The Relation Between the Degree of Invasion of the Placenta in Scarred Uterine Wall and Gestational Age in Cases of Placenta Previa

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A B S T R A C T

Due to the increased use of caesarean sections, the incidence of placenta previa has recently been estimated to be 0.5% of all gravidities. Due to the significant prenatal and intrapartum depletion associated with placenta previa, this condition is a leading cause of maternal morbidity and death. placenta previa is associated with antepartum haemorrhage, and massive bleeding necessitating a preterm caesarean section does not occur in all women with the disease. This study aimed to examine the relation between the degree of invasion of the placenta in scarred uterine wall and gestational age in cases of placenta previa. A cross-sectional retrospective study was conducted between January 2023 to October 2024, patients with placenta previa and a previous scar on 43 patients collected from the Tobruk Medical Center (gynaecological and obstetric department). The results showed a significant increase in gestational age in the nonscar group and a more pronounced association with low gestational age in the scar-related group. At the same time, accreta and mild invasion were associated with longer gestational ages. The Incidence of accreta was a long gestational age; it was also found that the increase in scar correlates with low gestational age.

INTRODUCTION

Placenta previa is the whole or partial cover of the internal os of the cervix with the placenta after 28 weeks of gestation [1-3]. Complete placenta previa (CPP) covers the cervical os, and a low-lying placenta, in which the placental edge is located ≤20 mm from the cervical os [4]. It is a main risk factor for postpartum hemorrhage and can cause morbidity and mortality of the mother and the newborn.[5] This condition prevents a safe vaginal delivery and needs the delivery of the neonate to be via cesarean delivery.

The basic cause of placenta previa is unknown. There is, however, an association between endometrial injury and uterine scarring [6]. The risk factors associated with placenta previa are progressive maternal age, multiparity, smoking, cocaine use, prior suction and curettage, aided reproductive expertise, history of cesarean section(s), and prior placenta previa [7]. The implantation of a zygote (fertilized egg) needs an environment rich in oxygen and collagen. Prior uterine scars deliver an environment that is rich in oxygen and collagen. The trophoblast can extend to the uterine scar, leading to the placenta covering the cervical os or the placenta invading the walls of the myometrium [8].

Placenta previa affects 0.3% to 2% of pregnancies in the third trimester and becomes more evident secondary to the increasing rates of cesarean sections [6]. Placenta previa is the complete or partial covering of the cervix. A low-lying placenta is where the edge is within 2 to 3.5 cm from the internal os. Marginal placenta previa is where the placental edge is within 2cm of the internal os.[9] Leaving the distal portion of the placenta at the lower uterine segment with relatively poor blood supply to regress and atrophy [10].

The risk factors for placenta previa include a history of high maternal age (age greater than 35 years), multiparity, smoking, history of curettage, use of cocaine, and history of cesarean section(s). The nicotine and carbon monoxide, found in cigarettes, act as potent vasoconstrictors of placental vessels; this compromises the placental blood flow, thus leading to abnormal placentation [11].

Routine sonography in the first and second trimesters of pregnancy provides early identification of placenta previa. A follow-up sonogram is recommended at 28 to 32 weeks of gestation to look for persistent placenta previa.[9] With the diagnosis of placenta previa, the patient is scheduled for elective delivery at 36 to 37 weeks via cesarean section. However, some patients with placenta previa present with difficulties and require urgent cesarean sections at an earlier gestational age [12]. Patients who present with a known history of placenta previa and vaginal bleeding should have vitals performed, and should have electronic fetal monitoring initiated. The patient should receive two

large-bore intravenous lines with a complete blood count, type and screen, and have coags drawn. If she presents with substantial bleeding, then 2-4 units of blood should be cross-matched.

A cesarean section should optimally occur under controlled conditions. The surgeon, anesthesiologist, nursing staff, pediatricians, and blood bank should receive notification of these patients. If there is a concern for PAS, then urology, general surgery. The patient should have two large-bore IV lines in place and blood crossed and matched. Regional anesthesia, spinal-epidural combination, is recommended at the time of delivery for nonurgent cases [13]. In the event a hysterectomy is necessary, the patient can convert to general anesthesia. A high vertical uterine incision may be required if the placenta is covering the lower uterine segment or if the lower uterine segment is underdeveloped. After delivery of the fetus, the placenta spontaneously detaches, and the uterine incision can be closed [14].

