ORIGINAL RESEARCH ARTICLE

Outcome of Abnormal Placental Attachments in Pregnancies with a Review of Literature

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Abstract

Objective: The study evaluated the clinical course of a low-lying placenta, the outcome of a placenta previa with or without morbidly adherent placenta, and the association with previously reported risk factors.

Materials and methods: A prospective descriptive study was conducted from December 2016 to May 2018 at a tertiary care hospital and medical institute on 66 cases of a sonographically diagnosed abnormal placental attachment at 20 or more than 20 weeks of gestation. We analyzed the potential risk factors and the respective outcomes of pregnancies with an abnormal placental attachment.

Results: Of the 66 patients in the study, most of the patients (60.6%) were above the age of 30 years; the mean maternal age in the present study was 29.03 years. In this study, the rate of placental migration was 85% in patients without any history of a prior uterine surgery compared to 19.6% in patients with a history of a prior uterine surgery. The major outcome in our study was operative delivery (in 45 patients). A live birth was observed in 64 cases and 2 cases presented with an Intrauterine fetal demise. Of the 64 live born babies in the study, 14 (21.2%) were small for the gestational age and 50 (75.8%) were appropriate for the gestational age.

Conclusion: Our study concluded that the most consistent risk factor of an abnormal placental attachment in pregnancy is scarred uterus. Abnormal placental attachment was associated with a higher operative delivery, hysterectomy, and blood transfusions.

Keywords: Antepartum hemorrhage, Placenta accreta, Placenta previa.

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Introduction

Obstetric hemorrhage is a life-threatening emergency and is the single most significant cause of maternal mortality worldwide, accounting for 25–30% of all maternal deaths.[1]

Of all the causes of obstetrical hemorrhage, abnormal placentation accounts for one-third of the cases. The antepartum hemorrhage secondary to an abnormal placental attachment is responsible for perinatal mortalities in 22% cases.[2]

Abnormal placental attachment includes an abnormal placental implantation and an abnormal placental invasion. Abnormal placental implantation (called placenta previa) is defined as an abnormal location of the placenta over or in close proximity to the internal cervical os.

Placenta previa has a global prevalence of 5.2 per 1,000 pregnancies. The highest prevalence is found in Asian women, in whom the overall prevalence is 12.2 per 1,000 pregnancies. This suggests that there may be a genetic predisposition.[3]

The classification of a placenta previa into a complete, a partial, and a marginal placenta previa probably had its origins in the 19th century. The description was meant to refer to the extent to which the placenta could be palpated through the cervix.[4]

The complete previa is referred to an implantation over the internal os where the margin of the placenta could not be felt; the partial previa is referred to the placenta covering a closed internal os, but not completely covering a dilated os; and the marginal previa meant an implantation in which the margin could be easily felt. A lateral (or low-lying) previa is the variety in which the margin of the placenta can only be felt with difficulty.

The accurate localization of the placental edge in relation to the discrete point of the internal os by TVS makes use of the terms such as marginal, partial, and low-lying outmoded. Sonographers are encouraged to report the actual distance from the placental edge to the internal cervical os at TVS, using standard terminology of millimeters away from the os or millimeters of overlap.

The following classification was recommended on the basis of fetal imaging:[5]

- Placenta previa—the internal os is covered partially or completely by the placenta. In the past, these were further classified as either a total or partial previa.
- Low-lying placenta—implantation in the lower uterine segment is such that the placental edge does not reach the internal os and remains outside a 2 cm-wide perimeter around the os.
- A previously used term, marginal previa, described a placenta that was at the edge of the internal os but did not overlie it.
- A distance of more than 2 cm from the lower placental edge and cervical os in the second trimester is a normal finding that does not represent a low-lying placenta and does not require followup.

Placenta localization with transabdominal sonography (TAS) has been a standard practice for a long time. Despite its availability

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and noninvasive nature, the accuracy of TAS may be limited by many factors, such as the posterior implantation of placenta, being obscured by the fetal head, an under-filled or over-distended bladder, the presence of blood clots, fibroids, uterine contractions, and obesity.[6,7] These limitations are overcome by transvaginal sonography (TVS), which provides a better resolution using a higher frequency transducer, a shorter distance from the transducer to the internal os, and is not affected by the over- or under-filling of the bladder.

