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Factors Associated with Placenta Previa: A Retrospective, Single-Center Study in Turkey

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF **Fatih Mehmet Findik**

Department of Obstetrics and Gynecology, Dicle University, Faculty of Medicine, Diyarbakir, Turkey

Corresponding Author: Fatih Mehmet Findik, e-mail: fatihmf@gmail.com
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Background: The incidence of placenta previa is gradually increasing. The major risk factor is a history of cesarean section (CS). Such patients may experience severe bleeding during pregnancy and surgery. Patients with placenta previa were classified based on risk factors in this study. This retrospective study from a single center in Turkey aimed to evaluate the factors associated with placenta previa in 151 women.

Material/Methods: Patients with placenta previa were grouped by the presence/absence of prior CS. Group 1 (123 patients) had undergone at least 1 CS, and Group 2 (28 patients) had not undergone CS. The diagnosis of placenta previa was made by ultrasound. Placenta previa was defined as cases where the placenta crossed the internal os. Duration of surgery, bleeding during surgery, and the amounts of erythrocyte suspensions required were compared between groups.

Results: Of Group 1 patients, 67.5% had anterior placenta previa compared to 46.4% in Group 2. The mean duration of surgery was: 52.0±19.2 and 28.5±4.6 min (P<0.001); the number of sutures was 8.4±2.4 and 5.9±0.9 (P<0.001); the bleeding volumes were 720.3±536.2 and 344±137.0 mL (P<0.001); and the amount of erythrocyte suspension administered intraoperatively was 0.2±0.7 and 0.0±0.0 unit (P=0.032).

Conclusions: Mean duration of surgery, number of sutures, bleeding volume, and intraoperatively applied ES volumes were significantly different between groups. Identification of placenta previa patients who have undergone prior CS is vitally important in terms of preoperative preparation.

Keywords: Cesarean Section, Repeat • Maternal Mortality • Placenta Previa

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Background

Placenta previa is diagnosed when the placenta completely covers the internal cervical os. The prevalence rises as cesarean delivery numbers increase, to attain about 0.5% [1-3]. Previous placenta previa and prior cesarean section (CS) are the 2 most significant risk factors [4-7]. However, maternal age, multiparity, smoking, chronic hypertension, multiple gestations, and previous uterine procedures (curettage and myomectomy) are also risk factors [3-9]. Severe bleeding during labor is possible, especially during the third trimester. The other risks include a need for cesarean hysterectomy, preterm delivery, and maternal death [7,10,11]. Patients with a previous cesarean section are more likely to have placental invasion. These patients have a higher risk of antepartum hemorrhage, postpartum hemorrhage, and hysterectomy [6,10]. Transvaginal or transabdominal ultrasonography aid diagnosis [12]. Diagnostic ultrasonography reveals complete closure of the cervical os by the placenta. The present study shows that placenta previa etiologies differ greatly between women who have undergone prior CS and those who have not. This retrospective study from a single center in Turkey aimed to evaluate the factors associated with placenta previa in 151 women.

Material and Methods

We retrospectively studied placenta previa patients operated on by the same physician, from July 2017 to June 2020. The study was approved by the Ethics Committee of Clinical Research of the University of Dicle (Ethics Committee decision number: 2020-355). We defined 2 groups. Group 1 (123 patients) had undergone at least 1 CS, and Group 2 (28 patients) had not undergone CS. The patients in Group 1 consisted of patients with at least 1 previous cesarean section. In Group 2 was composed of patients who had never had a cesarean section and who had a normal delivery. This group also included first pregnancies. Patient data were extracted from electronic medical records. We recorded age, gravidity, parity, gestational week at birth, placental location, duration of surgery, number of sutures placed, estimated blood loss during surgery, invasion status, erythrocyte suspension (ES) volumes transfused during and after surgery, hemoglobin and hematocrit levels before and after surgery, and body mass index. The hemoglobin and hematocrit levels were measured immediately before and 3 h after surgery. In patients who received ES, values were measured 3 h after the end of the procedure.

Four units of ES were reserved for all patients preoperatively. Spinal was preferred to general anesthesia. Placental invasion was defined when the placenta could not be entirely removed but was extracted by hand (or using a ring forceps) from uterine myometrial tissue, associated with bleeding from the placental bed. FIGO staging criteria were taken into account in the diagnosis of placental invasion [13]. The volume of blood in the aspirator (a suction canister) was the estimated blood loss. Depending on the hemograms, ESs were administered to patients at risk of severe bleeding during surgery. One expert surgeon (Fatih Mehmet Findik) performed all CSs.

