Obstetrics; Maternal-Fetal Medicine and Perinatology

Placental Location Affects Cesarean Complications in Patients with Placenta Previa

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ABSTRACT

OBJECTIVE: Placenta previa may cause massive hemorrhage at antenatal, intrapartum or postpartum periods and is one of the leading causes of maternal morbidity and mortality. Anterior or posterior location of placenta previa can change cesarean technique and management of the operation. Aim of this study is to assess factors increasing intraoperative complications in patients with placenta previa and investigate the significance of anterior placenta location apart from other factors.

STUDY DESIGN: This is a retrospective cohort study which was conducted in one center including 83 patients followed with placenta previa in three years' duration. Placental location, presence, and depth of myometrial invasion, previous uterine surgery and the type of uterine incision were evaluated. Intraoperative hemorrhage, need for blood transfusion and hysterectomy, complete blood count parameters of mother and newborn were compared between the anterior and posterior placenta previa.

RESULTS: Previous uterine surgery, abnormally invasive placenta and need for blood transfusion were significantly higher in patients with anterior placenta previa. The increasing number of previous cesarean operations enhanced placental invasion to cesarean scar area in anterior placentation, leading to higher rates of blood transfusion, classical incision, and hysterectomy. Also, when the patients with previous cesarean or classical incision were excluded, anterior placentation differed significantly when compared with posterior placentation with respect to hemoglobin differences between preoperative and postoperative values.

CONCLUSION: Anterior location of placenta previa increases hemorrhagic complications. Placental location, presence, and depth of invasion should be assessed and timing of delivery should be planned with appropriate preparation of blood products before delivery.

Keywords: Anterior placentation, Cesarean section, Hemorrhage, Placenta accreta, Placenta previa

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Introduction

Placenta previa may cause massive bleeding at antenatal, intrapartum or postpartum periods and is one of the leading causes of maternal morbidity and mortality (1). Abnormally invasive placenta (AIP) (i.e. accreta, increta, percreta), preterm labor, rupture of amniotic membranes, malpresentation, intrauterine growth retardation, vasa previa, congenital abnormalities, an amniotic fluid embolism can accompany placenta previa. Massive hemorrhage during cesarean section is frequently seen and may necessitate blood transfusion, balloon tamponade, use of uterine hemostatic sutures, ligation of hypogastric or uterine arteries, or even hysterectomy. Elongation of the placenta over internal cervical os, a previous cesarean section of patient and placenta covering a cesarean scar, lacunas greater than 1 cm in the placental parenchyma, AIP, advanced maternal age are shown factors for increased risk of hemorrhage in patients with placenta previa (2,3). It is also noted that when placental edges cannot be seen by vagi-

nal ultrasound in total placenta previa, the lower segment is not adequate for contraction leading to increased risk of bleeding and need for blood transfusion (4). Cervical length less than 3 cm is also shown to be related to increased bleeding during cesarean section in patients with placenta previa, and cervical length is recommended to be assessed along with other parameters (5).

Anterior placenta previa, which is determined with ultrasonographic examination carries a higher risk of intraoperative hemorrhage when compared with posterior placenta previa due to the higher probability of invasion to scar area of previous cesarean, higher frequency to accompany abnormally invasive placenta and much more transplacental access during cesarean section. Baba et al. depicted that anteriorly located placenta previa also increased risk of intraoperative massive hemorrhage independent of other risk factors, however, there are few studies on this issue (2).

Aim of this study is to assess factors increasing intraoperative complications such as massive hemorrhage, blood transfusion, and hysterectomy in patients with placenta previa, investigate the significance of anterior placental location independent of other factors, and to evaluate placentation and hemorrhage, especially after previous uterine surgery.

Materials and Methods

This is a retrospective cohort study which was conducted in the same center including all of the patients followed with placenta previa in between 2012 and 2015. A total of 83 patients were included. Consent of patients for using data was obtained. Placenta of patients was classified as placenta previa anterior totalis, anterior marginalis, posterior totalis and posterior marginalis due to location, which was determined with the ultrasonographic examination. The placenta which ended in ≤2 cm range of internal cervical os was assessed as marginal previa, and placenta which crossed over cervical os and ended in >2 cm range was assessed as total previa. Presence and depth of myometrial invasion (accreta, increta, and percreta) were also assessed with the ultrasonographic examination and AIP was defined.

Placental location in the third trimester of pregnancy was classified; AIP, antenatal bleeding, and previous uterine surgery (cesarean section, myomectomy, curettage, and hysteroscopic metroplasty) were evaluated. Type of uterine incision, amount of intraoperative bleeding, the need of blood transfusion, application of balloon tamponade or uterine hemostatic suture, ligation of the hypogastric/uterine artery, need for hysterectomy, complete blood count parameters of mother and newborn were compared between anterior and posterior placenta previa. These parameters were also compared between total and marginal placenta previa, and between four groups (anterior placenta previa totalis, anterior previa marginalis, posterior previa totalis, and posterior previa marginalis).

