

Placental Location, Postpartum Hemorrhage and Retained Placenta in Women with a Previous Cesarean Section Delivery: A Prospective Cohort Study

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Abstract: Objective: The objective of this study was to determine if placental location increased the risk of PPH and retained placenta in women previously giving birth with cesarean section. **Design** Prospective cohort study. **Setting:** Edfu general hospital –Edfu-Aswan and Elsayed Galal Hospitals. Patients and methods We performed a prospective cohort study on 100 women with cesarean section delivery in a previous pregnancy. Ultrasound examinations were performed at gestational week 28–30, and placental location, placental thickness, Data on maternal age, parity, BMI,, gestational week at delivery, induction, delivery mode, oxytocin, preeclampsia, PPH, retained placenta, and birth weight were obtained for all women. Outcome measures were PPH ($\geq 1,000$ mL) and retained placenta. **Main outcome.** Anterior and posterior previa location of placenta increase risk of postpartum and retained placenta. **Results** The overall incidence of PPH was 9.3% and of retained placenta 9.3%. two women (2.1%) with anterior previa, two women (2.1%) with posterior previa, two women (2.1%) with low anterior, two women (2.1%) with low posterior placenta had PPH compared to 89 (90.7%) with anterior, posterior or fundal locations. There was significant increase risk of retained placenta in women with anterior previa, posterior previa, and low anterior and low posterior placenta. **Conclusions** The overall risk of PPH and retained placenta was high for women with previous cesarean section. anterior previa, posterior previa, low anterior and low posterior placenta location of the placenta in such women tended to impose an increased risk for PPH and risk increase of retained placenta.

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Keywords: Postpartum hemorrhage, placental location, previous cesarean section, retained placenta and ultrasound

1. Introduction

The incidence of PPH has increased during the last decades ⁽¹⁾, also rates of cesarean section continue to increase worldwide ⁽²⁾, methods for prediction, surveillance, and management of complications during pregnancy and delivery associated with previous cesarean section become increasingly important ⁽³⁾. Uterine rupture, placenta previa, and placenta accreta are well-known and potentially life-threatening complications, but are fortunately still rare conditions ⁽⁴⁾.

They have, however, increased alongside the rising number of women with previous uterine surgery ⁽⁵⁾.

A decision-analytic model by Solheim ⁽⁶⁾ has predicted a substantial increase in the incidence of placenta previa and accreta and in maternal mortality if the cesarean section rate continues to increase. Postpartum hemorrhage (PPH) is more common and is associated with maternal mortality and morbidity. Women with previous cesarean section delivery have a higher risk for PPH compared with women without previous cesarean section ⁽⁷⁾.

The incidence of PPH has also increased during the last decades ⁽¹⁾.

We have previously conducted a population-based cohort study that showed an increased risk (3.44%) of retained placenta in women previously delivered by cesarean section ⁽⁴⁾.

The risk was higher for retained placenta with PPH than for retained placenta with normal blood loss. The reasons for this increased risk are not fully understood, but theories focus on the scarred uterine wall and resemble discussions concerning the pathology behind placenta previa and accrete ⁽⁸⁾.

If the abnormal implantation in the uterine wall is caused by the cesarean section scar, the placenta should be located over the scarred myometrium in order to be retained and cause PPH. It has been reported that, among women with placenta previa, all with abnormal invasive placentae had a previous cesarean section and anterior placenta previa. Pictorial ultrasound, including measurements of myometrial thickness and 3D power Doppler at the placental site, has been used to diagnose invasive placentation ⁽⁹⁾.

In Sweden, every pregnant woman is offered a routine second trimester ultrasound at 18 weeks of gestation, and 97% of all women attend ⁽⁴⁾.

Gestational age is estimated, fetal anomalies looked for, and location of the placenta is recorded. In

case of a low-lying placenta the woman is examined again in the third trimester to evaluate if the placenta has migrated or not. Previous studies have shown that migration of a low-lying placenta occurred less often in women with previous cesarean section ⁽¹⁰⁾.

