Factors Associated With Peripartum Blood Loss Among Women With Placenta Previa/Accreta in Fayoum University Hospital

Original Article

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ABSTRACT

Objective: To study the risk factors associated with massive blood loss among women with placenta previa/accreta.

Methods: This prospective cohort study was conducted at the department of obstetrics and gynecology at Fayoum University from September 2021 to February 2023. This study recruited women diagnosed with placenta previa/accreta spectrum according to prespecified inclusion and exclusion criteria. The diagnosis was confirmed by MRI. All risk factors for massive blood loss either obtained by history, ultrasound findings, and MRI findings were evaluated.

Results: Patients who lost ≥2000 cc had significantly higher parity, number of CS, and shorter interpregnancy interval (*P value* <0.001, < 0.001, and 0.003 respectively). Gravidity (*P*=0.015), parity (*P*=0.002), number of CS (*p*<0.001), and pregnancy complications (*P*=0.03) were significant predictors of massive blood loss. Certain ultrasound (lost placental and uterine regularity, bladder serosa interface and myometrial thinning, and placental lacunae) and MRI findings (evidence of focal bulge T2 dark spot) predicted massive blood loss significantly.

Conclusion: MRI is very important in the diagnosis of placenta previa/accreta. The developing of a scoring system for the prediction of intrapartum blood loss is paramount.

Key Words: Blood loss; MRI; placenta accreta; placenta previa; risk factors; ultrasound.

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INTRODUCTION

Placenta previa/accreta spectrum is a major cause of obstetric hemorrhage leading to maternal mortality[1]. This spectrum represents abnormal impregnation of the placenta in the lower uterine segment (placenta previa) or abnormal encroachment of the placenta into the uterine musculature (placenta accreta). The latter would be further divided depending on the extend of encroachment into placenta accreta (where the trophoblastic villi invade the decidua), increta (where the chorionic villi invade the inner part of the myometrium), and percreta (where the chorionic villi invade the whole thickness of the myometrium and might reach the serosa[2,3].

Many factors contributed to increased peripartum bleeding among these women. Previously reported factors included increased maternal age, increased parity, smoking, fertility treatment, previous cesarean section (CS), and history of recurrent miscarriage[4]. Recently, there is a tremendous increment in the rate of CS, fertility treatments, and increased maternal age which increased the rates of abnormal placentation[5].

Previous studies evaluating risk factors contributing to increased peripartum blood loss reported that increased maternal age > 34 years, history of multiple dilatation and curettage (D&C), and the type of placenta previa (major) were associated with increased intrapartum blood loss[6]. However; another study reported no association between maternal age, parity, number of CS deliveries, degree of placental invasion and intrapartum bleeding among women with placenta accreta[7]. Accordingly, this study was conducted to evaluate possible risk factors associated with maternal hemorrhage in women diagnosed with placenta previa/accreta.

METHODS

This prospective cohort study was conducted at the department of obstetrics and gynecology at Fayoum University from September 2021 to February 2023. The study was conducted on 96 pregnant women diagnosed with abnormal placentation by u\s and MRI and underwent elective or emergency CS according to predetermined inclusion and exclusion criteria.

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The inclusion criteria

a) Pregnant women aged 18–45 years,

b) Single viable pregnancy,

c) Placenta previa or accreta by doppler U/S or MRI,

d) After 28weeks gestation,

e) BMI not more than 40.

The exclusion criteria

a) multifetal gestation,

b) Polyhydramnios,

c) Kidney or liver diseases,

d) Patients on anticoagulant therapy,

e) Patients with platelet disorders,

f) Patients with anemia and PET.

The eligible subjects included in this study were subjected to the following

- Informed consent was obtained from parents of each participant.
- Full history including: Age, Gravidity, Parity, Gestational age, any risk factor for placenta previa (previous C-section, previous dilatation and curettage (D&C), previous myomectomy, previous history of placenta previa), Body mass index (BMI), number of prenatal bleeding episodes, time interval between previous CS and present CS, and hospitalization after previous CS.
- Clinical Examination including: General examination, vital signs, and fundal level evaluation.
- Laboratory investigations: Complete blood count (CBC), blood group, and bleeding profile.
- Ultrasound examination was done for all patients using Logic p-52012 device with 3.5-5 MHz curvilinear transducer (for gray scale and color Doppler techniques) while the patients lying supine with medium-full urinary bladder for transabdominal approach and empty bladder for transvaginal approach. Ultrasound evaluated the type of placenta previa and the existence of any criteria suggestive of invasion[8].
- MRI: MRI was performed on a 1.5T Scanner (Achieva, Philips Medical System, Best, and the Netherlands). MR protocol comprises T2w images (including high resolution sequences) in sagittal, coronal, and axial orientations using a fast spin-echo sequence; T1-Thrive sequences were obtained in axial plane. MRI indicators included the cervical canal length, dilation of the cervical canal, placental thickness on the uterine scar area, focal uterine bulging, focal interruption of the myometrium, T2 dark intra-placental bands, empty vascular shadow of the uterus, low signal discontinuity in the muscular layer of the posterior wall of the bladder, attachment position of the placenta, and the distance from the upper edge of the placenta to the uterine fundus[8].
- Intra-operative blood loss was evaluated and massive blood loss was defined as loss of 2000 ml blood.

