). The risk was significantly increased after two previous cesarean sections and even after one previous abortion. The main perinatal complication was preterm birth, with almost 11-fold higher risk in women with placenta praevia.

Conclusion: The most important obstetric factors for placenta praevia development were; advanced maternal age especially >34 years, 3 or more previous pregnancies (gravidity), parity of > 2, rising number of previous abortions, and history of previous cesarean sections. Preterm delivery still remains the greatest problem in pregnancies complicated with placenta praevia.

Key words: Cesarean section, Placenta praevia, Risk factors.

INTRODUCTION

Placenta praevia is a form of impaired placentation where placenta lies low in the uterine cavity, sometimes covering completely or partially, the internal cervical ostium and thereby preventing normal vaginal delivery. It is one of the major causes of antipartum hemorrhage,¹ and a significant cause of maternal¹⁻⁴ and perinatal morbidity and mortality.³⁻⁶ The incidence of placenta praevia in pregnant women is approximately, 0.28-2.0%, depending upon the population investigated.^{1,5,7} A trend of increasing placenta praevia incidence was observed in the past decade mainly because of an increasing cesarean section rate and advancing maternal age at the time of first pregnancy.^{7,8} Although the clinical course of placenta praevia is better understood, the etiology of this condition still

remains obscure. The strongest connection was found between previous histories of cesarean section,^{5,9-13} high parity,^{9,10,13} and advanced maternal age, but the strength of the connection varies from study to study. Moreover, in some cases the results of the studies are contradictory and deserve further evaluation. Other potential risk factors with more confounding effect on the development of placenta praevia include history of previous spontaneous or induced abortions,^{10,12,14} increasing number of previous cesarean sections,^{11,12} previous uterine operations, previous placenta praevia, multiple gestation,¹⁵ and child sex at birth.^{16,17} As results of the studies in risk factors and outcome of placenta praevia pregnancies, vary around the world,^{4,7-11, 18,19} it was decided to evaluate potential risk factors and perinatal outcome of pregnancies complicated with placenta praevia on a population of pregnant women recruited from tertiary care hospital.

MATERIAL AND METHODS

This retrospective case-control study encompassed, one year period between January-December 2005 and was conducted in unit "A" of the Obstetrics /Gynaecology Department of Lady Reading Hospital, Post Graduate Medical Institute, Peshawar, NWFP, Pakistan. This is the largest tertiary care center in Peshawar (NWFP), with approximately 5,000-6,000 deliveries annually.

Study Sample: Study group comprised of all pregnancies with major degree placenta praevia admitted during the above mentioned time period. Major degree placenta praevia was defined as a placenta that completely or partially covered the internal cervical ostium. Cases with low-lying placentas (type I & type II) and incomplete data were excluded from further analysis and were not considered to have placenta praevia.

The diagnosis of placenta praevia was

established by trans-abdominal ultrasonographic imaging performed by trained attending physicians, and the last ultrasonographic examination before delivery was used to establish correct diagnosis. This was particularly important in order to exclude the cases of placenta praevia that resolved spontaneously during the course of pregnancy. Furthermore, the diagnosis was confirmed by direct inspection of the placental location at the time of cesarean section or examination under anesthesia prior to operation, in emergency unbooked cases of heavy antepartum hemorrhage.

The data was derived from case histories, operation protocol descriptions along with direct interviewing of the patients. Control group consisted of 671 simple randomly selected singleton pregnancies of women delivered by cesarean section in the study period recruited from the same unit from a total number of 5992 deliveries. For each case, 6 randomly selected

MULTIPLE POTENTIAL RISK FACTORS FOR PLACENTA PRAEVIA (PP) DEVELOPMENT IN PLACENTA PRAEVIA AND CONTROL GROUP. No. (%) of women

No	Parameters	With PP (n = 113)	Without PP (n = 671)	Chi-square	P	Crude Odds ratio (CI 95%)
1	Age (Years)					
	>30	71 (62.8)	261 (38.9)	22.7	<.001	2.66 (1.76-4.0)
	<30	42 (37.2)	410 (61.1)			
2	Multiparity					
	Yes	81 (71.6)	358 (53.4)	13.2	<.001	2.2 (1.42-3.40)
	No	32 (28.4)	313 (46.6)			
3	Previous Caesarean Sections					
	Yes	11 (9.8)	35 (5.2)	3.6	<0.1	2.0 (1.02-4.06)
	No	102 (90.2)	636 (94.8)			
4	Previous abortion					
	Yes	51 (45.5)	154 (23)	24.6	<.001	2.8 (1.85-4.23)
	No	62 (54.5)	517 (77)			
5	Previous Placenta Praevia					
	Yes	2 (1.8)	7 (1)	0.024		1.7 (1.05-2.11)
	No	111 (98.2)	664 (99)			
6	Abnormal presentation					
	Yes	23 (20.5)	26 (3.9)	44.8	<.001	6.34 (3.46-11.58)
	No	90 (79.5)	645 (96.1)			
7	Uterine abnormality					
	Yes	3 (2.5)	2 (0.3)	8.5	<.01	9.0 (2.42-54.5)
	No	110 (97.5)	669 (99.7)			
8	Newborns' Sex					
	Male	65 (57.6)	347 (51.7)	1.3		1.26 (1.18-1.88)
	Female	48 (42.4)	324 (48.3)			
9	Premature labor (< 37 weeks);					
	Yes	39 (34.5)	31 (4.6)	106.3	<.001	10.88 (6.41-18.47)
	No	74 (65.5)	640 (95.4)			