Anterior and posterior placenta locations were also compared in patient groups who did not have previous uterine surgery, who did not have AIP and who did not have classical incision separately.

SPSS 23.0 program was used for statistical analysis. Categorical measurements were assessed as number and percent, continuous measurements were summarized as mean and standard deviation (median, minimum and maximum when needed). Chi-square or Fisher test statistics were used to compare categorical variables. To compare continuous variables between groups, ranges were assessed, one-way variance analysis ANOVA or Student t-test in dual groups for variables in the parametric range were used. $P<0.05$ was considered significant for all tests.

Results

As for the location of placenta previa, 46.9% were posterior total, 21.6% were anterior total, 19.2% were posterior marginal, and 12.3% were anterior marginal. Mean age of the patients was 31.9 which was similar between groups. Of all patients, 56% delivered after completing 36th - 37th gestational week.

Although 55% of patients have not undergone uterine surgery previously, 37% had previous cesarean section once or more times, 2 of 83 patients had a myomectomy, 2 had curettage and 2 had hysteroscopic metroplasty. Previous uterine surgery had been performed in 83.4% of women with anterior placenta previa totalis, in 41.0% of posterior previa totalis, in 20% of anterior previa marginalis, and in 25.0% of posterior previa marginalis. Therefore, anterior and posterior placenta locations were significantly different in terms of previous uterine surgery (p=0.013).

More than 2 units of transfusion were needed in 15.6% of patients. In 72.3% of patients, uterine lower segment incision was performed. Additional surgical intervention was not needed for 78.3% of the patients, while uterine artery ligation was performed at 9.6% and hypogastric artery ligation was performed at 6% of the patients. Uterine hemostatic suture and intracavitary balloon application were performed in lower rates (3.6% and 2.4%, respectively). Hysterectomy was performed at 20% of patients. Need for blood transfusion more than two units were significantly higher at patients who had cesarean previously (p=0.001).

Anterior or posterior location of placenta previa did not cause a difference in terms of antenatal vaginal bleeding. However, postoperative hemoglobin difference was found to be significantly higher in anterior placental location (Table I). Also, the amount of blood transfusion was significantly higher in patients with anterior placentation (p=0.005) (Table II).

Table I: *Neonatal features and hemoglobin values in the anterior and posterior placental location in placenta previa*

	Posterior placental location (n=55)	Anterior placental location (n=28)	p
Birth weight (g)	2782.9±675.6	2841.8±636.7	0.705
Birth week	35.63±2.61	35.78±2.15	0.793
Hb difference (g/dL) (preoperative Hb %)	1.59±1.05 (13.6 %)	2.26±1.27 (19.7%)	0.013

Table II: *Comparison of anterior and posterior placental location in placenta previa*

	Posterior placental location (n=55) n (%)	Anterior placental location (n=28) n (%)	p
Blood transfusion ≥ 2 units	6 (10.9%)	7 (25%)	0.005
Placental invasion anomalies	11 (20.0%)	17 (60.7%)	0.001
Previous uterine surgery	20 (36.3%)	17 (60.7%)	0.013
Classical incision	8 (14.5%)	13 (46.4%)	0.005

Among 46 patients who did not have previous uterine surgery, anterior and posterior located placenta also differed significantly in terms of preoperative and postoperative Hb difference (p=0.020).

Placental invasion was found at 34% of patients. AIP was not seen in posterior placenta previa marginalis, while 28.2% of posterior previa totalis patients, 30% of anterior previa marginalis patients, and 87.8% of anterior previa totalis patients had a placental invasion. Anterior and posterior groups were significantly different with respect to AIP (p=0.001).

The classical incision was used in 72% of patients in anterior previa totalis group, in contrast to 20% of posterior previa totalis group, 10% of anterior marginalis group and 7% of posterior marginalis group. Hence, there was a significant difference between anterior and posterior groups with respect to types of the incision (p=0.001). Hemoglobin (Hb) difference was not related to uterine incision, however, blood transfusion more than 2 units and hysterectomy rates were significantly higher in a classical incision in contrast to lower segment transverse incision (p=0.000).

Anterior and posterior located placenta were not significantly different with respect to blood transfusion for 55 patients who did not have AIP and for 61 patients who did not have a classical incision, however, this latter group had a significant difference between anterior and posterior located placenta in terms of Hb difference (p=0.029).

As for marginal placenta, we found a weak positive correlation between postoperative Hb values and cesarean time and birth weight, hence, postoperative Hb increased by increasing values of these parameters. A weak negative correlation was found between Hb difference and birth weight, hence by increasing birth weight Hb difference decreased. Furthermore, there was a weak positive correlation between Hb difference and parity, hence the former increased with the latter.

Discussion

Placenta previa is a leading cause of maternal morbidity and mortality as mentioned before, and anterior placentation, in particular, is reported to be an important risk factor (2,4). In our study, although hemoglobin difference was higher in anterior placenta group, hemoglobin values were similar after blood transfusion, which demonstrated an effective replacement intraoperatively or postoperatively. When the patients were classified into four groups, a significant difference was not found, probably owing to an inadequate patient number of each group.