The incidence of a placenta previa is on rise because of the increasing rate of cesarean section being performed, and a trend of child bearing at a later age among the women. Other risks for a placenta previa include uterine surgery,[8] increasing maternal age, high parity[9] multifetal gestation,[10] and smoking and cocaine use.[11] The risk of a placenta previa in pregnancies following assisted reproductive treatment is considerably higher than in pregnancies following a natural conception.

At the same time, the dangerous complication of a placenta accreta associated with a placenta previa and prior cesarean deliveries has also increased in frequency.

There are several risk factors for placenta accreta and they include a placenta previa with or without a previous uterine surgery, a previous myomectomy, a previous caesarean section, Asherman's syndrome, submucosal fibroids, a maternal age more than 35 years, and previous trophoblastic disease.[12]

Placenta accreta is considered a severe pregnancy complication that may be associated with massive and potentially life-threatening intrapartum and postpartum hemorrhage.[13] It has become the leading cause of emergency hysterectomy.[14]

Materials and Methods

A prospective descriptive study was conducted from December 2016 to May 2018 at a tertiary care hospital and medical institute on 66 cases of a sonographically diagnosed abnormal placental attachment at 20 or more than 20 weeks of gestation.

Written informed consent was taken from each subject included in the study.

The inclusion criteria are as follows:

- Patients with a sonographic report showing abnormal placental attachments such as low-lying placenta, placenta previa, or placenta accreta at or after 20 weeks of gestation.
- Patient reporting in emergency with any obstetrical complication such as bleeding and evidence of a low-lying placenta/placenta previa.
- Patients with a history of subchorionic hemorrhage or retroplacental bleed in the first trimester presenting as threatened abortion and now having an abnormal placental attachment.

The following are the exclusion criteria:

- Patient with uterine malformation.
- Multiple pregnancies.
- All patients with a normal location of placenta at or after 20 weeks of gestation.

Patients with an abnormal placental attachment found sonographically at or any time beyond 20 weeks were followed up for presumable migration of placenta and future antenatal course. The gestational age was determined by the last menstrual periods and the first-trimester ultrasound. A detailed history of the patient (including her thorough obstetric history, menstrual history, family history, and past history) was taken. General physical examination and detailed obstetrical examination (including per abdomen examination for fundal height, abdominal girth, presentation, estimated amount of liquor) were done.

Per vaginum examination was avoided in cases of a placenta previa for the fear of bleeding. Routine laboratory parameters studied included: (1) CBC and complete hemogram, (2) urine complete examination, (3) blood grouping, (4) viral markers (HIV, HbsAg), (5) coagulation profile, (6) OGTT and thyroid profile, and (7) VDRL. Any other investigation related to a specific case was recorded such as LFT, RFT, and was serially repeated whenever needed. Routine hematinics and calcium supplements were prescribed to all cases of abnormal placental attachment and patients were advised to maintain abstinence and to avoid strenuous heavy physical work. The diagnosis of placenta previa was based on transabdominal ultrasonography done for fetal wellbeing using a curvilinear 1–5 MHz probe on GE VOLLUSON E8 for assessing mean gestational age, amniotic fluid index, placental localization, fetal lie and presentation, and estimated fetal weight. Cases of placenta previa were confirmed by transvaginal ultrasonography. A repeat scan in asymptomatic patients at 28 weeks was done to see migration of placenta (if any). A color Doppler was done in subjects with a persisting low-lying placenta to rule out the possibility of a placenta accreta and to study the vascular sufficiency of the uteroplacental and fetoplacental unit.

Patients reported to be having an abnormal placental attachment sonographically were followed up in the Antenatal OPD till delivery with the advice to come immediately in case of any emergency such as bleeding per vaginum. Patients were admitted at 36 weeks of gestation (or earlier in case of any episode of bleeding per vaginum) to study maternal outcome in terms of mode of delivery, gestational age at the time of delivery, per op findings, maternal complications, need for blood transfusions, ICU stay, and neonatal outcome. At admission, each patient had two or more units of cross-matched blood ready for use. Patients admitted at or before 36 weeks gestations received 12 mg of betamethasone, 2 doses 24 hours apart.