Table 1

AGE, GRAVITY, PARITY, PREVIOUS CAESAREAN SECTIONS AND ABORTION DISTRIBUTION IN WOMEN WITH PLACENTA PRAEVIA AND CONTROL PREGNANCIES

Parameters	No. (%) of women with PP(n=113)	Without PP (n=67)
Age (years)		
< 25	9 (8)	176 (26.2)
25-29	33 (29.2)	234 (34.9)
30-34	42 (37)	170 (25.3)
>34	29 (25.8)	91 (13.6)
Gravidity		
1	19 (15.8)	253 (37.7)
2	23 (20.3)	215 (32.1)
3	32 (28.7)	113 (16.9)
4	17 (15.3)	46 (6.8)
5+	22 (19.8)	44 (6.5)
Parity		
0	32 (28.2)	313 (46.6)
1	39 (34.7)	230 (34.3)
2	24 (20.8)	84 (12.5)
3+	18 (16.3)	44 (6.6)
Previous Cesarean sections		
0	102 (90.1)	636 (94.8)
1	7 (6.4)	32 (4.7)
2+	4 (3.5)	3 (0.5)
Previous abortions		
0	55 (49.0)	510 (76.0)
1	30 (26.2)	123 (18.3)
2	15 (12.9)	28 (4.2)
3	8 (7.4)	9 (1.3)
4+	5 (4.5)	1 (0.2)

Table 2

unmatched controls were chosen. Drug abuse, cocaine abuse and smoking are not prevalent in our society of women generally, so have not been considered in the study.

Exclusion criteria for control subjects, was multiple gestations, placenta praevia or any other placental abnormality (adherent placenta, placenta accreta, or placental abruption), and incomplete data. Correct gestational age was derived from the first day of the last menstrual period and was checked with ultrasonographic evaluation of gestational age.

Outcome Measures: For all women with placenta praevia and their controls, medical record was carefully reviewed and multiple parameters regarding potential obstetric risk factors were extracted and compared. The following data was obtained: age of pregnant women, gravidity,

previous parity separately with total number of previous cesarean sections, history of spontaneous or induced abortions, history of previous placenta praevia or any other uterine operation or anomaly, child sex, pathological presentations (breech, transverse, or oblique lie), delivery data, and neonatal outcome data (gestational age at delivery, birth weight and, Apgar scores).

Statistical Analysis: The data was analyzed with statistical package program SPSS, version 10. Patients with placenta praevia were compared with those without placenta praevia, i.e controls. For the study purpose, detailed multiple variable database was formed. All the data were collected either as dichotomous categorical variables (e.g “yes” or “no” for history of previous cesarean section), variables with set of multiple different categories (e.g., different age groups), or as continuous numeric variables. After testing for normality of distribution, continuous variables were expressed as median because the distribution was not normal. For statistical comparison, non-parametric Mann-Whitney U-test was used. Dichotomous categorical variables were given as percentages. To test independence between two dichotomous variables, Pearson's chi-square test was used. Fischer's exact test was performed when a single cell in a 2x2 contingency table had an expected frequency less than 5. Crude odds ratio, with 95 % confidence interval, was also calculated to test a connection between an independent and factor variable. Calculated odds ratio served as an approximation of relative risk. P-value of less than 0.05 was considered significant.

RESULTS

Out of a total of 6000, deliveries at this unit during the study period, 114 were comprised of major degree placenta praevia. From those, 113 were singleton deliveries and 1 was multiple twin gestations. The calculated incidence of major placenta praevia was 1.9% in this study.