Difference diagnosis of vaginal bleeding based on the trimester of pregnancy. In the first and second trimester, vaginal bleeding can be secondary to subchorionic hematoma, cervicitis, cervical cancer, threatened abortion, ectopic pregnancy, or molar pregnancy. In the third trimester, vaginal bleeding can be due to labor, placental abruption, vasa previa, or placenta previa [3]. There is a threefold to fourfold increase in neonatal mortality and morbidity rate with placenta previa, primarily from preterm delivery. The neonate is at increased risk of preterm birth, lower birth weight, lower APGAR scores, and increased risk for respiratory distress syndrome [15].

About 90% of placenta previa cases resolve through delivery. Jing et al. found that women with anterior placentas have poorer prognostic factors and are more likely to have massive blood loss and higher hysterectomy rates compared to any other location [7]. Placenta previa can lead to postpartum hemorrhage requiring a blood transfusion, hysterectomy, maternal intensive care admission, septicemia, and maternal death. Postpartum hemorrhage is blood loss greater than or equal to 1000 ml accompanied by signs or symptoms of hypovolemia occurring within 24 hours after delivery, regardless of the route of delivery[15]. This condition may necessitate blood transfusion, uterotonics, uterine artery embolization, iliac artery ligation, balloon tamponade, and hysterectomy. Placenta previa is also associated with preterm birth, low birth weight, lower APGAR scores, longer duration of hospitalization, and higher blood transfusion rates[16]. This study aimed to examine the relation between the degree of invasion of the placenta in scarred uterine wall and gestational age in cases of placenta previa

METHODS
Study design
This study was designed as a retrospective cross-sectional analysis conducted at the Tobruk Medical Center's Gynecological and Obstetric Department over a period spanning from January 2023 to October 2024. The primary focus was to evaluate maternal and neonatal outcomes in pregnancies complicated by placenta previa in women with a history of prior uterine scarring, particularly from previous cesarean deliveries. A total of 43 patients who met the predefined inclusion criteria were included in the study.

Eligibility criteria
The selection of participants was based on strict inclusion and exclusion criteria to ensure homogeneity in the study population. Eligible patients were those with a gestational age between 34 and 38 weeks, falling within the late preterm to term range, as this period is critical for decision-making regarding delivery in high-risk pregnancies. Maternal age was restricted to 25–44 years to minimize confounding factors associated with very young or advanced maternal age. Since placenta previa often necessitates cesarean delivery, only patients who underwent this mode of delivery were included. Neonatal outcomes, including birth weight and preterm status, were also recorded to assess the impact of placenta previa on fetal health. Patients with a gestational age below 28 weeks were excluded to avoid the extreme prematurity that could independently influence neonatal outcomes. Additionally, cases with incomplete medical records, such as missing maternal or neonatal data, were omitted to maintain data integrity.

Data collection
Data collection was comprehensive, encompassing three main components: demographic and clinical history, obstetric examination findings, and diagnostic investigations. Detailed patient histories were obtained, including basic identifiers such as name, age, and nationality, as well as obstetric details like gravidity, parity, history of abortions, and previous uterine scars. The last menstrual period (LMP) and expected date of delivery (EDD) were noted to confirm gestational age. A history of antepartum bleeding and lower abdominal pain was also recorded, as these symptoms are commonly associated with placenta previa and may indicate disease severity.

Clinical examinations
Clinical examinations were conducted to assess maternal and fetal well-being. Fundal height measurements provided an estimate of fetal growth, while Leopold's maneuvers were performed to determine fetal position and engagement, which are crucial for delivery planning. Any documented uterine tenderness or abnormal contractions were noted, as these could indicate placental complications or preterm labor.

