

## Placenta Accreta Spectrum Disorder: A Retrospective Study of 78 Cases

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### ABSTRACT

**Background:** Placenta accreta spectrum (PAS) disorder is a potentially near-miss life-threatening hemorrhagic obstetrical condition causing maternal complications and death. As there was no unique method recommended for the treatment of PAS all over the world until now, an analysis of the treatment of these cases in the study's locality was needed.

**Objectives:** To analyze the management of cases with a diagnosis of PAS and study the maternal outcome.

**Materials and methods:** A descriptive observational retrospective case series study included 78 consecutive pregnant women with a diagnosis of PAS who were managed at Al-Khansaa Teaching Hospital in Mosul/Iraq from June 1<sup>st</sup>, 2017 to May 31<sup>st</sup>, 2020. The grade of PAS, time of diagnosis, treatment modalities, and complications were studied and analyzed.

**Results:** In these 3 years, 78 patients met the diagnostic criteria of PAS. Overall, 21.8% of patients had an antenatal diagnosis and had a scheduled Caesarean section. About half of cases (48.72%) had placenta increta. In 33.33% of patients, preservation of the uterus after removal of the placenta with good hemostasis was successful. Hysterectomy was needed in 66.67% of cases. Maternal complications were reported in 16.67% of cases, and fortunately, no maternal death was reported.

**Conclusion:** In a limited resource clinical setting, hysterectomy and preservation of the uterus after removal of the placenta with a low threshold to hysterectomy were two methods appropriate to treat PAS cases. Both these methods were effective with low complications by an experienced obstetrician.

**Keywords:** Placenta accreta spectrum (PAS); Morbidly adherent placenta; Placenta accreta; Hysterectomy; Uterine preservation .

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### INTRODUCTION

Placenta accreta spectrum (PAS) disorder is considered a public health problem by the World Health Organization [1]. It was earlier called the morbidly adherent placenta and referred to the varying degree of pathological adherence of the placenta [2]. "The 2018 International Federation of Gynecology and Obstetrics (FIGO) consensus" described the PAS disorders according to villous invasion into three categories: as accreta, increta, and percreta [3]. Several hypotheses were proposed, as the exact pathogenesis of PAS cannot be determined yet, including

abnormal excessive trophoblastic invasion and decidua mal-development or a combination of both[1].

Uterine surgery, prior Caesarean delivery, placenta previa, advanced maternal age, multiparity, and in vitro fertilization are recognized risk factors for PAS [4]. Managing PAS is still one of the worst nightmares for all obstetricians worldwide, as it causes significant maternal morbidity and mortality [1]. It increases the risk of hemorrhage, injury to adjacent organs, need for re-operation, and postpartum complications (including bleeding, transfusion reaction, infection, and deep venous thromboembolism)[5]. Additionally, it is the leading cause of Caesarean hysterectomy [6]. The incidence of the PAS has increased all over the world over the years, which makes matters more complex [1].

Antenatal diagnosis of the PAS is highly needed to improve outcomes for the mother and fetus and arrange the delivery

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at the well-equipped center, which can be done by ultrasound and magnetic resonance imaging (MRI) [7]. The management strategy for PAS is still a challenging problem [8] and the optimal treatment remains undefined. Many factors (ante-partum diagnosis, PAS grades, presenting symptoms, and the expertise of local obstetricians) affect the choice of treatment modality. Besides, there is a wide variation between low- and middle-income countries and high-income countries due to limited or no access to essential additional treatment [9].

Although a hysterectomy is a lifesaving procedure, it has major complications like injury to adjacent organs, and loss of fertility, with its psychological insult. As fertility preservation is required in cases due to their low parity and young age, obstetricians have created many conservative approaches to PAS management [10]. These include leaving the placenta in situ and preserving the uterus with or without methotrexate, hemostatic measures (uterine artery and/or internal iliac artery embolization or ligation), dilatation and curettage, or hysteroscopic resection with the risk of sepsis and delayed hemorrhage [11], and the need for delayed hysterectomy [3]. Removal of the placenta and preservation of the uterus with a risk of bleeding is another option [10].

Owing to the increasing prevalence of PAS and its significant morbidity and mortality worldwide, this study was conducted to analyze the management of these patients and maternal outcomes to outline the best strategy in the treatment of this devastating condition in the study's locality.

