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Placenta Accreta Spectrum: Epidemiology, Risk Determinants, and Clinical Consequences in Benghazi Medical Centre -2022.

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Original Research Article

Abstract

Background: Placenta Accreta Spectrum (PAS) is a pregnancy-related disorder characterized by the abnormal adherence of trophoblastic tissue to the uterine myometrium, posing a significant risk of maternal mortality. Key risk factors for PAS include placenta previa and prior cesarean deliveries, which have been rising in frequency.

Aim: to explore the risk factors of PAS, incidence, clinical outcomes of affected patients, and strategies to minimize maternal morbidity and mortality.

Method: prospective cohort study conducted on 60 patients during the year 2022 in Benghazi Medical Centre including all patients labeled as PAS cases, Review of records for all patients using the structured data collection sheet. The total number of deliveries, caesarean deliveries, maternal and perinatal deaths had been registered; patients were followed up till delivery.

Results: Mean age of the studied group was 35.37±5.70, 43.3 % of them were multipara , 56.7% with previous cesarean section three or more times, 71.7% of the studied group with grade III placenta previa, 95.0% experienced some complication, after multivariate analysis C.S 3 times and more is considered risk factor for hysterectomy (p value = 0.03) (OR 6.12, 95% CI (1.15-32.59), there was statistical significant association between CS delivery and length of hospital stay (p value =0.005).

Conclusion: Incidence of placenta accreta increases with advanced age, with multipara and with 3 times and more CS. Placenta previa was coexisting factor in 95% of the cases.

Keywords: Placenta accrete, incidence, Risk factors, complications.

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INTRODUCTION

Placenta accreta is the abnormal invasion of placental trophoblasts into the uterine myometrium and this comprises a spectrum of disorders, based on the degree of myometrial invasion; including placenta accreta, placenta increta, and placenta percreta, and recognized as placenta accreta spectrum disorders [1]. Due to the risk of excessive hemorrhage and difficulty in hemostasis, they are associated with increased maternal morbidity and mortality and an interprofessional team should take care for these patients. The incidence of the condition increases with increasing rate of caesarean deliveries. Anyhow, some other factors are related [2]. The International Federation of Gynecology and Obstetrics (FIGO) introduced a grading system for placenta accreta spectrum (PAS) disorders, replacing the previous terms (placenta accreta, increta, and percreta) [3]. With the rising frequency of cesarean deliveries, the incidence of placenta accreta has surged, increasing from 1 in 30,000 pregnancies in the 1960s to 1 in 533 in the 2000s, and as high as 1 in 272 according to one study [4,5]. The risk of developing placenta accreta is strongly correlated with the number of prior cesarean sections, with an odds ratio exceeding 22 for those with five previous cesareans compared to none [6]. Placental adhesions are thought to be caused by the placenta adhering to a defective site in the decidua. Histological diagnosis of placenta accreta spectrum (PAS) disorders provides definitive confirmation, revealing varying degrees of trophoblast invasion and a higher prevalence of trophoblastic inclusions compared to normal placentation [7]. However, other factors warrant increasing attention as well, including advancing maternal age, fertility treatments, and gynecologic surgery. Defining the full clinical range of this condition may impact preconception patient management and reproductive decision making. In addition, as efforts to reduce hemorrhagic morbidity have shifted to predelivery risk stratification, understanding the full range of accreta risk factors should improve proactive management of this severe condition. [5] Advancements in medical imaging, particularly ultrasound technology, have made it a crucial component of routine antenatal care for most pregnant women [8]. Ultrasonography is now fundamental in assessing the fetus, placenta, umbilical cord, and amniotic fluid. The antenatal diagnosis of placenta accreta is typically made through ultrasound, aiding in management planning [9]. It is important to discuss the consequences or results of having placenta accrete spectrum disorders, both for the mother and the fetus, our research aims to investigate the incidence and determine the risk factors of placenta accrete spectrum disorders and evaluate management and outcomes of cases among deliveries.

METHODS

Study Setting, Design, and Sampling This a prospective cohort study conducted during the year 2022 in department of obstetrics and gynaecology in Benghazi Medical Centre (BMC). Our inclusion criteria encompassed all patients prenatally diagnosed with PAS disorders using ultrasound, Doppler, and magnetic resonance imaging (MRI). We excluded patients with impaired liver or renal function, coagulation disorders, spontaneous intraoperative placental separation, other uterine pathologies requiring hysterectomy, and those who declined participation in the study. Our sample was 60 patients after informed consent Patients were followed up till deliveries, all experiments were conducted according to the relevant guidelines and regulations, and the participants were not exposed to any harm or unintended effects. The study adhered to the ethical principles of the Declaration of Helsinki.