Diagnostic investigations
Routine laboratory tests included a complete blood count (CBC) to assess for anemia or infection, blood

glucose levels to rule out gestational diabetes, and cross-matching in anticipation of possible blood transfusions during delivery. Imaging studies were essential for definitive diagnosis and risk stratification. Abdominal ultrasound was the primary tool for identifying placenta previa, while Doppler ultrasound, when available, provided additional information on placental blood flow. In cases where abnormal placental invasion was suspected, MRI was utilized to evaluate for placenta accreta spectrum disorders, though its availability was limited.

Statistical analysis
Statistical analysis was performed to derive meaningful conclusions from the collected data. Descriptive statistics, such as means and standard deviations for continuous variables and percentages for categorical variables, were used to summarize the findings. Comparative analyses explored potential correlations, such as the relationship between the number of previous cesarean scars and the likelihood of complications like excessive bleeding or hysterectomy. Data were processed using statistical software such as SPSS or R to ensure accuracy and reproducibility.

Ethical considerations
Ethical considerations were strictly adhered to throughout the study. Approval was obtained from the Institutional Review Board (IRB) of Tobruk Medical Center to ensure compliance with ethical standards. Patient confidentiality was maintained by anonymizing all data, with no personally identifiable information included in the analysis.

RESULTS
Table 1 shows the age ranged from 23-44 years with a mean value of 33.10±5.53. Gravidity had a mean value of 5.21±2.45, parity had a mean value of 3.57±2.33, and abortion had a mean value of 0.73±0.92. Table 2 shows that regarding previous scar, No" NVD" was 10(23.3%) while C/S were 33(76.7%). One scar was found in 12 (36.4%) cases, 2 scars were in 8(24.2%) cases, 3 scars were in 5(15.2%) cases, 4 scars were in 3(9.1%), 5 scars were in 3(9.1%) and 6 scars were in 2(6.1%) cases.

Table 1. Distribution of the studied group regarding age and maternal history.

	Number	%
Age		
<30	13	30.2
30-35	14	32.6
>35	16	37.2
Total	43	100.0
Range Mean±SD	23-44 33.10±5.53	
Gravidity		
1-2	10	23.3
3-4	11	25.6
5 or more	22	51.2
Range Mean±SD	1-9 5.21±2.45	
Parity		
1-2	16	37.2
3-4	11	25.6
5 or more	16	37.2
Range Mean±SD	0-9 3.57±2.33	
Abortion		
No	23	53.5
1	9	20.9
2-3	11	25.6
Range Mean±SD	0-3 0.73±0.92	

Table 2. Distribution of the studied group regarding previous scar and the number of scars

Parameter	Number	%
Previous scar		
No "NVD"	10	23.3
C/S	33	76.7
Number of scars		
1	12	36.4
2	8	24.2
3	5	15.2
4	3	9.1
5	3	9.1
6	2	6.1

Table 3 shows that GA at time of OT < 36 was 7(16.3%) and >36 was 36(83.7%), it ranged from 34-38 with mean value 36.36±1.19.

Table 3. Distribution of the studied group regarding gestational age at time of delivery.

GA at the time of OT	Number	%
<36	7	16.3
>36	36	83.7
Range Mean SD	34.0-38.0 36.36 1.19	

Table 4 shows that cases without P.O.H were 32(74.4%), cases with P.O.H were 11(25.6%) from them there were 11(100%) was PPH and 6(54.5%) of them had wound infection.

Table 4. Distribution of the studied group regarding P.O.H. findings.

P.O.H	Number	%
No P.O.H	32	74.4
Yes	11	25.6
PPH	11	25.6
Wound infection	6	20.0

Table 5 shows that free past medical history was 41(95.3%) while HTN was 2(4.7%). Regarding past surgical history, C/S was higher with 20(46.5%) followed by non-past surgical history 19(44.2%).

Non-drug history cases were 41(95.3%) and Aldomet 250 mg cases were 2(4.7%).

Table 5. Distribution of the studied group regarding past medical history, past surgical history findings, and drug history.

