ORIGINAL ARTICLE

Study on Outcomes of Pregnancy in Women with Placenta Accreta Spectrum: A 10-year Study in a Tertiary Care Center

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Abstract

Introduction: Placenta accreta spectrum (PAS) disorders include accreta, increta, and percreta, which are associated with increased maternal morbidity and mortality. Obstetric hysterectomy for PAS disorders is more associated with massive obstetric hemorrhage than the conservative management methods.

Aim: To study the outcomes in women with PAS in a tertiary care center—uterine preservation (conservative) versus obstetric hysterectomy with arterial embolization.

Materials and methods: The patients were divided into three groups: group I included women in whom placenta left *in situ* with uterine artery embolization (UAE) done, group II included women with partial accreta undergone placenta removal followed by UAE, and group III included women who underwent obstetric hysterectomy with arterial embolization.

Results: A total of 43 women were included in this study between 2010 and 2020. Among 43 women, 28 (65.11%) had accreta, 10 (23.25%) had increta, and 5 (11.62%) had percreta. Group I had 24 (55.81%) women managed by leaving the placenta *in situ* with UAE done. Group II had 9 (20.93%) women undergone placental removal in toto followed by UAE, and group III had 10 (23.25%) women who underwent obstetric hysterectomy with arterial embolization. The outcomes were studied among the three groups in terms of the amount of intrapartum blood loss, ICU admissions, prolonged hospital stay, bladder injury, and disseminated intravascular coagulation. The blood loss and postoperative complications were more in group III, which was statistically significant ($p < 0.0001$). There was no maternal mortality in our study.

Conclusion: Conservative management by leaving the placenta *in situ* with arterial embolization helps women to retain the uterus and reduces maternal morbidity in PAS disorders.

Keywords: Accreta, Increta, Obstetric hemorrhage, Obstetric hysterectomy, Percreta, Uterine artery embolization.

Journal of South Asian Federation of Obstetrics and Gynaecology (2021): 10.5005/jp-journals-10006-1903

Introduction

Placenta accreta is an abnormal invasion of the trophoblastic cells of the placenta deep into the myometrium. The incidence of placenta accreta spectrum (PAS) is increasing due to increasing cesarean rates. PAS results in massive obstetric hemorrhage (MOH) especially with forcible attempts at placenta removal.[1] MOH refers to any kind of excessive bleeding of the parturient related to pregnancy. There is no universal consensus on the exact definition of the MOH, but it is defined as blood loss of more than 1500 mL or fall in the hemoglobin of less than 4 g/dL or the need for more than four packed red blood cell transfusions.[2] So traditionally cesarean hysterectomy (CH) at the time of delivery is the management strategy for morbid placenta accreta.[3] For women who wish to retain uterus and to minimize obstetric hemorrhage, other options such as placenta left *in situ* with uterine artery embolization (UAE) are the alternative strategies.[4] The American College of Obstetricians and Gynecologists (ACOG) and Society for Maternal–Fetal Medicine recommend all women diagnosed with PAS disorder should receive level III (subspecialty) or higher care.[1] This article discusses about the outcomes of women with PAS disorders in various groups managed in our tertiary care hospital.

Materials and Methods

All women who were confirmed with PAS from 2010–2020 in the Department of Obstetrics and Gynecology at Sri Ramachandra Institute of Higher Education and Research (SRIHER) were admitted. The data obtained from 2010–2017 were retrospectively collected from the charts, and the data obtained from 2018–2020 were prospectively followed up. The study was approved by the ethical committee of SRIHER.

All women with a singleton pregnancy from 28 weeks of gestation diagnosed as PAS in the antenatal period were included. The following data were collected regarding maternal age, parity, mode of antenatal screening, intraoperative and postoperative complications, and maternal outcomes in terms of morbidity and mortality. Some of the details that were not captured in the charts

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How to cite this article: Srinivasan B, Balasubramanian N, Vijayaraghavan J, *et al*. Study on Outcomes of Pregnancy in Women with Placenta Accreta Spectrum: A 10-year Study in a Tertiary Care Center. J South Asian Feder Obst Gynae 2021;13(3):94–97.

Source of support: Nil

Conflict of interest: None

were obtained through telephonic guidance and from the patients while coming for the follow-up.