Statistical analysis

The collected data were coded, entered, and analyzed using the IBM software statistical package for social sciences (SPSS) (version 25). For categorical variables, descriptive statistics were in the form of frequency and percentage, while for numerical variables, in the form of mean and standard deviation. (mean ± SD). The proper statistical significance measures were used: (Independent Sample t-test, Chi-Square ($\chi 2$) test, and Pearson's correlation analysis; {r- values: 0 to 0.3 positive or negative (slight), 0.3 to 0.7 (moderate) and 0.7 to 1 (strong). Statistical significance was described at a *p-value* of less than or equal to 0.05.

RESULTS

The amount of blood loss among the studied cases which ranged from 1000 to 7000 cc with a mean of 2790 ± 1331.5 cc as more than half patients (64%) had lost ≥2000 cc of blood.

There was a statistically significant difference between the amount of blood loss and the mean parity as patients who lost ≥2000 cc had significantly higher parity as compared to those who lost <2000 CC (the mean parity was 3.59 ± 1.31 vs 2.72 ± 1.06 respectively, $P<0.001$). There was a significant difference between patients with massive blood loss and those without in the number of CS deliveries and the total duration of surgery (*p value* < 0.001 and 0.003, respectively). On the other hand, there was no statistically significant difference in age and history of abortion between both groups (Table 1).

Table 1: Baseline characteristics of all the studied patients divided according to the amount of blood loss (n = 100)

		Amount of blood loss		*P value*
		<2000 (n = 36)	≥2000 (n = 64)	
Age (years)		29.56 ± 5.45	31.06 ± 5.90	0.211
Gravidity		4.11 ± 1.26	4.88 ± 1.51	0.022*
Parity		2.72 ± 1.06	3.59 ± 1.31	0.001*
Abortion	Yes	10 (27.8%)	14 (21.9%)	0.670
	No	26 (72.2%)	50 (78.1%)	
Number of CS		2.22 ± 1.10	3.31 ± 1.19	<0.001*
Duration since last CS		(n = 34) 4.29 ± 2.31	(n = 64) 3.13 ± 1.41	0.003*

Patients with ≥2000 blood loss had significantly lower rate of pregnancy complications as compared to those with <2000 cc blood loss (*P*= 0.028). There was no statistically significant difference between the studied groups in terms of uterine surgical procedure, contraceptive use before pregnancy, medical disorders, and preoperative Hb level (Table 2).

Table 2: Patients' medical history divided according to the amount of blood loss (n = 100)

	Amount of blood loss				*P value*
	<2000 (n = 36)		≥2000 (n = 64)		
	No.	%	No.	%	
Uterine surgical procedure	8	22.2	10	15.6	0.410
No	28	77.8	54	84.4	
D&C	6	16.7	10	15.6	0.203
Myomectomy	2	5.6	0	0.0	
Before preg. Contra					
No	20	55.6	32	50.0	
Depoprovera	8	22.2	18	28.1	
IUD	4	11.1	4	6.3	0.751
OCP	4	11.1	8	12.5	
Lactational amenorrhea	0	0.0	2	3.1	
Medical disorders	8	22.2	10	15.6	0.410
Pregnancy complication	14	38.9	12	18.8	0.028*
Preoperative HB	10.46 ± 1.41		10.63 ± 0.77		0.522

*: Statistically significant at $p \leq 0.05$

Based on the results of Univariate Logistic regression analysis, gravidity (OR: 1.502, 95%CI: from 1.081 – 2.087, *P*=0.015), parity (OR: 1.907, 95%CI: from 1.260 – 2.886, *P*=0.002), number of CS (OR: 2.299, 95%CI: from 1.501 – 3.520, *P*<0.001) and pregnancy complications (OR: 0.363, 95%CI: from 0.145 – 0.908, *P*=0.03) were significant predictors of massive blood loss. Age, history of abortion, previous contraception, medical disorders, preoperative Hb and abnormal lab before CS were not significantly associated with massive blood loss. According to ultrasound findings, patients who lost placental and uterine regularity had significantly higher odds of losing ≥2000 cc of blood (OR: 11, 95%CI: from 3.952 – 30.614, *P*<0.001). Patients with bladder serosa interface and Myometrial thinning had significantly higher odds of losing ≥2000 cc of blood (OR: 15.273, 95%CI: from 4.786 – 48.738, *P*<0.001) and (OR: 15.19, 95%CI: from 5.185 – 44.505, *P*<0.001) respectively. Patients with placental lacunae had significantly higher odds of losing ≥2000 cc of blood (OR: 6.682, 95%CI: from 2.610 – 17.104, *P*<0.001). Regarding MRI findings, patients with evidence of focal bulge had significantly higher odds of losing ≥2000 cc of blood (OR: 11.692, 95%CI: from 3.691 – 37.035, *P*<0.001). Regarding patients with t2 dark spot, they had significantly higher odds of losing ≥2000 cc of blood (OR: 10.286, 95%CI: from 3.254 – 32.510, *P*<0.001) (Table 3).