Various potential risk factors were analyzed for placenta praevia development in the study population and controls (Table-1). The median age of pregnant women with placenta praevia was significantly higher than in controls (30 vs. 28 p<0.001). The distribution according to age groups revealed a significantly higher frequency of women older than 34 years in the placenta praevia group than in the control group (25.8% vs.13.6%, respectively), and at the same time significantly lower frequency of women younger than 25 (8% vs. 26.2%, respectively; Table-2). The risk for placenta praevia development increased with increasing number of previous pregnancies. Whereas a stable trend of lower gravidity toward higher gravidity groups

**STRATIFIED ANALYSIS OF WOMEN'S AGE
ACCORDING TO DIFFERENT PARITY GROUP
(NO. (%) OF WOMEN AGED (YEARS))**

PARITY	< 30	> 30	OR (95 % CI)
Primiparous:			
Placenta Praevia	18 (56.1)	14 (43.9)	2.512
Control	239 (76.3)	74 (23.7)	(1.19-5.29)
Multiparous:			
PlacentaPraevia	24 (29.7)	57 (70.3)	2.172
Control	171 (47.8)	187 (52.2)	(1.29-3.65)
Total Placenta Praevia.	42 (37.2)	71 (62.8)	2.655
Total control.	410 (61.1)	261 (38.9)	(1.75-4.01)

Table 3

(4+) was observed in the control group of women, there were an increasing percentage of women with 3 or more previous pregnancies among the women with placenta praevia. Women with 5+ previous pregnancies had 3-fold higher risk for placenta praevia development. A trend of increasing parity was also observed. The frequency of multiparous women was significantly higher in the group of women with placenta praevia than in the control group (Table 2). The distribution according to different parity groups showed that this was the consequence of significantly higher percentage of women who delivered 2 or 3+ times in the placenta praevia group, whereas the frequency of women with 1 previous delivery was the same in both groups (Table 2). Stratified analysis was performed for the women's age according to different parity groups (multiparous vs. primiparous). Adjusted and crude odds ratios proved that women's age was a significant risk factor even after controlling for high parity (Table 3). Women with previous cesarean section had a 2-

fold higher risk for placenta praevia development (Table 1). Among women with placenta praevia, there was a significantly higher frequency of those with 2 or more previous cesarean sections. (Table 2). The number of previous spontaneous/induced abortions was also significantly higher in the group of women with placenta praevia (45.5% vs. 23.0%, $p < 0.001$). Furthermore, the risk significantly increased with increasing number of previous abortions (Table 2). The rate of pathological fetal presentations was significantly higher in women with placenta praevia than in the control group (20.5 % vs. 3.9%, $p < 0.001$). Women with placenta praevia had also higher rate of different uterine abnormalities, such as uterine septum or myomatous uterus (Table 1). No association was found between placenta praevia development and drug abuse during pregnancy (Table 1). Only two women in placenta praevia group had the evidence of previous placenta praevia. Slight, but statistically non-significant predominance of male newborns was noticed in the

**NEONATAL OUTCOME DATA IN PLACENTA PRAEVIA AND
CONTROL PREGNANCIES (MEDIAN, RANGE)**

Variable	Placenta Praevia	Control	P*
Term delivery (>37 weeks):			
Birth weight(g)	3000 (2000-4800)	3200 (2200-5000)	0.001
APGAR score			
1 min	10 (1-10)	10 (2-10)	0.200
5 min	10 (3-10)	10 (4-10)	0.240
Preterm delivery (<37 weeks):			
Birth weight(g)	2290 (1000-3500)	2350 (940-3300)	0.167
APGAR score			
1 min	6 (1-10)	10 (2-10)	0.001
5 min	8 (3-10)	10 (5-10)	0.045

*Mann Whitney U test

Table 4

placenta praevia group in comparison with control group (57.6% vs. 51.8%, respectively). The risk of having preterm delivery was >10 -fold higher in the placenta praevia group (41.1% vs. 4.8%, $p < 0.001$). Stratified analysis of neonatal outcome data according to time of delivery (preterm vs. term delivery) showed no significant difference in median birth weight of preterm infants between the two groups (Table 4). However, in the same group, the infants had significantly lower first- (6 vs. 10) and fifth-minute (8 vs. 10) median Apgar scores than their controls. Term infants of mothers with placenta praevia had significantly lower birth weight than infants of the mothers in control group (3,000 g vs. 3,200 g, $p < 0.001$).