The screening tool was transabdominal (TAS) with transvaginal (TVS) ultrasound MRI was done at 28–32 weeks of gestation to assess the depth of the myometrial involvement at the discretion of the consultant. According to the institution protocol, informed consent was obtained for cesarean delivery, massive blood transfusions, UAE, obstetric hysterectomy, and ICU care from the patient and relatives. An interventional radiologist was informed prior to the procedure. For all women with PAS, cesarean delivery was carried out in catheter lab with an interventional radiologist attending the same. Arterial catheters were placed prior to the abdominal incision after giving spinal or general anesthesia.

The abdominal incision was either transverse or vertical as decided by the consultant and so was the uterine incision, which was either classical or transverse, but the aim was to be away from the placental margin as much as possible. Intraoperatively accreta spectrums were usually managed with the preoperative ultrasonography reports. In the case of partial accreta where the placenta was partially separated, it was removed in toto and placental bed sutured followed by UAE. In the case of complete accreta, placenta increta, or percreta, the placenta was usually left *in situ* followed by UAE. In the case of failure of the above techniques leading to MOH, obstetric hysterectomy was performed. Arterial embolization was done for all the women in this study. Analysis of cases was done with regard to age, parity, diagnosis, treatment given, intrapartum blood loss, postoperative complications, duration of the hospital stay, and the follow-up period.

For all the women where the placenta was left *in situ*, IV antibiotics were given and periodic postnatal follow-up was done with history, physical and pelvic examination, and ultrasonography done for placental volume. Follow-up was done for a period of 6 months to 1 year till the resolution of placental mass. Methotrexate was not given to any of the women in this study as it is not the standard of care.

Statistical Analysis

Data entry was done in MS OFFICE EXCEL 2013. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. The association between categorical explanatory variables and quantitative outcome was assessed by comparing the mean values. The mean differences along with their 95% confidence interval (CI) were presented. The association between categorical explanatory variables and categorical outcome was assessed using the chi-square test. A p value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

Results

A total of 43 subjects were included in this study. Among 43 patients, increased incidence of PAS was seen in women with increasing maternal age. The mean age-group of women in this study was 32.2 years. Among the PAS disorders, the incidence of accreta ($N = 28$) was more when compared to increta ($N = 10$) and percreta ($N = 5$) (Table 1).

Among the study population, 40 (93.02%) women were multigravida and 3 (6.98%) were primigravida. All three primigravida had partial placenta accreta. Among 40 multigravida, 33 (82.5%) women with the history of previous lower segment cesarean section had PAS and only 5 women (12.5%) had previous normal vaginal delivery. Sixteen women (40%) had previous history of dilatation and curettage. Among 43 women, 9 (20.93%) had associated placenta previa (Table 2).

Table 1: Comparison of PAS between age-groups ($N = 43$)

	Age-group	
Group	*20–30 years*	*31–40 years*
Accreta ($N = 28$)	7	21
Increta ($N = 10$)	3	7
Percreta ($N = 5$)	4	1
Total	14	29

Table 2: Risk factors and mode of diagnosis

Variables	*Frequency*	*Percentages*
Parity		
Multigravida	40	93.02
Primigravida	3	6.98
PAS with placenta previa	9	20.93
Previous mode of delivery		
Previous LSCS	33	82.5
Previous NVD	5	12.5
Previous D AND C	16	40
Mode of diagnosis in antenatal		
TAS + TVS	9	20.93
MRI	34	79.07

D and C, dilatation and curettage; LSCS, lower segment cesarean section; MRI, magnetic resonance imaging; NVD, normal vaginal delivery; PAS, placenta accreta spectrum; TVS, transvaginal ultrasound TAS, transabdominal ultrasound

Diagnosis of PAS disorders was made antenatally in all women. The diagnosis was made by TAS with TVS, later confirmed by MRI. TAS with TVS pelvis was the only modality of diagnosis in nine (20.93%) women. Thirty-four (79.07%) women had both TAS with TVS and MRI (Table 2).

Of 28 women diagnosed with placenta accreta, 19 had complete accreta and 9 had partial accreta. In 9 women who had partial placenta accreta, the placenta was removed in toto, placental bed sutured, and UAE was done postprocedure. Among the 19 women with complete accreta, the placenta in 14 women was left *in situ* and UAE was done and the remaining 5 underwent obstetric hysterectomy despite UAE. Of 10 increta cases, 8 cases were managed by leaving placenta *in situ* with UAE and 2 cases underwent obstetric hysterectomy. Among five cases of percreta, two women were managed by leaving placenta *in situ* and three underwent obstetric hysterectomy. A total of 10 obstetric hysterectomies were done due to MOH. In seven of these women, UAE failed to control MOH and hence obstetric hysterectomy was proceeded. In three women, MOH was encountered soon after the delivery of the baby and obstetric hysterectomy was done followed by internal iliac artery embolization (Table 3).