## MATERIALS AND METHODS

It was a descriptive observational retrospective case series study that was done from June 1<sup>st</sup>, 2017 to May 31<sup>st</sup>, 2020 at Al-Khansaa Teaching Hospital in Mosul City, Nineveh, Iraq. All consecutive cases diagnosed and managed as a cases of PAS in the hospital during the study period were included. Histopathological confirmation of PAS was done in all cases treated by hysterectomy. A clinical diagnosis of PAS was done at the time of placental delivery as there was no cleavage plane between parts or all of the placenta, which needed forced placental removal during Caesarean section or laparotomy for retained placenta after vaginal delivery and an incomplete abortion, which caused heavy bleeding from the placental site. Patients with incomplete records were excluded from the current study.

All the information regarding history, examination, investigations, operatives, and follow-up notes was elected after approval from the Collegiate Committee for Medical Research Ethics at the University of Mosul and from the Nineveh Health Directorate.

Intra-operatively, experienced obstetricians decisions about the surgical procedure (preservation of the uterus or hysterectomy) was individualized according to the bleeding severity, general condition of the patient, desire for future childbearing, and parity with early recourse to hysterectomy in those trials to preserve the uterus was failed.

All cases of PAS that were managed were studied and analyzed statistically for demographic characteristics, grade of PAS according to FIGO classification [3], time of diagnosis, treatment modality, complications, and maternal morbidity and mortality associated with PAS. Statistical analysis of the data was performed with the software package SPSS (Statistical Package for Social Sciences) for Windows 21 and Microsoft Office Excel (2010). The descriptive statistics include the mean  $\pm$  standard deviation (SD) for measurable variables and

frequencies and percentages for categorial variables. The statistical differences between variables in the study were tested using the Chi square ( $\chi^2$ ) test and the Fisher exact test. P-value  $< 0.05$  was considered statistically significant.

## RESULTS

During the three year study period, there were 78 cases of PAS. The maternal and some obstetrical characteristics are shown in Table 1. The youngest woman was aged 18 years old, and the oldest was 42 years old. The mean age was  $32.23 \pm 5.215$  years. The maximum number of pregnancies was 13, and the maximum number of parity was 10. The gestational age ranged from 22 to 42 weeks. Previous Caesarean delivery was reported in seventy cases (89.7%) with a significant statistical difference (P-value = 0.000). The placental localization was done by ultrasound and/or intra-operatively, and the normally located placenta was seen in 33.33% of cases and the placenta previa in 66.67% of cases, with a significant statistical difference (P-value = 0.000). Three cases (3.8%) were twins pregnancy. Assisted reproductive technique (ART) was reported in 2 cases ( 2.56%).

The vast majority of the patients were diagnosed at the time of Caesarean section (n = 58, 74.36%). There was a statistically significant difference among the different timing of the diagnosis (P-value = 0.000) as shown in Table 2.

About half of the cases were diagnosed to have grade 2 (increta) with a significant statistical difference (P-value = 0.000) as shown in Table 3.

Elective surgery was done in 21.8%, and the remaining 78.2% underwent emergency treatment for PAS. Nearly one-third of cases (33.33%) were treated by removal of the placenta and good hemostasis with successful preservation of the uterus. Eight cases (10.26%) underwent hysterectomy after a failed trial to preserve the uterus. Forty four patients

**Table 1.** Maternal and obstetrical characteristics of the 78 patients\*.

Variables	Mean $\pm$ SD	Range		
Maternal age (years)	32.23 $\pm$ 5.215	18-42		
Gravidity	5.01 $\pm$ 2.276	1-13		
Parity	3.58 $\pm$ 2.055	0-10		
Gestational age (weeks) at delivery	36.10 $\pm$ 3.515	22-42		
	Number	Percentage(%)	P-value	
History of previous Caesarean delivery				
No	8	10.3	0.000	
Yes	70	89.7		
Localization of placenta				
Not previa	26	33.33	0.000	
Previa	52	66.67		
Type of pregnancy				
Singleton pregnancy	75	96.2	0.000	
Multiple pregnancy	3	3.8		
Type of pregnancy according to conception				
Spontaneous pregnancy	76	97.44	0.000	
Assisted reproductive technique	2	2.56		

\* Chi-square test has been used.

**Table 2.** Diagnosis timing of the placenta accreta spectrum in 78 patients\*.

Variables	Number	Percentage(%)	P-value
Ultrasound antenatal diagnosis of PAS	17	21.80	0.000
At the time of Caesarean section	58	74.36	
Post vaginal delivery	2	2.56	
Post miscarriage	1	1.28	

\* Chi-square test has been used.