At our institution, we have round-the-clock blood bank facilities providing blood and blood products whenever required. Availability of Urologists was ensured in cases of placenta accreta. There was provision of a neonatologist and intensive neonatal care facilities at our institution for timely and appropriate neonatal care and resuscitation. Neonatal record for the first week of life was included for an immediate review.

Statistical analysis

The recorded data were compiled and entered in a spreadsheet program and were analyzed using SPSS, version 20. Percentages, means, and standard deviation were calculated. The statistical test applied was Pearson's Chi-square test. For all tests, the confidence interval was set at 95% and p value of <0.05 was taken as significant.

Results

Of the 66 patients in the study, most of them (60.6%) were above the age of 30 years. The mean maternal age in the present study was 29.03 years with SD of 3.78 (range 19–38 years).

Of the total 66 patients, 15 (22.7%) were primigravidae and 51 (77.2%) were multigravidae (Table 1).

Table 1: Distribution according to obstetrical history and prenatal care

Variable	*No. of patients*	*%*
Primigravida	15	22.7
Previous vaginal delivery	5	7.6
Previous LSCS	26	39.4
Previous LSCS (1,2,3) + curettage	13	19.7
Previous 1 LSCS + myomectomy	2	3
Previous h/o curettage only	5	7.6
Prenatal care status		
Booked	47	71.2
Un-booked	19	28.7
Total	66	100

An estimated 46 (70%) patients had a history of a scarred uterus in the form of previous LSCS in 26 (39.4%) patients, previous LSCS and curettage for prior abortions in 13 (19.7%) patients, myomectomy and LSCS in 2 (3%) patients, and curettage done for prior abortions in 5 (7.6%) patients.

Of the 66 patients, 47 (71.2%) patients were booked, and had at least three antenatal visits at our hospital, while there were 19 (28.7%) patients who had no prenatal care at all throughout the pregnancy; those who registered at our hospital but had less than two antenatal visits were referred as emergency from other facilities.

Of the 66 patients who had an abnormal placental attachment in the form of a placenta previa at 20–24 weeks on a trans vaginal scan, 26 patients had their placenta migrated beyond 20 mm of the internal cervical os at 32–34 weeks scan and labeled as the migrated placenta group, while 40 patients had a persisting placenta previa, which included patients with no migration of placenta as well as patients with a slight shift of placenta from grade 4 or 3 towards grades 2 or 1 till term (Table 2).

Of the 26 (39.4%) patients who had their placenta migrated beyond 20 mm from the internal cervical os at 32–34 weeks, 1 got delivered at 33.4 weeks and the rest of 25 patients had their pregnancy continued after 34 weeks.

Of the 40 (60.6%) patients who had a persistent placenta previa, 2 patients had their pregnancy terminated before 28 weeks, while 13 patients had their pregnancy terminated between 28 and 34 weeks and the rest of the 25 patients continued their pregnancy beyond 34 weeks.

Of the 40 patients with a persisting placenta previa at term, 8 patients had a morbidly adherent placenta in the form of placenta accreta (5), increta (2), and percreta (1) (Table 3). As the grade of placenta previa increased, the incidence of morbidly adherent placenta also increased and the correlation showed statistical significance ($p = 0.000$).

Table 4 shows the correlation between previous number of LSCS with morbidly adherent placenta (MAP) in this pregnancy and it was found to be positively correlated with increasing number of previous cesarean sections ($p = 0.001$).

It was observed that the rate of migration was less in patients with a history of a previously scarred uterus compared to patients with a unscarred uterus, signifying the association of a persistent abnormal attachment of the placenta in the scarred uterus (Table 5).

As shown in Table 6, the major outcome was operative delivery in 45 (68.1%) patients (44 CS + 1 hysterotomy).

An estimated 44 (66.7%) patients underwent a cesarean section, while 1 patient had to undergo hysterotomy at 23 weeks gestation owing to a severe hemorrhage.

21 patients had vaginal deliveries, of which 18 patients had normal placental attachment and 3 patients had a grade-1 placenta previa at delivery. Of these 3 patients, 1 showed a spontaneous vaginal expulsion of live fetus at 26 weeks following recurrent bouts of vaginal bleeding, and other 2 vaginal deliveries were following spontaneous labor in a grade-1 placenta previa at 34 weeks and 39 weeks, respectively.