Whether or not there is an association between the locations of the placenta in a scarred uterus and complications such as retained placenta and PPH has not yet been examined. Therefore, the aim of this

study was to investigate if an anterior placental location in women with a previous cesarean section delivery increased the risk for PPH and retained placenta ⁽¹¹⁾.

Aim of the Work

The aim of this study is to assess the relation between postpartum hemorrhage and retained placenta regarded to placental location in women with a previous cesarean section.

Table (1): All parameters distribution of the study group.

Parameters	Total (N=100)
Age (years)	19-37[26.43±5.51]
BMI [wt/(ht)^2]	18-35[25.91±4.62]
Parity	
P1	43(43%)
P2	25(25%)
P≥3	32(32%)
No. of previous	
Prev.1	59(59%)
Prev.2	25(25%)
Prev.≥3	16(16%)
Presentation	
Breech	26(26%)
Cephalic	74(74%)
Location of placenta	
Anterior	60(60%)
Anterior previa	2(2%)
Posterior	21(21%)
Posterior previa	2(2%)
Low anterior	2(2%)
Low posterior	2(2%)
Fundal	11(11%)
Placental thickness (mm)	36.9-41[38.79±1.12]
Retained placenta	
Yes	9(9%)
No	91(91%)
Postpartum in ml	
<1000	91(91%)
>1000	9(9%)
Birth weight	2500-3250[2888.64±226.92]
Typing	
A+	23(23%)
Ab+	7(7%)
B+	6(6%)
O+	64(64%)
Medical disorder	
No	100(100%)

Data are expressed as mean ± standard deviation (SD) and frequency (%)

2. Patients and methods

Patients

- Design: prospective cohort study.
- Setting: Edfu general Hospital-Edfu-Aswan and Elsayed Galal Hospitals.
- Study population.

The study was conducted on 100 pregnant women with previous section attended in outpatient

clinic women in Edfu general hospital and Elsayed Galal Hospitals. so the study was done on 100 pregnant women in the period from March 2018-September

2018. The study is designed to study the possible association between postpartum and retained placenta and placental location.

The consent was taken from all patients.

Inclusion criteria:

- 1- Pregnant women with previous caesarean section.
- 2- Only singleton pregnancies.
- 3- Age 20-40.
- 4- Viable full term fetuses.

Exclusion criteria:

1. Primigravida
2. Preterm labor
3. Multiple pregnancies
4. Medical disorders: iron deficiency anemia, Diabetes mellitus-preeclampsia and eclampsia

Methods:

All cases of study were subjected to:

- 1- Detailed history taking with emphasis on:
 - Obstetric history
 - History of present condition of fulfillment inclusion and exclusion criteria
 - Medical history to fulfill inclusion and exclusion criteria
 - Full physical examination:
 1. vital sign
 2. General examination edema kind is coloration
 3. Local examination
 - In section fundal level
 - Palpation
 - Auscultation fetal heart sound
 4. PV examination
- 2- Routine Laboratory investigation.
 - Complete blood picture (CBC)
 - Fasting blood sugar
 - Abotyping
 - Complete urine analysis

- SGOT, SGPT
 - Serum Urea, Serum Creatinine
- 3- 2D Ultrasonography

Statistical analysis

Statistical analysis was performed by using postpartum retained placenta as outcome variable. Crude and adjusted odds ratio (OR) was used to calculate the association with placental location.

The adjusted odds ratio was estimated by logistic regression when calculating the association between placental volume and amount (ml) of blood loss.

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean \pm standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Chi-square (χ^2) test of significance was used in order to compare proportions between two qualitative parameters.
 - The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
 - Probability (P-value).
 - P-value <0.05 was considered significant.
 - P-value <0.001 was considered as highly significant.
 - P-value >0.05 was considered insignificant.

Results**Table (2):** Comparison between retained placentas and no according to parity.

Parity	Retained Placenta		χ^2	p-value
	Yes (N=9)	No (N=91)		
P1	8(88.9%)	35(38.5%)	8.566	0.014*
P2	0(0%)	25(27.5%)		
P \geq 3	1(11.1%)	31(34.0%)		

This table shows statistically significant difference between retained placentas and no according to parity.

Table (3): Comparison between retained placentas and no according to location of placenta.