**Table 3.** Types of the placenta accreta spectrum among 78 patients according to FIGO classification\*.

Variables	Number	Percentage(%)	P-value
Grade (1) Accreta	35	44.87	0.000
Grade (2) Increta	38	48.72	
Grade (3) Percreta	5	6.41	

\* Chi-square test has been used.

(56.41%) were treated with hysterectomy without trial to preserve the uterus with a significant statistical difference (P-value = 0.000). Total and subtotal hysterectomy were done in 53.8%, and 46.2%, respectively with no significant statistical difference as shown in Table 4.

In cases where preservation of the uterus was tried, uterine artery ligation (UAL) and placental bed suturing were done in all cases, while uterine tamponade and B-Lynch suture were used in 23 and 4 patients respectively. Internal iliac artery ligation was done in one patient treated by hysterectomy.

Complications were reported in thirteen patients (16.67%), and the most frequent complication was bleeding (10.26%), with a statistically significant difference (P-value = 0.000). After a few hours of treatment, one case required a re-laparotomy and a hysterectomy because the uterus had started to bleed. No maternal death was reported in this study. All complications, except bleeding occurred in hysterectomized patients. About three quarters (79.49%) of cases needed blood products transfusion in an amount less than 10

**Table 4.** Surgical management of the 78 patients with placenta accreta spectrum\*.

Surgical management	Number	Percentage(%)	P-value
Timing of surgery			0.000
Elective surgery	17	21.8	
Emergency surgery	61	78.2	
Treatment methods			0.000
Preserve uterus	26	33.33	
Hysterectomy after failed trial to preserve uterus	8	10.26	
Hysterectomy (without trial to preserve uterus)	44	56.41	
Type of hysterectomy			0.433
Subtotal hysterectomy	24	46.2	
Total hysterectomy	28	53.8	

\* Chi-square test has been used.

pints, with a significant statistical difference (P-value = 0.000) from the remaining 20.51% of cases which needed more than 10 pints with no reported acute serious blood products transfusion complications, as shown in Table 5.

**DISCUSSION**

Apparently, for all obstetricians, cases of PAS have become more frequent in the last few years all over the world, which is associated with potential morbidity and mortality [6].

The mean maternal age in this study was  $32.23 \pm 5.215$  years, which was somewhat similar to other study [12], as it was reported at  $32.8 \pm 4.98$  years. As there was a cultural difference between the studies and more teenage marriage in the study's locality, the youngest mother (18 years) and the oldest mother (42 years) were reported in this study, which differed from other studies [1, 13] where the youngest mother aged 28, 26 years, respectively and the oldest mother aged 38 years.

As the study's locality culture tends to have a big family, the mean gravidity was  $5.01 \pm 2.276$ , while the mean gravidity in Tahir et al.'s study [13] was  $3.98 \pm 0.99$ . The mean parity was  $3.58 \pm 2.055$ , which was higher than Richa et al.'s study [11], where their mean parity was  $2.5 \pm 0.9$ . Gestational age ranged from 22 to 42 weeks, and the mean was  $36.10 \pm 3.515$  weeks, which was similar to  $36.19 \pm 1.557$  weeks reported in Wajid et al.'s study [14] and higher than  $35.13 \pm 0.91$  weeks reported in Tahir et al.'s study [13], which could be explained by the higher number of cases with antenatal diagnosis and elective preterm delivery. The history of previous Caesarean delivery was reported in 89.7% of cases in this study, which was slightly higher than in other studies (79.3%) [15].

In this study, the associated placenta previa was reported in 66.67% of cases, which was between 48.97% [8] and 79.62% [13]. Twins pregnancy were reported in 3.8%, which was near the other study (5%) [2]. Assisted reproductive technique was reported in 2 patients (2.56%) which was somewhat similar to the result in previous study [16] where ART was reported in 3 patients (1.9%).

Grade 1 accreta was reported in 44.87% of cases in this study, which was near Naser et al.'s study [2] as accreta was reported in 47.5% of their cases. Grade 3 percreta was re-

**Table 5.** Complications of the placenta accreta spectrum and the need for blood products transfusion among 78 patients\*.

Variables	Number	Percentage(%)	P-value
Bleeding	8	10.26	0.000
Urinary bladder injury	4	5.13	
Cardiac stand still	2	2.56	
Pelvic hematoma	1	1.28	
Pelvic abscess	1	1.28	
DIC	1	1.28	
Re-laparotomy	1	1.28	
Maternal death	0	0	
Need for blood products transfusion			
10 pints and more	16	20.51	
Less than 10 pints	62	79.49	

\* Chi-square test and Fisher Exact test have been used. Some patients had more than one complication. DIC = disseminated intravascular coagulopathy.

ported in 6.41% of this study, which was less than in other studies [11, 15] as it was reported in 20% and 17.2% of their cases, respectively.