Peripartum hysterectomy was associated more with a morbidly adherent placenta. An estimated 4 (6.1%) patients of placenta accreta out of 5, and 2 (4.5%) patients of placenta increta required cesarean hysterectomy; however, 1 patient of a major degree placenta previa had a severe postpartum hemorrhage and required relaprotomy after cesarean and hysterectomy.

As shown in Table 7, of the 5 patients of placenta accreta, 3 patients required emergency cesarean hysterectomy and 1 patient underwent elective hysterectomy, and 1 patient of a placenta previa required relaprotomy after elective cesarean section. All patients of placenta increta and percreta were managed with elective cesarean hysterectomy.

Antepartum hemorrhage was seen in 28 of 44 patients with an anterior placenta and 11 of 22 patients with a posterior placenta. The mean blood transfused to patients with an anterior placenta was more (2.02 vs 0.41) than in those with a posterior placenta. Peripartum hysterectomy was required in 7 patients, all of whom had an anterior placenta.

In the this study, the mean gestational age at delivery was 35.4 weeks ± 3.48 SD. Of the 66 patients, a live birth was observed in 64 cases and 2 cases presented with an intrauterine fetal demise.

Table 2: Distribution of patients in different grades of placenta previa at 20–24 weeks, at 32–34 weeks/delivery and at >34 weeks/term ($n = 66$)

	At 20–24 weeks		*At 32–34 weeks*		*>34 weeks/at term*	
Placenta previa grades	*No. of patients*	*%*	*No. of patients*	*%*	*No. of patients*	*%*
Grade 1	16	24.2	4	4.5	2	3
Grade 2	13	19.7	11	16.7	10	15.1
Grade 3	15	22.7	8	12.1	4	6.1
Grade 4	22	33.3	17	24.2	9	13.6
Migrated placenta (>20 mm from the internal cervical OS)	0	0	26	39.4	25	37.9
Total	66	100	66	100	50/66	75.8
Already delivered amongst persisting placenta previa					15/40	–
Already delivered amongst migrated placenta					1/26	–

Table 3: Distribution and association between placenta previa grade at delivery with a morbidly adherent placenta (MAP)

	MAP				
Placenta previa grades	*Not adherent*	*Accreta*	*Increta*	*Percreta*	*Total*
Migrated placenta	26	0	0	0	26
	39.4%	0.0%	0.0%	0.0%	39.4%
Grade 1	4	0	0	0	4
	6.1%	%	0.0%	0.0%	6.1%
Grade 2	11	0	0	0	11
	16.7%	0.0%	0.0%	0.0%	16.7%
Grade 3	6	2	0	0	8
	9.1%	3%	0.0%	0.0%	12.1%
Grade 4	11	3	2	1	17
	16.7%	4.5%	3%	1.5%	25.8%
Total	58	5	2	1	66
	88%	7.5%	3%	1.5%	100.0%
p value	0.000*				

Test applied: Chi-square test. *Indicates statistical significance

Table 4: Association between the previous number of LSCS with a morbidly adherent placenta (MAP) in this pregnancy

	No. of previous LSCS				
MAP	*0*	*1*	*2*	*3*	*Total*
Not adherent	25	9	15	9	58
	37.9%	13.6%	22.7%	13.6%	88%
Accreta	0	0	2	3	5
	0.0%	0.0%	3%	4.5%	7.5%
Increta	0	0	0	2	2
	0.0%	0.0%	0.0%	3%	3%
Percreta	0	0	1	0	1
	0.0%	0.0%	1.5%	0.0%	1.5%
Total	25	9	18	14	66
	37.9%	13.6%	27.3%	21.2%	100.0%
p value	0.001*				

Test applied: Chi-square test. *Indicates statistical significance

Table 5: Rate of placental migration in different grades of placenta previa with respect to previous history of scarred uterus

Grades of placenta previa	*20–24 weeks*	*History of scarred uterus*	*No. of patients*	*%*	*Migrated placenta*
1	16	Yes	4	6.1	3/4
		No	12	18.2	12/12
2	13	Yes	9	13.6	4/9
		No	4	6.1	3/4
3	15	Yes	13	19.7	1/13
		No	2	3	1/2
4	22	Yes	20	30.3	1/20
		No	2	3	1/2
Total	66		66	100	26/66
% migration in scarred uterus (9/46) 19.6%					
% migration in unscarred uterus (17/20) 85%					