Inclusion and Exclusion Criteria

Patients whose placenta completely covered the cervical os (as revealed by preoperative ultrasonography) were included; those with low-lying placenta and who underwent surgery prior to week 20 were excluded. In addition, patients with multiple pregnancies and comorbidities such as diabetes mellitus, hypertension, and bleeding disorders were excluded from the study.

Statistical Analysis

Statistical analysis employed SPSS ver. 21.0 for Mac (SPSS, Inc., Chicago, IL, USA). Data are presented as means±standard deviations or as medians with interquartile ranges. The Mann-Whitney U-test or the Fisher exact test was used to compare the groups. A P value <0.05 indicated statistical significance. The Kolmogorov–Smirnov test was used to evaluate whether data were normally distributed. Prior to the study, approval was obtained from our local ethics committee.

Results

A total of 151 placenta previa patients underwent operations; 123 patients in Group 1 (with at least 1 prior CS) and 28 in Group 2 (no CS). The mean ages of patients in Groups 1 and 2 were 33.5±5.2 and 32.4±7.1 years, respectively, and were not significantly different. Gravidity was 5.0±2.3 in Group 1 and 3.8±2.5 in Group 2, and thus was significantly different (P=0.004). The placenta was anterior previa in 67.5% of Group 1 and 46.4% of Group 2; the difference was significant (P=0.037). **Table 1** presents further demographic information. The mean duration of surgery was 52.0±19.2 and 28.5±4.6 min (p<0.001); the numbers of sutures placed was 8.4±2.4 and 5.9±0.9 (P<0.001); the bleeding volumes were 720.3±536.2 ml and 344±137.0 ml (P<0.001); and the intraoperatively administered ES volumes were 0.2±0.7 and 0.0±0.0 L (p=0.032), respectively, and the differences were significant. The surgical data are presented in **Table 2**.

Discussion

In our study, the difference between the groups in terms of operation time, numbers of sutures, amount of bleeding, and

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Table 1. Demographic data of patients.

	Placenta previa with previous cesarean Mean±SD	Placenta previa without previous cesarean Mean±SD	p
Age	33.5±5.2	32.4±7.1	0.526
Gravida	5.0±2.3	3.8±2.5	**0.004**
Parity	3.5±1.9	2.2±1.9	**0.002**
Hospital stay (days)	2.5±2.3	2.3±2.1	**0.028**
Totalis part			**0.037**
Anterior	67.5	46.4	
Posterior	32.5	53.6	
BMI	29.6±4.6	29.3±2.7	0.731
Apgar 1	5.4±1.5	5.4±1.9	0.796
Apgar 5	8.0±1.3	7.8±1.6	0.756

Table 2. Operative data.

	Placenta previa with previous cesarean Mean±SD	Placenta previa without previous cesarean Mean±SD	p
Invasion			**<0.001**
Yes	92.7	35.7	
No	7.3	64.3	
Preoperative hb (g/dl)	11.6±1.6	11.8±1.2	0.675
Postoperative hb (g/dl)	10.0±1.4	10.5±1.3	0.096
Preoperative hct (g/dl)	34.7±4.1	35.2±3.9	0.527
Postoperative hct (g/dl)	29.8±3.8	31.2±3.8	0.107
Number of sutures used	8.4±2.4	5.9±0.9	**<0.001**
Operating time (min)	52.0±19.2	28.5±4.6	**<0.001**
Intraoperative blood loss (ml)	720.3±536.2	344±137.0	**<0.001**
Intraoperative ES	0.2±0.7	0.0±0.0	**0.032**
Postoperative ES	0.4±0.7	0.3±0.9	0.479
Total ES kan	0.6±1.2	0.3±0.9	0.157
Intraoperative blood requirement			**0.026**
Yes	14.6	0.0	
No	85.4	100.0	
Total blood requirement			0.142
Yes	27.6	14.3	
No	72.4	85.7	

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intraoperatively administered ES volumes was significant. In addition, the hospital stay of Group 1 was significantly longer.