ASSESSMENT MEASURES

-Review of records for all patients using the structured data collection sheet which include:

The total number of deliveries, caesarean deliveries, maternal and perinatal deaths

-Pregnant women were asked about the following:

Age, Parity, Previous abortions, history of infertility, uterine surgery or procedures, detection of PAS (weeks of gestational age), Co-morbidities, coexisting placenta Previa and its degree, Antenatal diagnosis (presence of antenatal bleeding or not) and

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Placenta description: (Accrete, Increta, Percreta)

- Outcomes:

Caesarean delivery Planned (Yes, No), Caesarean delivery (Elective Emergency), Method of placenta removal, Need for blood transfusion (Yes, No), Hysterectomy (Yes, No), Bladder injury: (Yes, No), Hospital stays in days, Critical care admission (Yes, No), Death (Yes, No)

early neonatal death (Yes, No).

ETHICAL CONSIDERATIONS

Confidentiality of data was assured using anonymous form of data collection. No interventions and no other use for data. Legal access for the data through alleged administrative permission.

STATISTICAL ANALYSIS

Data was analyzed using statistical package for social science (SPSS) version 26. Descriptive statistics as frequency and percentage. Inferential statistics were applied when needed Chi-square(X^2), t test and Student t test (or Mann-Whitney U test for non-normally distributed data) to find the difference in the distribution of the variables between the internal comparison groups, P-value was considered significant when ≤ 0.05. Data was presented in form of tables.

RESULTS

Our study includes 60 patients with placenta accreta, age of patients ranges from (20-44) years, with mean age group was 35.37±5.70, 38.3% of the studied group with OMA, 31.7% of the studied group with AMA and 30.0 % VAMA (Table 1).

Our results detected that 43.3 % of the studied group were multipara, 88.3% of studied group with previous abortion, 56.7% of them with previous cesarean section three or more times, 71.7% of the studied group with grade III placenta previa, 96.7% no history of infertility, and 13.3% of them with history of Evacuation and curettage (Table 1).

Regarding other related Comorbidities, we found anemia (11.7%), hypertension (8.3%), bronchial asthma (3.3%), diabetes (3.3%) and Thromboembolic disorders.

The majority of women (95.0%) experienced composite complications, 33.3% of them had hysterectomy, 21.7% of them had critical care admission, 20% with bladder injury (Table, 1).

Table (1): Demographic data and clinical history of the studied cases:

Variable		N	%
Age:	OMA* AMA* VADA*	23 19 18	38.3 31.7 30.0
Parity	Multipara Not multipara	26 34	43.3 56.7
History of abortion	No history of abortion History of ab abortion	7 53	11.7 88.3
Number of CS	One Two Three or more	7 19 34	11.7 31.7 56.7
History of infertility	No history of infertility History of infertility	58 2	96.7 3.3
Myomectomy	-None -Myomectomy	1 59	1.7 98.3
History of Evacuation and curettage	None Once Twice three	52 5 2 1	86.7 8.3 3.3 1.7
Comorbidities and pregnancy complication	Anemia Asthma Thromboembolic Diabetes Hypertension	7 2 1 2 5	11.7 3.3 1.7 3.3 8.3

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Variable		N	%
Obstetric Complication	-Co-existing Placenta Previa	57	95.0
	-Active Antepartum bleeding	13	21.7
	-Polyhydramnios	2	3.3
	-GDM**	3	5.0
	-PIH**	1	1.7
Grade of Coexisting Placenta Previa	-Grade I	8	13.3
	-Grade II	6	10.0
	- Grade III	43	71.7

*OMA: Optimal maternal age, *AMA: Advanced maternal age * VAMA: very advanced maternal age.

**GDM: gestational diabetes, ** PIH: pregnancy induced hypertension

Fifty five percent of the studied sample with Elective Cesarean section, most of our studied group (93.3%) with placenta increta and accrete, 95% with composite maternal complication (Excessive hemorrhage over 1500 ml, relaparotomy, injuries to adjacent viscera and Disseminated Intravascular Coagulation) ,most of sample have no perinatal deaths (85%), only 11.7 % has early neonatal death (Table, 2).