Table 6: Distribution of cases according to the mode of delivery

Mode of delivery		*Frequency*	*Percent*
Vaginal		21	31.8
Operative (CS + hysterotomy)	Elective	18	27.3
	Emergency	27	41
Total		66	100

Table 7: Distribution of patients requiring peripartum hysterectomy according to emergency/elective surgery

Peripartum hysterectomy		*No. of patients*	*%*
No		59	89.4
Yes	Emergency	4	6.1
	Elective	3	4.5
Total		66	100

The mean gestational age at delivery in booked cases was significantly higher (36.87 ± 1.9 SD) compared to the mean gestational age at delivery in unbooked cases (32.47 ± 3.2 SD) ($p = 0.001$).

The gestational age at delivery was lower in babies born to patients with severe forms of placenta previa, which was statistically significant ($p = 0.004$). Amongst the babies born, there were 49 (74.2%) males and 17 (25.8%) females.

Of the 64 live born babies in the study, 14 (21.2%) were small for the gestational age and 50 (75.8%) were appropriate for the gestational age. Correlation of SGA babies with placenta previa grades was not found to be significant in this study.

Discussion

Our study evaluated 66 women with abnormal placentation with respect to related risks, maternal, and fetal outcomes.

The mean maternal age in the study was 29.03 ± 3.78 years, which was comparable with study by Taipale et al.,[15] where the mean age of the patients was 29.4 years (range 16–45 years), and the study by Rajeshwari and Rubini,[16] where the mean maternal age was 29 years.

In this study, 51 (77.2%) patients were multigravida and 34 (51.2%) patients were multiparous and this correlates with other studies such as the retrospective case-control study done by Tuzović et al.,[17] which included a total of 202 singleton pregnancies with placenta previa during a 10-year study period and concluded that gravidity of 3 and more (OR 4; 95% CI, 2.5–6.6) and more than one previous delivery (OR 2.76; 95% CI, 1.7–4.3) had risk factors for placenta previa. Another meta-analysis of 58 studies by Faiz and Ananth[18] also concluded that increasing parity and gravidity conferred an increased risk for placenta previa along with other risk factors.

More than half (70%) of our patients with abnormal placental attachment had a prior uterine surgery. The most frequent surgical history was obviously a cesarean section. A retrospective analysis of 292 cases of a placenta previa by Clark et al.[19] showed an incidence of 0.26% in an unscarred uterus, 0.65% after one caesarean section, rising to 10% in women with four or more abdominal deliveries. From a large multicenter study by Chama et al. in Nigeria, it was revealed that the incidence of a placenta previa increases in a linear way with the number of a previous cesarean section.[20]

In this study, the rate of placental migration was 85% in patients without any history of a prior uterine surgery compared to 19.6% in patients with a history of a prior uterine surgery in the form of a previous lower segment caesarean section and/or curettage for abortions. The results were similar to the study by Shravage et al.,[21] where placental migration was less in patients with a history of a previous uterine surgery/curettage compared to patients without a previous uterine surgery/curettage, which concluded that 92% of the low lying placenta within 1.5 cm from the os continue to persist as placenta previa at term and factors such as previous LSCS and D&C may hinder placental migration.

In the present study, placental migration was observed more in posteriorly situated placentas compared with the anterior placentas, which is in concordance with study by Shravage et al.[21] and Banerjee et al.[22] Other report by Ghourab and Al-Jabari[23] also states that posterior placentas migrate more than anterior placentas but is in contrary with the study by Cho et al.,[24] which states that anterior placentas migrated more than posteriorly situated placentas.

In the present study, of the 8 (12.1%) patients who had a morbidly adherent placenta, 3 patients had previous 2 LSCS and 5 patients had previous 3 LSCS; hence, scarred uterus was associated with an increased incidence of morbidly adherent placenta in cases amongst placenta previa patients. This was in concordance with several other studies such as the prospective observational cohort study by Silver et al.,[25] where placenta accreta was present in 15 (0.24%), 49 (0.31%), 36 (0.57%), 31 (2.13%), 6 (2.33%), and 6 (6.74%) women undergoing their first, second, third, fourth, fifth, and sixth or more cesarean deliveries, respectively. Hence, the incidence of adherent placenta increases as the number of previous cesarean section increases.