Maximum complications were encountered in women of group III (obstetric hysterectomy). Intraoperative blood loss more than 1500 mL occurred in 80% (8/10) women who underwent obstetric hysterectomy (group III) and 90% (9/10) women required ICU stay. One woman had a bladder injury due to percreta, which was managed by urologist. The occurrence of disseminated intravascular coagulation (DIC) was also high in group III and so the hospital stay. The mean blood loss in group I was 1360 ± 563 mL,

group II was 1283 ± 580 mL, and group III was 2580 ± 737 mL. The *p* value was found to be statistically significant in intraoperative blood loss, ICU admissions, DIC, and hospital stay among the three groups (Table 4).

Follow-up of 24 women managed by leaving the placenta *in situ*, two women (8.33%) underwent interval hysterectomy. One patient with placenta percreta underwent hysterectomy with partial cystectomy due to the development of a vesicovaginal fistula on the 8th postoperative day. The other patient developed severe infection not responding to conservative management 3 weeks after cesarean section. The amount of blood loss in those patients who underwent interval hysterectomy was also less. In eight patients (33.33%), there was spontaneous resorption of placental tissue and responded well to the conservative management, which included antibiotics and antifibrinolytics. The mean days for spontaneous resorption were 181.1 ± 32.52 days. Fourteen patients (58.33%) had spontaneous expulsion of the placental tissues. The products are sent for histopathological examination and confirmation. The mean days of spontaneous expulsion 144.3 ± 56.67 days. The follow-up was done with ultrasonography pelvis. No patients in this study were managed with methotrexate (Table 5).

Table 3: Management of PAS disorders

PAS (N = 43)	*Group I: placenta left in situ with UAE (N = 24)*	*Group II: placenta removed in toto with UAE (N = 9)*	*Group III: obstetric hysterectomy with arterial embolization (N = 10)*
Accreta (*N* = 28)	14	9	5
Increta (*N* = 10)	8	0	2
Percreta (*N* = 5)	2	0	3

PAS, placenta accreta spectrum; UAE, uterine artery embolization

Discussion

The morbidly adherent placenta is one of the devastating complications in pregnancy. The important risk factors are the previous history of cesarean section, placenta previa, multiparity, and advanced gestational age.[5] Maternal outcomes are significantly improved when diagnosed in the antenatal period and delivery planned in a tertiary care center. Antenatal diagnosis has an important role in potential planning for uterus preservation treatments in managing invasive placenta. Ultrasound imaging remains to be the primary modality of diagnosis, and MRI was reserved for cases with equivocal findings.

Dr Listijono reported a 10-year experience study at a tertiary care center that included 16 placenta accreta cases and reported that nearly 87.5% of patients were diagnosed in the antenatal period.[6] In this present study, all 43 cases (20.93% by TAS and TVS and 79.07% by both ultrasound and MRI) were diagnosed in the antenatal period. According to ACOG, antenatal diagnosis of placenta accreta allows planned CH, which is the preferred treatment in most of the PAS disorders, as data suggest that the rate of complications and the amount of blood loss is greater in emergent hysterectomy than a planned one.

Conservative management reduces the peripartum hysterectomy rates and MOH. According to the PACCRETA which was a prospective population-based study conducted in 182 maternity hospitals in France between 2013 and 2015 that included women with PAS, the maternal outcomes were compared in conservative management versus CH in PAS disorders. It showed that among 246 women, 147 fulfilled the inclusion criteria. Outcomes were compared between conservative management (*n* = 85) and CH (*n* = 62). There was a lower incidence of transfusion of more than four packed RBCs in conservative management when compared to CH.[7] In the present study, 24 women were managed conservatively (group I) and 10 women underwent obstetric hysterectomy (group III). The intrapartum blood loss and postoperative period complications, such as DIC, ICU admissions, and hospital stay, were