DISCUSSION

Major placenta praevia complicated 1.9% of all deliveries, which is within the range of 0.28-2.0% observed in other studies.^{1,5-7} In the past two decades, a significantly increasing trend in incidence of placenta Praevia (PP) was reported in some studies.⁷ In this study, increase in incidence was observed which could be partly explained with an increasing rate of cesarean sections (13.62-18.17%) in this unit during the last decade. According to the recent reports, the incidence of cesarean section is in constant increase, reaching the incidence of more than 15% in tertiary care centers.²⁰ This study clearly demonstrated that women older than 30 years had more than 2.5-fold higher risk for placenta praevia development. The risk for placenta praevia development increased with increasing number of previous pregnancies. A trend of increasing parity was also observed. Because the group with placenta praevia had significantly higher percentage of multiparous women, and parity could have a confounding effect on risk associated with age, maternal age was adjusted for different parity groups. However, this had no effect on adjustment. Other authors reported a similar observation,⁷ although there were some who could not prove this association.¹⁰ The mechanism by which advanced maternal age impairs normal placental development is not well understood. One of the possible explanations could be that the percentage of sclerotic changes on intramyometrial arteries increases with increasing age, thereby reducing blood supply to placenta. Gravity and parity distribution showed women with placenta praevia having higher frequency of women with 3 or more previous pregnancies. Whereas in one of the studies,¹⁰ gravity became important after 5 or more previous pregnancies. Parity distribution showed that difference between the groups was significant for women having 2 or more previous deliveries. Some earlier studies showed that parity became significant after 4 or

more previous pregnancies.^{10, 21} This study also confirmed the higher prevalence of previous cesarean section in placenta praevia group than in the control group however the risk determined was at lower border of significance. Several studies conducted around the world confirmed a 2-5 fold increased risk for placenta praevia development in women with history of previous cesarean section.^{5,9-13} Some studies managed to prove that the risk increased with increasing number of previous cesarean sections,^(11, 22-25) but others did not.¹⁰ In this study, the effect of multiple repeated cesarean sections revealed that the frequency of placenta praevia increased more than 7-fold in women with 2 previous cesarean sections. The exact mechanism of previous uterine scar predisposing to low implantation of placenta is not well understood. It has been recently shown that uterine scar prevented migration of placentas during the course of pregnancy toward the more vascularized uterine fundus.²² This is supported by the fact that the incidence of placenta praevia is significantly higher early in gestation than at term,²³ and that its persistence mostly depends on type of placenta praevia in the third trimester and on history of previous cesarean section.^{22,24} The percentage of previous abortions was significantly higher among women with placenta praevia, which yielded a risk of 2.8. The risk increased with increasing number of previous abortions (1 or more). These findings are in accordance with those of the other studies dealing with this topic, although there are some studies that could not confirm this association.^{9,10} The mechanism how previous abortions predispose to placenta praevia development could be explained with possible endometrial damage during repeated abortions, which impedes successful fundal implantation of placenta.^{1,14,26} Contrary to some previous studies where an association between male sex of the newborn and placenta praevia was observed,^{16,17} this study showed only a slight, statistically insignificant predominance of male newborns. The role of previous placenta praevia, which implies genetic base for placenta praevia development, was of slight significance in this study as only two (1.8%) of the women with placenta praevia had a previous history of placenta praevia. Moreover, significant connection between placenta praevia and various uterine abnormalities in this study suggested these as possible mechanical barriers for normal placental implantation. The same trend was observed in other studies.¹⁹ In the last 10 years, the advances in obstetric and neonatal care significantly reduced perinatal mortality associated with placenta praevia. However, preterm delivery still remains one of the main problems.^{5,6,26-29} In this study, more than 34% of women with placenta praevia

delivered prematurely. Stratification according to different gestational age groups showed that premature babies from mothers with placenta praevia had significantly lower first and fifth-minute Apgar scores. In term infants the only significance was observed regarding birth weight, which was lower in placenta praevia group. This could reflect significantly higher frequency of intrauterine growth restriction among women with placenta praevia, although some authors were not able to prove this association.²⁹

This retrospective study has some limitations. Since it was a hospital-based study, its results are not applicable to the whole population of pregnant women in Peshawar or NWFP. Furthermore, although a large number of different parameters were tested in pregnant women with placenta praevia, the univariate model used in this study could not entirely prevent the possible confounding influence of different variables on the amount of the risk associated with each single variable. However it was tried, to attenuate this effect by using stratification method of data in variables of special interest (age, parity, and neonatal outcome data).

CONCLUSION

The results of this study indicated that the knowledge of obstetric factors, predisposing women for placenta praevia development in our population, is important for choosing adequate preventive measures for these women. Physician should suspect placenta praevia especially if woman is over 34 years of age, has had 3 or more previous pregnancies, parity of 2 and more, and raising number of previous abortions and cesarean sections. These women should receive counseling as soon as pregnancy is confirmed. This is especially important in non-compliant women with possible poor antenatal care. Careful monitoring of these high risk pregnancies is of utmost importance, especially regarding careful ultrasonographic examination with exact placental location during the second trimester of pregnancy. Early recognition, hospital admission and proper monitoring of placenta praevia could minimize the possibility of poor outcome in sudden massive vaginal bleeding.

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