In our study, a morbidly adherent placenta was seen in 8 (20%) of 40 patients of a persisting placenta previa, all of whom had previous ≥2 caesarean deliveries and anterior placental location.

In an analytical study of abnormal placentation by Miller et al.,[26] it was found that among women with a placenta previa, the risk of placenta accreta ranged from 2% in women <35 years old with no previous cesarean deliveries to almost 39% in women with two or more previous cesarean deliveries and an anterior or central placenta previa. It was concluded that among women with a placenta previa, the incidence is nearly 10%. In this high-risk group, advanced maternal age and previous cesarean section are independent risk factors.

The major outcome was operative delivery in 45 (68.1%) patients, of which 37 patients had abnormal placental attachment and 8 patients had placenta >20 mm from the internal cervical os at delivery.

In 10.6% of our patients with a placenta previa, hysterectomy was necessary, all of which had 2 or more previous caesarean deliveries and 12.1% of these also had a morbidly adherent placenta. Hysterectomy rate in patients with a placenta praevia ranges between 5 and 19% according to previous studies. Approximately 32% of physicians in a recent cross-sectional survey by Esakoff et al.[27] of maternal fetal medicine providers in the United States registered with the Society for Maternal-Fetal Medicine had attempted conservative management, although most believe that hysterectomy is the only management option for placenta accreta as the studies reported are only case reports or small series, and, hence, there is no consensus on the procedure to adopt.

In a retrospective review of 132 singleton pregnancies with a placenta previa by Daskalakis et al.[14] An estimated 19.7% women underwent obstetric hysterectomy. Mothers with 2 or more previous cesarean deliveries had an increased risk for obstetric hysterectomy ($p < 0.01$). A population-based study comparing all singleton pregnancies of women with and without a placenta previa conducted by Rosenberg et al.[28] concluded that placenta previa was significantly associated with adverse outcomes such as peripartum hysterectomy (5.3 vs 0.04%; $p < 0.001$).

There were two fetal deaths in our study: one at 23 weeks and the other at 32.4 weeks, where both the patients had a major placenta previa and a severe antepartum hemorrhage, making the perinatal mortality of 3%. Incidence of perinatal deaths was 6.66% in a study by Khirasaria et al.[29] in Gujarat, which included asphyxia and prematurity. Sheiner et al.[30] showed that congenital malformations and perinatal mortality was 2.6 times more common among cases with a placenta previa when compare to those without it. A study by Koifman et al.[31] concluded that vaginal bleeding is a dangerous complication related to a high prevalence of cesarean sections and constitutes a risk factor for perinatal mortality.

The mean gestational age at delivery in the study was 35.4 ± 3.48 weeks in our study, while delivery prior to 37 weeks of gestation occurred in 62.1% of our patients comparable with study by Kollmann et al.,[32] where the mean gestational age at delivery was 35.6 (23–41) weeks of gestation and a total of 179 (54.9%) infants were born before 37 weeks of gestation. The gestational age at delivery was lower in babies born to patients with severe forms of placenta previa, which was statistically significant.

There were 49 (74.2%) males and 17 (25.8%) females born in this study and the results are comparable with previous studies. The cohort metaanalysis of 8 studies by Demissie et al.[33] concluded that there was a 14 percent excess of placenta previa associated with male births and that women carrying male fetuses have a higher risk of developing a placenta previa.

All the live born babies were evaluated with respect to birth weight according to gestational age and were categorized as small for gestational age (SGA) and appropriate for gestational age (AGA). There were no babies with macrosomia/congenital abnormality in this study.

Of the 64 live born babies in the study, 14 (21.2%) were small for the gestational age and 50 (75.8%) were appropriate for the gestational age. Of the 14 SGA babies born in the study, 7 were amongst patients with migrated placenta and 7 were amongst patients with a persisting placenta previa and the correlation of SGA babies with placenta previa grades was not found to be significant in this study. In a similar study by Ojha[34] at Kathmandu, 27% of babies had a low birth weight. A population-based retrospective cohort study by Ananth et al.[8] among singleton 544,734 mother-infant pair showed that the association between a low birth weight and a placenta previa is chiefly due to preterm delivery and, to a lesser extent, to fetal growth restriction.

Limitation of our study was small sample size and single-center study.