As the diagnosis of grade 2 and 3 PAS was more than grade 1, as well as partial placental adhesion and invasion, it was difficult to be diagnosed definitively by ultrasound [17]. In addition to the presence of unbooked patients in this study, the antenatal diagnosis of PAS was reported in 21.8%, which was higher than Rani et al.'s study [18], as they reported antenatal diagnosis in 14% of cases but less than other studies [12, 19], as they reported in 32.8% and 53.2%, respectively. Using an MRI to identify a suspected ultrasound result of PAS could explain this difference.

In the current study, PAS was diagnosed after retained placenta in two cases delivered vaginally and in one case diagnosed to have an incomplete miscarriage, while in the Indian study [18], one case of PAS was diagnosed after preterm vaginal delivery and two after induced abortion. Emergency operations were done in 78.2% of cases, which was lower than other study [20], as reported in 82.35% of their cases which could be explained by the difference in antenatal diagnosis.

According to the grade of placental invasion, parity, and intra-operative state, all obstetricians managed most of the PAS cases in Mosul city by separating the placenta and did their best to preserve the uterus as much as they could despite the limited facilities in the hospitals to avoid the complications of hysterectomy, mainly the psychological insult and the patient's feeling of loss of femininity due to loss of her fertility.

Similar other study [17], this study adopted an early resource to hysterectomy without hesitation when there were ineffective medical and surgical interventions. Some cases are managed by hysterectomy without trial to preserve the uterus. The preservation of the uterus with the placenta in situ was not adopted in the study's location due to limited clinical resources in the hospitals and the incomppliance of the patients and their families for monitoring after delivery, as this method needs rigorous monitoring and adequate equipment and resources in the center where these cases were managed [21].

A trial to separate the placenta was performed in most cases in this study, even those who had antenatal diagnosis, as Nieto-Calvache et al.'s study [22] advised to confirm the antenatal diagnosis intra-operatively because of common false-positive ultrasound results. Successful uterine preservation after placental separation and good hemostasis were performed in 33.33% of the PAS cases in this study for those cases with high concern for preserving fertility, which is somewhat similar to the 30% reported in Bailit et al.'s study [19]. While it was reported in smaller number in other studies [23, 24]. However, it was much higher in a study that was conducted in Diyala city [25]. This could be attributed to the difference in hospital protocols for treating PAS cases, the experience of obstetricians, and the available facilities in every hospital.

Local hemostatic procedures (UAL, placental bed suturing, uterine tamponade, and B-Lynch suturing) were used in the current study due to the lack of interventional radiology services. Because there is no proof for the most effective uterus-preserving techniques in the world till now [8], every hospital has its protocol. In this study UAL and placental bed suturing after removal of placenta were used together in all cases when preservation of the uterus was decided to avoid severe bleeding and its sequels with better success (76.47%) than using UAL alone (65%) which was reported by Kansouh et al.'s study [8]. Uterine tamponade was used in 92.3% of

cases after UAL and placental bed suturing, while Shehata's simple procedure [10] used UAL, placental bed suturing, and uterine tamponade collectively in all their PAS cases. Adding a B-Lynch suture to the hemostatic measure in 15.38% of cases in this study while Pan et al.'s study [4] adopted it with UAL from the start of all cases. One case in the present study was undergone internal iliac artery ligation (1.28%) which was performed for a patient treated by hysterectomy and it was much lower than in other studies [8, 14].

Among hysterectomized patients in this study, total hysterectomy was reported in 53.8% which was lower than a study by Yasmeeen et al. (78.95%) [24] and much higher than other study (13.33%) [21]. This difference could be explained by the difference in the center's protocol, as subtotal hysterectomy was the preferred type and was usually done unless there was a need for a total hysterectomy in our center.

Due to severe intra-operative bleeding despite using medical and surgical interventions, trial to preserve the uterus was replaced by hysterectomy in 10.26% of cases. which was higher than other study (4.76%) [14] due to higher number of patients with grade 1 PAS than our study.