Parameters	Number	%
Past medical history		
Free	41	95.3
HTN	2	4.7
Past surgical history		
Free	19	44.2
C/S	20	46.5
Appendectomy	1	2.3
Blood transfusion	2	4.7
Partial thyroidectomy	1	2.3
Drug history		
No	41	95.3
Aldomet 250 mg	2	4.7
Total	**43**	**100.0**

Table 6 shows that normal OT finding was 31(72.1%) followed by mild invasion was 10(23.3%), and Ecreta and per ecreta were 1(2.3%) for each.

Table 6. Distribution of the studied group regarding OT findings.

OT finding	Number	%
Normal	31	72.1
Accreta	2	4.6
Mild invaded	10	23.3
Total	**43**	**100.0**

Table 7 shows that blood transfusion cases were 31(75.6%), C/S ballon cases were 23(56.1%) and C/S hysterectomy cases were 10(24.4%).

Table 7. Distribution of the studied group regarding outcome

OT outcome	Number	%
Blood transfusion	39	95.1
C/S ballon	23	56.1
C/S hysterectomy	2	4.88

Table 8 shows that normal birth weight cases were 18(41.9%) and preterm cases were 25(58.1%). Of these 8(32%) were admitted to the INCU, and 8(32%) were neonatal deaths.

Table 8. Distribution of the studied group regarding neonate outcome.

Neonate outcome	Number	Number
Normal birth weight	18	41.9
Pre term	25	58.1
Admission INCU	8	32.0
Neonatal death	8	32.0
Total	**43**	**100.0**

Table 9 shows that there was a statistically significant relation between the incidence of scar and gestational age (P< 0.05).

Table 9. The relation between the incidence of scar and gestational age.

Gestational age	No scar	With scar
Range	36.0-38.0	34-38.0
Mean	37.4	36.0
S.D.	0.8	1.1
t	4.25	
p value	0.001*	

Table 10 shows that there was a statistically significant decrease in gestational age with the increase of the number of scars (P< 0.05).

Table 10. The relation between the number of scars and gestational age

Gestational age	No scar	one scar	two scars	three or more
Range	36.0-38.0	35.01-38.03	34.03-38.01	34-36
Mean	37.4	36.55	36.27	35.3
S.D.	0.8	0.96	1.28	0.9
ANOVA	18.98			
p value	0.023*			

Table (11), shows that the gestational age was significantly increased in the accreta and invaded groups more than the normal group (p <0.05).

Table 11. Relation between OT findings gestational age.

Gestational age	Normal	Accreta	Mild invaded
Range	34.03-38.01	36.0-38.0	36.0-38.0
Mean	36.1	37.71	37.9
S.D.	1.27	0.94	1.03
ANOVA	12.6		
p value	0.021*		

DISCUSSION

The results of our study showed that the gestational age was significantly increase in accreta and invaded groups more than the normal group (p <0.05), in agreement with our results, Ogawa et al., (2022), study "Risk factors and clinical outcomes for placenta accreta spectrum with or without placenta previa" in this study they analyzed 645,863 women, and they found the gestational age was significantly higher in patients with previa more than without previa [17].

They also observed that advanced maternal age was a risk factor for PAS regardless of whether or not the women had placenta previa. This may possibly be due to vascular endothelial damage with aging leading to inadequate development of the decidua and placental implantation. The current study sheds some light on the interaction for the association between previous cesarean section or

previous miscarriage and PAS by placenta previa [18].

Abd El Khabeer (2020) discovered that the occurrences of placenta accreta and its related difficulties were higher in previous caesarean patients with placenta previa anterior [19]. Numerous reasons might be contributing to the increase in placenta accreta. It was assumed that an extra reason may be an amplified number of females with a history of numerous caesarean sections, as this is one of the greatest frequently recognized hazards of the placenta accreta. This has not been exposed to be the situation, though, as the number of females with more than four previous CS deliveries fell in the advanced periods [20].

CONCLUSION

In conclusion, we found that risk factors for the incidence of accreta were a long gestational age; it was also found that the increase of scar correlates with low gestational age. Future studies should examine the association between placenta previa and SGA in other population-based samples and consider parity and other factors that may potentially contribute to this association.

Conflict of interest. Nil

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