Conclusion

Our study concluded that the most consistent risk factor for an abnormal placental attachment was scarred uterus. Those with a diagnosis of a low-lying placenta in the second trimester scan need a careful followup, higher vigilance being needed in patients with an earlier history of a scarred uterus and anterior placenta.

It is important to identify and reduce the modifiable risk factors associated with it, such as reducing the primary caesarean section rate, encouraging VBAC in eligible subjects fulfilling the criteria for it, increasing awareness and education about contraceptive methods and misuse of medical methods of abortion that are responsible for converting a safe abortion into an unsafe practice and unnecessary uterine curettage, timely diagnosis and management of cases with abnormal placental attachment early in pregnancy, and offering a good prenatal care, which has been shown to have implications in adverse maternal and neonatal outcome.

Remarks

The major strength of this study was that this being a prospective approach, entire antenatal course since the first registration to delivery, clinical profile, radiological data, intraoperative and postoperative complications were studied. Most of the similar studies were retrospective studies and evaluated only a particular issue related to the abnormal placental attachment. We evaluated the clinical course of a low-lying placenta, outcome of the placenta previa with or without a morbidly adherent placenta as well as the association with previously reported risk factors.

References

1. World Health Organization. The World Health Report 2005: Make Every Mother and Child Count. Geneva, Switzerland: WHO Press; 2005. p. 62.
2. Neilson EC, Varner MW, et al. The outcome of pregnancies complicated by bleeding in the second trimester. Surg Gynecol Obstet 1991;173:371–374.
3. Cresswell JA, Ronsmans C, et al. Prevalence of placenta praevia by world region: a systematic review and meta-analysis. Trop Med Int Health 2013;18:712–724. DOI: 10.1111/tmi.12100.
4. Chassar Moir J, Myersough PR. Munro Kerr's operative obstetrics, 8th ed., London: Balliere, Tindall & Cassell; 1971. pp. 771–804.
5. Reddy UM, Abuhamad AZ, et al. Fetal Imaging Workshop Invited P. Fetal imaging: executive summary of a joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, American Institute of Ultrasound in Medicine, American College of Obstetricians and Gynecologists, American College of Radiology, Society for Pediatric Radiology, and Society of Radiologists in Ultrasound Fetal Imaging Workshop. J Ultrasound Med 2014;33(5):745–757. DOI: 10.7863/ultra.33.5.745.
6. Sunna E, Ziadeh S. Transvaginal and transabdominal ultrasound for the diagnosis of placenta praevia. J Obstet Gynaecol 1999;19(2):152. DOI: 10.1080/01443619965471.
7. Sherman SJ, Carlson DE, et al. Transvaginal ultrasound: does it help in the diagnosis of placenta previa? Ultrasound Obstet Gynecol 1992;2(4):256. DOI: 10.1046/j.1469-0705.1992.02040256.x.
8. Ananth CV, Smulian JC, et al. The association of placenta previa with history of cesarean delivery and abortion: a metaanalysis. Am J Obstet Gynecol 1997;177:1071–1078. DOI: 10.1016/S0002-9378(97)70017-6.
9. Ananth CV, Wilcox AJ, et al. Effect of maternal age and parity on the risk of uteroplacental bleeding disorders in pregnancy. Am J Obstet Gynecol 1996;88:511–516. DOI: 10.1016/0029-7844(96)00236-0.
10. Ananth CV, Demissie K, et al. Placenta previa in singleton and twin births in the United States, 1989 through 1998: a comparison of risk factor profiles and associated conditions. Am J Obstet Gynecol 2003;188:275–281. DOI: 10.1067/mob.2003.10.
11. Macones GA, Sehdev HM, et al. The association between maternal cocaine use and placenta previa. Am J Obstet Gynecol 1997;177:1097–1100. DOI: 10.1016/S0002-9378(97)70022-X.
12. Khadra M, Obhrai M, et al. Placenta percreta revisited. J Obstet Gynaecol 2002;22:689. DOI: 10.1080/014436102762062385.
13. Faranesh R, Romano S, et al. Suggested approach for management of placenta percreta invading the urinary bladder. Obstet Gynecol 2007;110(2 Pt 2):512–515. DOI: 10.1097/01.AOG.0000267135.31817.d6.
14. Daskalakis G, Anastasakis E, et al. Emergency obstetric hysterectomy. Acta Obstet Gynecol Scand 2007;86(2):223–227. DOI: 10.1080/00016340601088448.
15. Taipale P, Hiilesmaa V, et al. Transvaginal ultrasonography at 18-23 weeks in predicting placenta previa at delivery. Ultrasound Obstet Gynecol 1998;12:422–425. DOI: 10.1046/j.1469-0705.1998.12060422.x.
16. Rajeshwari RR, Rubini M. Maternal and perinatal outcome in placenta previa-one year study in tertiary care center in Tamil Nadu, India. Int J Reprod Contracept Obstet Gynecol 2016;5(8):2819–2822.
17. Tuzović L, Djelmis J, et al. Obstetric risk factors associated with placenta previa development: case-control study. Croat Med J 2003 Dec;44(6):728–733.
18. Faiz AS, Ananth CV. Etiology and risk factors for placenta previa: an overview and meta-analysis of observational studies. J Matern Fetal Neonatal Med 2003;13:175–190. DOI: 10.1080/jmf.13.3.175.190.
19. Clark SL, Koonings PP, et al. Placenta previa/accreta and prior cesarean section. Obstet Gynecol 1985;66:89–92.