Table (2): Delivery data and Outcome of pregnancy of the studied group:

Variable		N	%
Cesarean section	Planned	42	70
	Unplanned	18	30.0
Actual setting of Cesarean section	Elective	33	55.0
	Emergency	27	45.0
Placenta Accrete spectrum	Percreta	4	6.7
	Other type (increta- Accrete)	56	93.3
Maternal Outcome	-Composite Maternal outcome*	57	95.0
	-Maternal death	2	3.3
	-Critical care admission	13	21.7
	-Bladder Injury	12	20.0
	-Hysterectomy	30	33.3
	- Needs for blood transfusion	57	95.0
Perinatal death	-No perinatal death	51	85.0
	-IUFD**	2	3.3
	-Early neonatal death	7	11.7

* Composite Maternal outcome (representing maternal morbidity and/or mortality)

**IUFD: intrauterine fetal death

There is statistical significant association between three or more cesarean section and more hysterectomy (p value =0.002) and after multivariate analysis more than 3 times C.S is considered risk factor for hysterectomy (p value = 0.03) OR (6.12, 95% CI (1.15-32.59) , but there was statistically insignificant relation between advanced age and hysterectomy , in addition there was no relation with (multipara, any abortion, any previous procedures, any Comorbidities, any antepartum bleeding and Grade III PP) (Table,3).

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Table (3): Association of Maternal Factors with Hysterectomy

Factor	Hysterectomy			
	Univariate		Multivariate	
	P value	Odd (CI 95%)	P value	Odds (CI 95%)
AMA	0.133	2.45(0.74-8.05)	-	-
VAMA	0.55	1.42(0.44-4.49)	-	-
Grand multi	0.01*	3.85(1.24-11.9)	0.44	1.23(0.34-4.24)
History of infertility	0.31	1(0.08-11.7)	-	-
Any abortion	0.49	3.35(0.37-29.9)	-	-
Any previous procedure	0.44	1.75(0.41-7.39)	-	-
Previous three CS plus	0.001*	7.6(1.93-30.4)	0.03*	6.12(1.15-32.59)
Any comorbidity	0.69	1.25(0.4-3.93)	-	-
Active ante partum bleeding	0.57	0.52(0.12-2.19)	-	-
Grade III PP	0.83	0.88(0.27-2.88)	-	-
Caesarean delivery Planned	0.23	0.5(0.15-1.57)	-	-

*Statistically significant risk factor

Our results showed that, although univariate analysis revealed a significant association between multiparity and urinary bladder injury (p = 0.01), this association was not confirmed in the multivariate analysis; therefore, multiparity was not considered a risk factor for bladder injury. Additionally, no significant associations were found with advanced age, history of infertility, previous abortions, prior procedures, comorbidities, antepartum bleeding, or Grade III placenta previa (Table 4).

Table (4): Association of Maternal Factors with Urinary bladder injury

Factor	Urinary bladder injury			
	Univariate		Multivariate	
	P value	Odd (CI 95%)	P value	Odds (CI 95%)
AMA	0.34	2.1(0.51-8.9)	-	-
VAMA	0.77	1.21(0.31-4.6)	-	-
Grand multi	0.01*	5.47(1.30-22.9)	0.4	1.23(0.34-4.24)
History of infertility	1	-	-	-
Any abortion	0.98	1.57(0.17-14.4)	-	-
Any previous procedure	0.99	1.17(0.21-6.52)	-	-
Previous three CS plus	0.006*	11.96(1.43-100)	0.083	2.25(0.78- 7.82)
Any comorbidity	0.12	2.69(073-9.86)	-	-
Active ante partum bleeding	0.27	2.16(0.53-8.8)	-	-
Grade III PP	0.72	0.74(0.19-2.89)	-	-
Caesarean delivery Planned	0.74	0.82(0.21-3.18)	-	-

*Statistically significant risk factor

Table (5) shows that, based on the multivariate linear regression analysis, there was a statistically significant association between cesarean section (CS) delivery and length of hospital stay (p = 0.005).