Location of placenta	Retained Placenta		χ^2	p-value
	Yes (N=9)	No (N=91)		
Anterior	1(11.1%)	59(64.8%)	85.318	<0.001**
Anterior previa	2(22.2%)	0(0.0%)		
Posterior	0(0.0%)	21(23.1%)		
Posterior previa	2(22.2%)	0(0.0%)		
Low anterior	2(22.2%)	0(0.0%)		
Low posterior	2(22.2%)	0(0.0%)		
Fundal	0(0.0%)	11(12.1%)		

This table shows highly statistically significant difference between retained placentas and no according to location of placenta.

Table (4): Comparison between retained placenta yes and no according to postpartum in ml.

Postpartum in ml	Retained Placenta		x ²	p-value
	Yes (N=9)	No (N=91)		
<1000	0(0.0%)	91(100.0%)	97.000	<0.001**
>1000	9(100.0%)	0(0.0%)		

This table shows highly statistically significant difference between retained placenta yes and no according to postpartum in ml.

Table (5): Relation between post partum and location of placenta.

Location of placenta	Postpartum in ml		x ²	p-value
	<1000(N=91)	>1000(N=9)		
Anterior	59 (64,8%)	1 (11.1%)	85.318	<0.001**
Anterior previa	0 (0.0%)	2 (22.2%)		
Posterior	21 (23.1%)	0 (0.0%)		
Posterior previa	0 (0.0%)	2 (22.2%)		
Low anterior	0 (0.0%)	2 (22.2%)		
Low posterior	0 (0.0%)	2 (22.2%)		
Fundal	11(12,1%)	0 (0.0%)		

This table shows highly statistically significant relation between post partum in ml and location of placenta.

Discussion

Women with previous caesarean section deliveries were found to have an increased risk of retained placenta in a subsequent pregnancy.

The risk was most pronounced for retained placenta with heavy bleeding. Women with a previous caesarean section had no increased risk of retained placenta with normal bleeding. Several confounding factors were identified, but the increased risk remained after adjustment. Women with previous caesarean section and placenta previa had an increased risk of PPH and retained placenta.

This study was conducted at the Department of Obstetrics and Gynaecology, Edfu General Hospital and El-sayed Galal Hospitals, between March 2018 to September 2018. During the study period the caesarean section rate at the department was 30%. All women with singleton pregnancies who had been delivered by caesarean section in at least one previous pregnancy could be included. The women were asked to participate by me or my college when conducting the routine ultrasound scan at 28 weeks of gestation. Out of 220 women asked, twenty women were excluded; five due to premature delivery and fifteen who moved away before examination. One hundred women chose not to participate for their reasons. Thus, 100 women constituted the study group. A power calculation was completed, presuming an incidence of 10% for PPH.

In comparison of a study by Belachew (2017) was conducted at the Department of Obstetrics and Gynaecology, Uppsala University Hospital, between 2010 and 2013. During the study period the caesarean section rate at the department was 16%. All women

with singleton pregnancies who had been delivered by caesarean section in at least one previous pregnancy included. The women were asked to participate by the midwives or a research-nurse when conducting the routine ultrasound scan at 18 weeks of gestation. Out of 529 women asked, seven women were excluded; five due to premature delivery and two who moved away before examination. One hundred and twenty-two women chose not to participate and their reasons for not participating were not recorded. Thus, 400 women constituted the study group.

The reason for such results could be that previous caesarean section was not the main and only exposure. Moreover, the sample sizes were small, which could have concealed a real difference.

If retained placenta with heavy bleeding shares the same mechanism as abnormal invasive placenta, one could assume that the placental location in the uterus matters. The scar from a previous caesarean section only affects the anterior uterine wall, which should lead to an increased risk with the placenta localized anteriorly.

The current study results do show that women with placenta previa, attached to the scarred uterine wall, have a significant increased risk for PPH and retained placenta. For women with other anterior placentae, the increased risk was non-significant. In our cohort, two cases of placenta previa were anterior. Previous studies on women with placenta previa, regardless of previous caesarean section.