Placenta previa rates have risen dramatically in recent years. In our region, the incidence is 8.1% [14-16]. A previous CS is a major cause of this increase [17]. A placenta previa is more than a diagnosis. A placenta previa can cause hemorrhage during pregnancy and delivery, and maternal mortality. The infant may need to be delivered early, especially in patients with invasive abnormalities. The risk of hysterectomy in such patients is also rather high [2,7,10]. Although placenta previa is diagnosed by ultrasound, placental invasion is not always detectable in patients receiving standard obstetric care [18]. The literature reveals that placental invasion is likely to be associated with prior CS, but no distinction was made based on the patient's previous method of delivery [19]. Another study reported that the risk of invasion is increased, especially in women who have had a previous cesarean section [6]. In our study, we found a very significant difference in placental invasion between the 2 groups (92.7 and 35.7%, $P<0.001$). Inquiring about a prior CS aids estimation of placental invasion.

In another study on antepartum bleeding, the amount of bleeding was higher in the group with high invasion [10]. In this study, no distinction was made according to previous delivery type. The number of cesarean sections was higher in patients in the postpartum bleeding group. In addition, this group had more placental invasion and had more hospitalization days. Placenta previa is known to increase the requirement for blood transfusions and maternal mortality by inducing severe postpartum hemorrhage [20]. In this study, it was found that the amount of bleeding increased significantly when grouped according to the presence of cesarean section. Planned surgical delivery in patients with abnormal (invasive) placenta reduces complications and the need for blood transfusions. In the study, the diagnosis of abnormal invasion was categorized according to whether it was prenatal or intrapartum, but no distinction was made between the groups according to the presence of cesarean section [21]. Prenatal diagnosis of placental invasion minimized bleeding in a UK study. Some patients had never undergone CSs, but this was not considered when measuring bleeding [22]. It is essential to have ESs on standby during CS, as severe bleeding is possible [7,18,22,23]. Massive transfusion was maximally correlated with abnormal placentation in a study of over 690 000 deliveries [24]. Wefound that placental invasion was significantly higher in Group 1, as was the bleeding volume (720.3±536.2 vs 344±137.0 mL; $P=0.001$). No Group 2 patients required ES during surgery, but 18 Group 1 patients did (14.6 vs 0%, $P=0.026$). A study comparing placenta previa patients who underwent normal delivery and CS found more bleeding in patients who had undergone prior CS, and bleeding increased linearly with the number of previous CSs [1].

A 2018 study on placenta previa risk factors reported that a prior CS imparted the highest risk; this increased with the number of previous CSs [25]. When encountering placenta previa cases, it is essential to determine whether the placenta lies anterior or posterior. The risk of hysterectomy was considerably higher in the anterior cases [26]. We found that most placenta were anterior in Group 1 patients, and most were posterior in Group 2 patients (67.5% vs 46.4%, $P=0.037$). Massive bleeding is more common in anterior placenta patients [27]. Another study found that an anterior placenta increased the risks of blood loss, major transfusion, and hysterectomy. Over half of our patients lacked prior CSs; they did not consider prior CS status when grouping patients [28]. In one study, the duration of surgery was longer in the group with anterior placenta and high placental invasion. In addition, the postoperative hospital stay was longer in these patients. In this study, no distinction was made between normal birth and previous cesarean section [10]. The Group 1 operative time was significantly longer than that of Group 2 (52.0 vs 28.5 min, $P<0.001$). Given the high invasion rate of Group 1, this is reasonable. Also, Group 1 patients required longer hospitalization (2.5 vs 2.3 days, $P=0.028$).

Our study has some limitations. One of these is the relatively low incidence of placenta previa patients (although its incidence has been increasing recently). As the incidence increases, some of our information on this subject will be updated and some of our information will be renewed. In addition, multicenter studies may support our study and contribute to the literature.

Conclusions

In conclusion, placenta previa patients (who are becoming more common) require careful obstetric care. These patients have a high risk of bleeding and may need hysterectomy during surgery. The need for blood transfusions is also high. We observed that there were significant differences between the groups in terms of duration of surgery, amount of bleeding, amount of ES used, and length of hospital stay. It is essential to ask patients if they have undergone prior CS. In this way, the preoperative preparation process will be carried out according to the needs of the patient. In addition, more specific information about the disease can be given to the patient.

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