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Table (5): Multivariate linear regression to detect factors related to length of hospital stay

Factor	B	Wald X^2	P
AMA	21.530	2.791	0.095
Caesarean delivery Planned	22.292	8.029	0.005*
Any previous procedure	-12.688	1.767	0.184
Active ante partum bleeding	15.853	3.442	0.064
Age	-0.846	0.593	0.441
Intercept**	36.155	1.112	0.292

*Statistically significant risk factor
**Intercept (pre-existing medical illness, gestational disease like pre-eclampsia and thrombocytopenia)
In addition, there was no obvious risk factors related to composite maternal outcome or perinatal deaths (table, 6)

Table (6): Association of Maternal Factors with composite maternal outcome and feotal deaths

Factor	Composite maternal Outcome		Foetal deaths	
	Univariate		Univariate	
	P value	Odd (CI 95%)	P value	Odds (CI 95%)
AMA	0.55	3.42(0.29- 40.1)	0.07	0.41(0.08-2.07)
VAMA	1.0	-	0.25	0.35(0.03-3.16)
Grand multi	1.0	-	0.27	0.48(0.08- 2.71)
History of infertility	1.0	-	0.28	8.66(0.47-157.1)
Any abortion	1.0	-	1.0	-
Any previous procedure	1.0	-	1.0	-
Previous three CS plus	0.57	2.75(0.23-32.1)	1.0	-
Any comorbidity	1.0	-	1.0	-
Active ante partum bleeding	0.52	0.53(0.04-6.39)	1.0	-
Grade III PP	0.19	5.6(0.47-66.3)	1.0	-
Caesarean delivery Planned	1.0	-	0.11	0.52(0.10-2.63)

DISCUSSION

Placenta accreta spectrum (PAS) disorders have emerged as a major life-threatening obstetric issue, with its incidence rising from 0.12% to 0.31% over the past 30 years and an associated mortality rate of approximately 7.0%. PAS is also linked to significant maternal morbidity, including the need for massive blood transfusions, urinary tract injuries, hysterectomy, ICU admission, sepsis, and prolonged hospital stays.

Our study includes 60 patients with placenta accreta ,age of patients ranges from (20-44) years mean age group was 35.37±5.70, 38.3% of the studied group with Optimal maternal age, 31.7% of the studied group With Advanced maternal age and 30.0 % advanced maternal age, our results in agreement with El Gelany et al.,[10] who found that 32.4 ± 4.2 (23–39) and declared that placenta accreta increase with age more than 32 years , Several authors have agreed on the findings regarding risk factors for PAS disorders. Fitzpatrick et al. [11] identified advanced maternal age as a significant risk factor. Similarly, a 2017 study highlighted that older maternal age, previous cesarean sections, placenta previa, and high parity were independent risk factors for PAS disorders [12]. Other researchers have also reported comparable outcomes [13,14].

Our results detected that 43.3 % of the studied group multipara , 88.3% of studied group with previous abortion , 56.7% of them with previous cesarean section three or more times, 71.7% of the studied group with grade III placenta previa , 96.7% no history of infertility, and 13.3% of them with history of Evacuation and curettage , on the same line El Gelany et al.,[10] It was found that the risk factors for PAS disorders included having two or more previ-

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ous cesarean sections, a parity of three or more, and a prior history of placenta previa. These findings are consistent with those reported by numerous other researchers [11,13].

Numerous previous studies have investigated the risk factors for PAS, primarily focusing on general populations of pregnant women and comparing those with and without the condition. Around half of PAS cases involve a history of one or more cesarean sections and an abnormally positioned placenta, with this combination being identified as a significant risk factor[11,15,16,17,18]. These findings have influenced current clinical practice, leading to PAS screening being focused on women with the combination of previous cesarean sections and an abnormally positioned placenta. However, studies have shown that women with PAS differ in characteristics depending on whether they have this combination of risk factors [18,19]. Therefore, PAS risk factors may be unique to each subgroup and should be studied separately. It is particularly important to maintain a high level of diagnostic suspicion when placenta previa coexists with a history of cesarean delivery. Silver et al.[17] reported that the risk in such cases increases to 40% or more after a third cesarean. In a recent study, one-third of PAS cases involved women with a history of cesarean and placenta previa in the current pregnancy in a study published by Fitzpatrick et al.[11]

Regarding other related Comorbidities, we found iron deficiency anemia (11.7%), hypertension (8.3%), bronchial asthma (3.3%), diabetes (3.3%) and Thromboembolic disorders, other studies by Kloka etal.,[21] The incidence of "anemia during pregnancy" (90.43% vs. 55.18%; $p < 0.001$), "other forms of anemia" (92.34% vs. 38.0%; $p < 0.0001$), and "anemia due to acute bleeding" (91.93% vs. 35.74%; $p < 0.001$) is significantly higher in women with PAS. Given that PAS is often associated with inadequate iron stores, particularly due to peripartum bleeding, effective iron management during pregnancy is essential [22]. National and international Patient Blood Management (PBM) guidelines recommend screening for anemia during the antepartum period and throughout pregnancy whenever anemia is present [23,24].