Table 3: Univariate Logistic regression analysis for the parameters affecting amount of blood loss ≥2000 (n = 64 vs. 36)

	p	OR (LL – UL 95%C.I)
Age (years)	0.210	1.049 (0.974 – 1.129)
Gravidity	0.015*	1.502 (1.081 – 2.087)
Parity	0.002*	1.907 (1.260 – 2.886)
Abortion	0.403	0.758 (0.397 – 1.450)
Number of CS	<0.001*	2.299 (1.501 – 3.520)
Before preg. contra	0.594	1.250 (0.551 – 2.838)
Medical disorders	0.412	0.648 (0.230 – 1.826)
Pregnancy complication	0.030*	0.363 (0.145 – 0.908)
Hb pre	0.452	1.162 (0.787 – 1.715)
Abnormal lab before CS	0.557	0.548 (0.074 – 4.069)
Loss of regularity of placenta and uterus (US)	<0.001*	11.0 (3.952 – 30.614)
Thinning bladder serosa interface (US)	<0.001*	15.273 (4.786 – 48.738)
Myometrial thinning (US)	<0.001*	15.190 (5.185 – 44.505)
Placental lacunae (US)	<0.001*	6.682 (2.610 – 17.104)
Evidence of focal bulge (MRI)	<0.001*	11.692 (3.691 – 37.035)
Dark t2 (MRI)	<0.001*	10.286 (3.254 – 32.510)

OR: Odd`s ratio **C.I:** Confidence interval **LL:** Lower limit **UL:** Upper Limit. *: Statistically significant at $p \leq 0.05$

DISCUSSION

Massive blood loss occurred in 64% participants. An earlier study reported massive blood loss in 28.3% of their participants (8). This difference would be rendered to the difference in the definition of massive blood loss as the current study reported blood loss ≥2000 ml to be massive while the other study used blood loss ≥ 2500 as their reference. Also, the difference in the sample size contributed to the discrepancy in the reported results. Additionally, they recruited 19.9% cases with placenta percreta, which was not properly mentioned in the

current study. Other factors that contributed to different amount of blood loss between studies included proper prenatal diagnosis, the adopted management strategy either conservative management or hysterectomy, surgical expertise, the gestational age at termination, and whether the surgery was elective or emergency[9].

The current study reported women who had massive blood loss, had higher gravidity, parity, previous CS deliveries, and shorter interpregnancy interval. These women also, had fewer pregnancy complications. This was in accordance in recently reported results as maternal age, parity, and previous CS deliveries were significantly higher among women with massive blood loss[8]. Repeated CS deliveries resulted in poor endometrial repair at the scar site with relative tissue hypoxia. Accordingly, in any subsequent pregnancy, placental implantation is impaired with encroachment into the decidualized endometrium only without entering the spongiosus layer. Also, this process does not stop abnormal invasion, resulting in increased bleeding during delivery[10].

Gravidity, parity, number of previous CS, pregnancy complications, and certain ultrasound and MRI criteria predicted massive blood loss significantly among women with placenta previa/ accreta spectrum. Another study reported that advanced maternal age, gravidity, number of CS deliveries, and decreased preoperative Hb level were significant predictors of massive blood loss. Additionally, this study included MRI findings as empty vascular shadow of the uterus and the extend of attachment of the placenta as significant predictors also[11]. Ultrasound criteria that predicted massive blood loss were loss of placental regularity, thinned bladder mucosa and myometrium, and placental lacunae. This was in accordance with previous results were loss of clear zones and abnormal placental lacunae with feeding vessels predicted massive blood loss significantly. Other findings included focal exophytic mass, and placental bulge[8]. Some previous studies reported a significant association between bridging vessels and massive blood loss[12,13], however; this was not evident in the current study.

CONCLUSION

Placenta previa / accreta is a major cause of obstetric hemorrhage. Risk factors contributing to peripartum massive blood loss differed between studies. Proper anticipation is mandatory to provide proper care for women and to prevent maternal mortality.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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