20. Chama CM, Wanonyi IK, et al. From low-lying implantation to placenta praevia: a longitudinal ultrasonic assessment. J Obstet Gynaecol 2004 Aug;24(5):516–518. DOI: 10.1080/01443610410001722545.
21. Shravage J, Dhumale H, et al. Assessment of placental migration in mid trimester low lying placenta. J Obstet Gynaecol India 2009 Jul/Aug;59(4):317–319.
22. Banerjee S, Seth S, et al. A Study Of Migration Of Low Lying Placenta In A Tertiary Indian Hospital. JEMDS 2013;2(13):2159–2164. DOI: 10.14260/jemds/511.
23. Ghourab S, Al-Jabari A. Placental migration and mode of delivery in placenta previa: transvaginal sonographic assessment during the third trimester. Ann Saudi Med 2000;20(5–6):382–385. DOI: 10.5144/0256-4947.2000.382.
24. Cho JY, Lee YH, et al. Difference in migration of placenta according to the location and type of placenta previa. J Clin Ultrasound 2008;36(2):79–84. DOI: 10.1002/jcu.20427.
25. Silver RM, Landon MB, et al. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol 2006 Jun;107(6):1226–1232. DOI: 10.1097/01.AOG.0000219750.79480.84.
26. Miller DA, Choller JA, et al. Clinical risk factors for placenta previa accrete. AJOG 1997;177:210–214. DOI: 10.1016/S0002-9378(97)70463-0.
27. Esakoff TF, Handler SJ, et al. PAMUS: placenta accreta management across the United States. J Matern Fetal Neonatal Med 2012;25(6):761–765. DOI: 10.3109/14767058.2011.598585.
28. Rosenberg T, Pariente G, et al. Critical analysis of risk factors and outcome of placenta previa. Arch Gynecol Obstet 2011;284(1):47–51. DOI: 10.1007/s00404-010-1598-7.
29. Khirasaria DM, Nayak TC. A study of complications in cases of placenta previa. Int J Reprod Contracept Obstet Gynecol 2017;6(12):5503–5507. DOI: 10.18203/2320-1770.ijrcog20175269.
30. Sheiner E, Shoham-Vardi I, et al. Placenta previa: obstetric risk factors and pregnancy outcome. J Matern Fetal Med 2001;10(6):414–419. DOI: 10.1080/jmf.10.6.414.419.
31. Koifman A, Levy A, et al. The clinical significance of bleeding during the second trimester of pregnancy. Arch Gynecol Obstet 2008;278(1):47–51. DOI: 10.1007/s00404-007-0530-2.
32. Kollmann M, Gaulhofer J, et al. Placenta praevia: incidence, risk factors and outcome. J Matern Fetal Neonatal Med 2016;29(9):1395–1398. DOI: 10.3109/14767058.2015.1049152.
33. Demissie K, Breckenridge MB, et al. Placenta previa: preponderence of male sex at birth. Am J Epidemiol 1999;149:824–830. DOI: 10.1093/oxfordjournals.aje.a009898.
34. Ojha N. Obstetric factors and pregnancy outcome in placenta previa. J Inst Med 2012;34(2):38–41.