Between the routine ultrasound at 28 week examination, 4 (4.2 %) of the low-lying placentae (anterior or posterior) position. On the other hand, 4 women who were diagnosed placenta previa at 28

weeks. There were 4 (4.2%) placenta previa in the study group; 2 anterior and 2 posterior, and the location of placenta was the same position at delivery. The risk for PPH and retained placenta in women with anterior placenta compared to others is shown in Table 5. There was equal PPH with anteriorly low lying or previa located placenta and posteriorly low lying or previa; 4 women (4.2%) compared to 4(4.2%), but this difference was not significant. Among the women with retained placentae, 5 were anterior and 4 were posterior. There was, however, a significant increased risk for women with low-lying anterior placentae, anterior previa, lowlying posterior and posterior previa with other placental locations ($p < 0.001^{**}$). Among women with retained placentae, 2 (2.1%) had low lying anterior placentae and 2 (2.1%) low lying posterior placenta 2 (2.1%) had anterior previa placentae and 2 (2.1%) posterior previa placenta ($p < 0.001^{**}$).

In Belachew (2017) cohort, six of the eight (75%) placentae previa were anterior. Previous studies on women with placenta previa, regardless of previous caesarean section, report on only 30% on the anterior wall. This might indicate that a scar in the uterine wall affects the placentation site. In our study, 55.5% of the women had an anterior-located placenta (low anterior and anterior previa included) compared to 44% in a general population.

On the contrary, a previous study by Naji et al reported an incidence of 46.8% anterior-located placentae in women with previous caesarean section. They even found more posterior placentae in the previous caesarean section group than others and the same amount of low-anterior placentae in both groups. A major difference from our study was that they assessed placental location with abdominal ultrasound at 11-14 weeks and only the low-lying placentae were examined further in weeks 20 and 34. Migration from low-lying to anterior or posterior location occurred in 62-64%, with no difference between those with previous caesarean section and others. This percentage of placental migration is well in line with our finding (62%) and with the report by Lal et al did, however, show a complete resolution of placenta previa in 90% of the women without previous caesarean section, thus favoring the hypothesis on the influence of caesarean scar on placental location.

This might indicate that a scar in the uterine wall affects the placentation site. In his study, 55.5% of the women had an anterior-located placenta (low anterior and anterior previa included) compared to 44% in a general population. On the contrary, a previous study by Naji et al., reported an incidence of 46.8% anterior-located placentae in women with previous caesarean section. They even found more posterior placentae in the previous caesarean section group than others and

the same amount of low-anterior placentae in both groups.

In our cohort study same as by Naji et al. that no significant difference between anterior or posterior location but all low lying and previa anterior and posterior suffer from postpartum hemorrhage.

On the other hand study conducted by Torricelli M. et al 2015 a prospective study including 2354 patients with singleton pregnancy at term admitted for vaginal delivery was conducted. Placental position was determined before delivery by ultrasonography examination performed Trans abdominally with women in the supine position. Maternal characteristics and delivery outcome such as premature rupture of membranes, induction of labor, mode and gestational age at delivery, indication for cesarean section, duration of the third stage, postpartum hemorrhage (PPH) and manual removal of placenta were correlated with anterior, posterior or fundal placental locations.

Among women enrolled: i) 1164 had an anterior placenta, ii) 1087 a posterior placenta, iii) 103 a fundal placenta. Women with anterior placenta showed: i) a higher incidence of induction of labor ($p = 0.0001$), especially for postdate pregnancies and prolonged prelabor rupture of membranes ($p < 0.0001$), ii) a higher rate of cesarean section rate for failure to progress in labor ($p = 0.02$), iii) a prolonged third stage ($p = 0.01$), iv) a higher incidence of manual removal of placenta ($p = 0.003$) and a higher rate of PPH in vaginal deliveries ($p = 0.02$)⁽¹²⁾.

The Torricelli M., et al 2015 study showed the influence of anterior placental location on the course of labor, with a later onset of labor, a higher rate of induction and cesarean section and postpartum complications. The reason for this influence on labor and delivery complications remains to be elucidated.

On the contrary the current study the rate of postpartum hemorrhage in this study, 5% of the women had an anterior-located placenta (low anterior and anterior previa included) compared to 64,8% in a general population.