Majority of women (95.0%) experienced some complication, 33.3% of them do hysterectomy, 21.7% of them had critical care admission, 20% with bladder injury. On the other hand, the study by Birendra et al.,[25] declared that hysterectomy was performed in 87.5% of cases, and similarly, in 91.6% of cases in a study conducted at a tertiary center [26]. Conservative or expectant management should be reserved for carefully selected PAS patients after thorough counseling about the risks, uncertain benefits, and effectiveness [27]. Protocols from the Royal College of Obstetricians and Gynaecologists (RCOG) and the American College of Obstetricians and Gynecologists (ACOG) emphasize the importance of monitoring blood loss, correcting coagulation disorders, and addressing hydro-electrolytic imbalances. Postoperative care in the intensive care unit continues to focus on stabilizing vital signs [26]. In another study, a planned cesarean hysterectomy was performed in 67% of prenatally diagnosed PAS cases, which is considered the preferred treatment approach by experts [28].

Our study declared that 11.7% with neonatal death, 3.3% IUFD and 85% no perinatal mortality, other study by Balayla and Bondarenko [29] who detected that unfavorable outcomes for neonates, according to a comprehensive evaluation of 34 studies.

There is statistical significant association between three or more cesarean section and more hysterectomy (p value =0.002) and after multivariate analysis more than 3 times C.S is considered risk factor for hysterectomy (p value = 0.03) OR (6.12, 95% CI (1.15-32.59) , but there was statistically insignificant relation between advanced maternal age and hysterectomy , in addition there was no relation with (multipara, any abortion, any previous procedures, any Comorbidities, any antepartum bleeding and Grade III PP. On the same line with other studies which declared that multiple cesarean section increased the risk of PAS approximately five- to six-fold (a OR 5.64, 95% CI 3.01–10.57) [30]. Miller et al.'s cohort study demonstrated two to three

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times the risk for PAS in multiple cesarean section (adjusted relative risk 2.96, 95% CI 2.23–3.93) [31], which is an important cause of postpartum uterine atony-related hemorrhage that requires critical care and lead to hysterectomy.

Our results detected that after univariate analysis we found significant association between multipara and Urinary bladder injury (p value =0.01) but after multivariate analysis no association so it is not considered as risk factor for bladder injury, in addition there was no relation with (advanced age, history of infertility, any abortion, any previous procedures, any Comorbidities, any antepartum bleeding and Grade III PP).

Regarding length of hospital stay, we found statistically significant relation between CS delivery and Length of hospital stay (P value = 0.004), also after multivariate analysis, there was statistically significant association between CS delivery and length of hospital stay (p value =0.005).

One potential limitation is the lack of histologic confirmation of PAS in cases where hysterectomy was not performed. However, the prospective study design and the use of predefined criteria reduce the risk of false PAS diagnoses. Another limitation is the small sample size of the studied women. Ideally, we would have preferred to compare these risk factors with a control group of women without placenta accreta.

IN CONCLUSION

Incidence of placenta accreta increases with advanced age, with multipara and with previous three CS plus. Placenta previa was coexisting in 95% of the cases, also associated with antenatal bleeding, outcome of placenta accreta related to some factors as hysterectomy increase among patient with cesarean section more than 3 times. Addressing the growing burden of PAS disorders requires a combination of early detection, appropriate surgical planning,

RECOMMENDATION

-Early detection and diagnosis through routine Screening for High-Risk Women: Women with known risk factors, such as a history of cesarean sections or placenta previa.

- In need further prospective studied to compare these risk factors with another group without placenta accrete and compare outcome between different grade of placenta accrete.

- It is important to do Histologic confirmation of PAS for the cases without hysterectomies

Conflict of interest:

The authors report no conflicts of interest in this work

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