Table 4: Complications of placenta accreta spectrum disorders

	Study groups			
Complications	*Group I (N = 24)*	*Group II (N = 9)*	*Group III (N = 10)*	*p value*
Intraoperative blood loss				
<1,499	20/24 (83.33%)	7/9 (77.78%)	2/10 (20%)	
1,500–2,499	2/24 (8.33%)	1/9 (11.11%)	3/10 (30%)	<0.0001
2,500–3,499	1/24 (4.16%)	1/9 (11.11%)	4/10 (40%)	
>3,500	1/24 (4.16%)	0	1/10 (10%)	
ICU admissions	2/24 (8.33%)	1/9 (11.11%)	9/10 (90%)	<0.0001
Bladder injury	0	0	1/10 (10%)	—
DIC	1/24 (4.16 %)	1/9 (11.11%)	3/10 (30%)	<0.0001
Prolonged hospital stay (> 1 week)	4/24 (16.66%)	5/9 (55.56%)	8/10 (80%)	<0.0001

DIC, disseminated intravascular coagulation

Table 5: Outcomes of placenta left *in situ*—Group I

Placenta in situ outcomes	*No. of patients*	*Percentage*	*Mean ± SD*	*95% CI*
Interval hysterectomy	2/24	8.33	—	—
Spontaneous resorption	8/24	33.33	181.1 ± 32.52	153.9–208.3
Expulsion	14/24	58.33	144.3 ± 56.67	108.3–180.3

more in group III than in group I, which was statistically significant (p value < 0.0001). One woman had a bladder injury in group III due to percreta involving the dome of the bladder, leading to a vesicovaginal fistula.

Elective peripartum hysterectomy may be unacceptable to women desirous of uterine preservation. In such cases, leaving the placenta *in situ* should be considered.[8] Several adjuvant treatments have been proposed, such as internal iliac artery balloon occlusion and UAE. Wang reported a total of 47 patients with pernicious placenta previa enrolled in an observational study (STROBE compliant). The study comprised of two groups: the embolization group ($n = 32$) and the control group ($n = 15$). The hysterectomy rate in the embolization group was significantly lower than in the control group. Hence, prophylactic embolization intraoperatively will help in uterus preservation for cases of pernicious placenta previa.[9] In the present study, arterial embolization was done for all 43 patients, 3 of whom had internal iliac artery embolization done after hysterectomy. Thus, UAE is preferred in women with PAS to retain the uterus and preventing MOH.

Miyakoshi conducted a retrospective multicenter study in which data from 613 patients were included. Of these, 41 had the placenta left *in situ* of which follow-up data were available for 36 women. Leaving the placenta *in situ* was successful in 25 (69%) patients with placental resorption in postpartum, and 11 patients underwent hysterectomy owing to infections.[10] In our study, out of 43 women, 24 women were managed by leaving the placenta *in situ* out of which 14 (58.33%) had spontaneous expulsion, 8 (33.33%) had spontaneous resorption, and 2 (8.33 %) underwent interval hysterectomy in view of infection and another due to percreta involving the dome of the bladder, leading to a vesicovaginal fistula. The rest of the 22 women with the placenta *in situ* were followed up on a periodic basis.

Methotrexate as conservative management is not advised as it makes the patient vulnerable for neutropenia and myelosuppression.[11] These conditions will further attribute to secondary infections when the placenta was left *in situ*. Methotrexate was not administered in our study. The follow-up of women in whom the placenta was left *in situ* can be done by history, pelvic examination, and ultrasonography of placental mass. The residual placenta tissue may require from 6 months to 1 year for complete resolution. In our study, the monitoring of the left out placental mass was done by ultrasound on a monthly basis till there was complete resolution of the placenta mass.

In certain places where UAE not available, people have resorted to internal iliac artery ligation prior to hysterectomy to reduce MOH. In our study since facilities were available, arterial embolization was done in all the cases.

Strength of Study

Arterial embolization was a minimally invasive intervention technique available in our institute, so it was resorted in all the patients included in this study, a facility that may not be available everywhere.

Limitations

The limitations of this study were that it was partly retrospective and fertility aspects were not studied. There was a lack of histopathological evidence to confirm the type of placenta invasion in patients in whom the placenta was left *in situ*.

Conclusion

Conservative management by leaving the placenta *in situ* for PAS along with arterial embolization helps in reducing obstetric hysterectomy rates, maternal morbidity, intrapartum, and peripartum MOH.

Women with PAS require a tertiary care center so that they could be benefited from retaining the uterus with the arterial embolization methods. The rate of postoperative complications is also lower in conservative management. The purpose of this study is to assist obstetricians in the mode of management that is appropriate for different types of PAS disorders.

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