The women had a posterior -located placenta (low posterior and postarior previa included) had 25% and fundal located placenta had 11%, When we compare the relation between retained placenta parity its show statistically significant p-value 0.014* 88.9% of P1 had retained placenta table 2.

We found that it show highly statistically significant between retained placenta and location of placenta such as low anterior placenta, low posterior placenta, anterior previa posterior previa in 22.2% with p-value $< 0.001^{**}$ table 3.

We found that it show highly statistically significant between retained placenta and postpartum in ml > 1000 ml with p-value $< 0.001^{**}$ table 4.

We found that it show highly statistically significant between postpartum in ml and location of placenta anterior placenta 11.1%, anterior previa 22.2%, posterior previa 22.2%, low anterior 22.2%, low posterior 22.2% all those were suffer from postpartum hemorrhage and the rest don't; table 5.

And there is another study that we can remember in the same issue by Karagiozova J., et al 2014 stresses our opinion in this current study that previous Caesarean section is considered to be established predisposing factor for abnormal placentation. In this study we examined whether prior cesarean section is a risk factor for low laying placenta. Retrospective documentation was studied of 171 pregnant women after a cesarean section (test group) and of 150 pregnant women after a normal birth (control) and cases of hysterectomy after giving birth to five years. Pathological lying placenta have established at 1.34% in the test group versus 0.67% in controls ($p = 0.058$), i.e. no proven link between prior Cesarean section and location of the placenta in the lower uterine segment during the next pregnancy⁽¹³⁾.

The analysis of cases of postpartum hysterectomy is found that the combination of condition after Cesarean section, placenta previa and placenta accreta is a risk factor for hysterectomy after childbirth.

There is another study to explore the maternal and perinatal outcomes for different types of placenta previa conducted by Yang XL., et al 2013.

In the same page with current study a total of 343 pregnancies with PP from January 2003 to December 2012 at our hospital were retrospectively reviewed. The general profiles, maternal and perinatal outcomes of different types of 325 singletons PP were evaluated⁽¹⁴⁾.

Among them, 221 pregnancies were of complete PP. There were partial ($n = 22$) and marginal ($n = 82$) PP. Proportions of previous vaginal and cesarean deliveries in women with complete and partial PP were higher than those with marginal PP ($P < 0.05$). Compared with marginal PP group, ratio of placenta in the uterus posterior wall prepartum hemorrhage and probability of blood transfusion and neonatal asphyxia were much higher in complete and partial PP (14). The gestational age at delivery and neonatal body weight with complete PP and partial PP marginal PP were higher than those of the other two groups ($P < 0.05$).

As for the placenta adhesion, placenta accrete or postpartum hemorrhage, no difference existed among three groups placenta location.

The gestational age at delivery, prepartum hemorrhage, probability of blood transfusion and perinatal outcome in women with PP are related with the type of PP. Both complete and partial PP has relatively worse outcomes. The type of

PPhasnoeffecton placenta adhesion, placenta accrete or postpartum hemorrhage.⁽¹⁴⁾

Conclusion

The volumes of the uterine body and cavity decrease substantially during the postpartum period, but the individual variations, especially in early postpartum period, are extensive.

The uterine cavity is always empty two months postpartum.

The presence of an intrauterine echogenic mass, revealed by 2D ultrasound, which is most predictive of retained placental tissue.

Women delivered by caesarean section have a higher risk of retained placenta in subsequent pregnancy, compared to women with previous vaginal delivery. This risk is highest for retained placenta with heavy bleeding.

Women previously delivered by caesarean section with placenta previa, have an increased risk of retained placenta and PPH.

All women with anteriorly-located placentae might have an increased risk of PPH.

Placental thickness is not associated to PPH or retained placenta.

Abdominal ultrasound at 28 weeks of gestation is not sufficient to diagnose placenta previa.

Recommendations

First of all we should reduce the rate of cesarean section in our country because of low implantation and retained placenta is more common in previous cesarean section.

So to reduce postpartum hemorrhage and suspect of cases we should well monitoring our patient and save their lives by regular antenatal care.

Inform all risk patients to go to close medical center or hospitals if any alarm signs (bleeding, pain, fainting) appear quickly.

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