Previous cesarean is a known risk factor to increase hemorrhage (4). Unlike the significant relation between need for blood transfusion, having a previous cesarean operation and anterior placentation, we could not identify the effect of other surgical procedures such as myomectomy, curettage and uterine metroplasty on placental location as all were applied to 2 patients each.

Prior studies showed that risk of abnormal placental attachment has increased by the rising number of previous cesareans, consecutively, hemorrhagic complications necessitating blood transfusion and risk of hysterectomy increased (6,7). Our study is consistent with previous reports; as anticipated, more than 2 units of blood transfusion was significantly higher if AIP existed.

Classical incision was also significantly higher in the anterior placenta previa location. This can be explained by the effort of performing the incision far from the placenta which covers low anterior segment and which carries a high risk of invasion anomalies, and therefore decreasing hemorrhage. Also, the relation between classical incision and hysterectomy and more blood transfusion is probably related to AIP, as mentioned at prior studies (2,4,8).

Giambattista et al. reported that previous cesarean operation, suspect of accreta in ultrasound view, and cesarean before the 34th gestational week in patients with placenta previa increased risk of peripartum hysterectomy (9). Also in our study group, hysterectomy was performed in significantly higher rates in patients who had anterior placentation owing to the effort of ceasing hemorrhage mostly caused by AIP. It may be decided during operation subsequent to preoperative detailed examination and patient information on risk factors. In this case, topography and invasion depth of placenta is explored by ultrasound or magnetic resonance imaging, personal features such as age, parity of the patient are considered and detailed informed consent is obtained from the patient before the operation, cesarean is performed by classical incision, and after clamping the cord, placenta is left in the uterus without an effort to get it out, uterine incision is sutured and hysterectomy is performed. Leaving placenta in place and performing hysterectomy was shown to diminish morbidity significantly in contrast to an attempt to remove the placenta first (10,11). Also FIGO, in 2018 guideline, recommended not to remove placenta in planned emergency hysterectomies for placental invasion anomalies and noted less blood loss in this way (8). Clausen et al. compared conservative treatment, local resection and hysterectomy options for placental invasion anomalies; conservative treatment in which placenta is left in place and expected to resorb was found to increase hemorrhage and infection risk, furthermore, this method carried hysterectomy risk even several months after cesarean (12).

When the patients with previous uterine surgery or classical incision were excluded, the significant difference still occurred between patients with anterior and posterior placentation with respect to postoperative hemoglobin differences. This result is consistent with prior studies, which concluded anterior placentation irrespective of other risk factors caused much more bleeding due to the existence of more vascularization in the anterior wall of the uterus (2,13).

A weak positive correlation between postoperative Hb values and cesarean time and birth weight, and weak negative correlation between Hb difference and birth weight for marginal placenta previa can be explained by early antenatal bleeding and consecutive emergency cesarean operation. In our center we usually plan cesarean timing of placenta previa patients at 36-37th gestational weeks, however, there are many patients who have to undergo a cesarean operation in earlier weeks due to bleeding. Gibbins et al. reported that placenta previa increased risk of preterm birth and maternal morbidity because of hemorrhagic complications even in the absence of invasion anomalies (1). On the other hand, in FIGO 2018 guideline, it is stated that the timing of cesarean for AIP varied between 34-36th weeks to 36-38th weeks in different centers, and because of most of the AIP accompanies placenta previa, risk of major prepartum bleeding increased as the gestational week precedes (8). Soyama et al. considered that fetal

weight and placental blood flow were correlated positively and depicted that increased birth weight caused increased bleeding at cesarean operation at patients with placenta previa (14). Our findings of the relationship between birth weight and Hb values are inconsistent with these reports probably due to elective operation at 36-37th week which allows increased birth weight and decreased hemorrhage in contrast to emergency cesarean in earlier weeks. A weak positive correlation between Hb difference and parity may be explained by increased AIP with increased parity.

A major limitation of our study is its retrospective nature. Hemorrhage was assessed by preoperative and postoperative Hb values and need for blood transfusion instead of direct measurement due to lack of data. Besides, the diagnose of AIP was not always based on pathologic examination as all of the patients did not undergo a hysterectomy. They were evaluated due to radiologic imaging and intraoperative direct vision.

In conclusion, placenta previa is an important condition in which placenta location, presence, and depth of invasion should be assessed and the timing of delivery should be planned with appropriate preparation of blood products before delivery. Anterior placentation particularly increases the risk of complications, therefore it may affect the decision of cesarean technique and management of the operation. Classical incision and hysterectomy in selected cases may subside morbidity and mortality. Our results and inferences support and strengthen the current literature. However, future prospective studies with larger study population are needed to evaluate the importance of anteriorly located placenta previa irrespective of other risk factors.

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