As all cases of PAS were managed by expert obstetricians in the study's locality with the rule of early resources to hysterectomy and the availability of nearby blood bank, the complication rate was 16.67%. which was lower, than in other studies (23.5% and 25%, respectively) [20, 26]. Bleeding at the time of operation occurred in 10.26% while it was reported in 90% of cases in Naser et al.'s study [2]. This might be due to the difference in the number of cases with placenta previa and grade 3 placental invasion, as they were higher than in this study.

Urinary tract injuries, namely urinary bladder, were reported in 5.13% of this study, which was lower than Kasraeian et al.'s study (15%) [12]. This could be attributed to that all their patients treated by hysterectomy, which is lower than other study (59%) [18] due to the higher number of grade 3 placental invasions among their patients. On the other hand, it was higher than the 2% reported by Pan et al.'s study [4] and this difference could be explained by their hospital, as no case was treated by total hysterectomy in their study. Due to differences in treatment modalities and the number of patients with high grade PAS, no injury was reported in other organs in this study. While, ureteric injury was reported in 1% of Kasraeian et al.'s study [12]. Besides, Warshak et al.'s study [26] was reported 6% ureteric injury and 1.01% bowel injury.

Owing to the difference in the rules for postoperative follow-up and admission to the intensive care unit (ICU) in different centers, all cases required close monitoring on the first day postoperatively and one case was needed ICU admission and consultation with a physician in this study. While, in Warshak et al.'s study [26], 66% of their patients were admitted to the ICU in the first day postoperatively, and longer in some cases. Two refereed cases (1.57%) who had severe blood loss in Wajid et al.'s study [14] needed ventilator, while no case required ventilator support in this study because all cases of PAS managed in this study's center from the beginning and no referred cases.

One case (1.28%) was complicated by DIC as a result of massive blood loss, and no case of sepsis was reported in this study, while 9% was complicated by DIC and one case by sepsis in Rani et al.'s study [18]. This is because the antenatal diagnosis of PAS was lower than in our study, in addition to their management of referred cases even after Caesarean

delivery.

Re-laparotomy and hysterectomy after a few hours from the first operation were needed in one case in this study, while two cases needed re-laparotomy in previous studies [2, 24], which may be explained by the difference in grade of invasion of PAS and treatment modality.

Maternal deaths reported among patients with PAS ranging from 0-30% in previous studies [4, 11]. Richa et al.'s study [11] reported a high percentage of maternal deaths (30%) among their patients. This high rate is due to the fact that most of the patients were unbooked and had no antenatal diagnosis, a delayed medical management request, and the need for emergency interventions. Fortunately, no maternal deaths were reported in this study, despite a high number of the study population being unbooked, diagnosed during operation with delayed medical management requests, and the need for emergency intervention.

The need for ten units and more blood products for transfusion was reported in 20.51% of cases in this study, while it was reported in 32.5% of other study [2] as there were many factors (all their cases had placenta previa, three quarters had undergone classical Caesarean section, and a high number of patients with grade 3 PAS) that predispose to bleeding more than in our study.

There were three limitations to the present study. First, there was a trend in our hospital towards adopting two treatment modalities (hysterectomy, preservation of the uterus after the removal of the placenta) and avoiding other conservative methods for PAS management. Second, histopathological confirmation of PAS was impossible in cases treated by preservation of the uterus. Third, the long-term complications could not be studied due to the short period of follow-up.

## CONCLUSION

Appropriate individualized decisions by experienced obstetricians for choosing the method of treatment for cases with PAS are pivotal points in decreasing maternal morbidity and mortality, especially in cases with no antepartum diagnosis. Preservation of the uterus after removal of the placenta is still a good option for the treatment of PAS in limited resource clinical settings in patients who need to preserve fertility. We

recommend that adequate training of doctors to anticipate and handle this emergency condition and triage appropriately is mandatory.

## ETHICAL DECLARATIONS

### Acknowledgments

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### Ethics Approval and Consent to Participate

Ethical approval of the current study was issued by the Collegiate Committee for Medical Research Ethics/ University of Mosul, Nineveh, Iraq (Reference number 09 on September 2, 2020) and from Nineveh Health Directorate, Nineveh, Iraq (Reference number 26288 on November 1, 2020). The information was taken from medical files, therefore informed consent was waived from the participants.

### Consent for Publication

Not applicable (no individual personal data included).

### Availability of Data and Material

Data generated during this study are available from the corresponding author upon reasonable request.

### Competing Interests

The authors declare that there is no conflict of interest.

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### Authors' Contributions

All stated authors contributed significantly, directly, and intellectually to the work and consented it to be published.

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