



Full length article

Comparison of placenta accreta spectrum disorders diagnosed in intrapartum and antepartum period— A three year experience in a tertiary referral unit of India



Pratima Mittal, Jyotsna Suri*, Neha Pruthi, Divya Pandey, Rekha Bharti

Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi, India

ARTICLE INFO

Article history:

Received 7 October 2018
 Received in revised form 1 March 2019
 Accepted 2 March 2019

Keywords:

Placenta accreta spectrum
 Cesarean hysterectomy
 Secondary hysterectomy
 Placental resolution

ABSTRACT

Objective: To determine the frequency of placenta accreta spectrum (PAS) disorders and to study the demographic profile, risk factors and maternal and fetal outcomes in women with antepartum diagnosis of PAS as compared to women with diagnosis made in the intrapartum period.

Study design: Retrospective analysis over a 3-year period of all patients who delivered with PAS. The cases were divided into 2 groups. Group 1 consisted of the patients who were diagnosed during the intra partum period and Group 2 was those diagnosed as PAS by ultrasound in the antepartum period. Maternal and fetal outcomes were compared between the 2 groups. The cases that underwent conservative management were also analyzed for need of secondary hysterectomy/placental resolution

Results: There were 81,480 deliveries conducted during the study period of which 74 were identified as PAS. Hence PAS was seen in 1:1101 deliveries (0.09%). The estimated blood loss and number of units of blood products required were significantly higher in Group 1 (2.36 ± 0.77 l vs 1.8 ± 0.91 L, $p = 0.002$; and 10.17 ± 5.12 vs 6.77 ± 4.22 , $p = 0.005$) compared to Group 2. The ICU stay was also more common in Group 1 ($p = 0.01$). The perinatal mortality was significantly higher in Group 1 (45.71% vs 23.08%, $p = 0.040$). 79.7% women underwent primary cesarean hysterectomy while others were managed conservatively. In conservatively managed group, placental resolution took place in 60% and 40% required secondary hysterectomy.

Conclusion: Antenatal diagnosis of placenta accreta spectrum disorders decreases the maternal morbidity and perinatal mortality.

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Introduction

Placenta accreta spectrum (PAS) is a condition in which the placenta implants at area of defective decidualization typically caused by preexisting damage to the endometrial-myometrial interface and hence does not separate after delivery. It is described as adherent or invasive placenta. The adherent variety is commonly known as placenta accreta, where the placental villi are attached but are not invading the myometrium. The invasive types are placenta increta, where placental villi have invaded the myometrium and placenta percreta, where the placental villi have penetrated the myometrium and extended up to or beyond the uterine serosa.

PAS has taken epidemic proportions of late which parallel's the rise in cesarean deliveries [1]. It was reported as 1:30,000 deliveries in 1950 and has dramatically increased to 1:700 in recent years [2–4]. Other risk factors associated are placenta previa, advanced maternal age, grand multiparity, previous curettage, scar pregnancy, uterine surgeries like myomectomy, hysteroscopic adhesiolysis, endometrial ablation, submucous myoma, post-partum endometritis, infertility procedures and previous adherent placental disorders [5–10]. The presence of previous caesarean delivery and placenta previa increases the risk many folds and increases exponentially with the number of past caesareans [1].

PAS is one of the most important causes of maternal mortality and morbidity in modern obstetrics with mortality as high as 7% and even higher in under-developed nations [11,12]. Increased maternal morbidity is due to massive intrapartum or postpartum hemorrhage and its sequel namely, blood transfusions, coagulopathy, sepsis and multiorgan failure. Besides, it is currently the most common indication of emergency peripartum hysterectomy [13].

* Corresponding author at: D -2/153 West Kidwai Nagar, New Delhi, 110023, India.

E-mail address: jyotsnasuri@gmail.com (J. Suri).

Grey scale ultrasound is adequate in most cases for diagnosing the condition. However, MRI may be required in some cases especially in those with posterior placenta [13]. It has been seen that antenatal diagnosis of this condition with planned elective delivery in a tertiary care set up with availability of multidisciplinary care can significantly improve maternal and fetal outcomes [14]. The mainstay and standard treatment of this condition is peripartum hysterectomy after cesarean section, without disturbing the placenta. Attempts at manual removal of placenta after cesarean in such cases can result in torrential hemorrhage with severe morbidity or mortality. However, in selected cases where the desire to preserve the reproductive function is strong, the uterus may be retained with the placenta in situ after extensive counseling regarding risks of this procedure.

It was hypothesized that women having an antepartum diagnosis of PAS would have better maternal outcomes in terms of need for ICU care, ventilator support, vasopressor support and requirement of blood and blood products and also a better perinatal outcome.

This study was therefore planned to assess the frequency of placenta accreta spectrum disorders and to study the demographic profile, risk factors and maternal and fetal outcomes in women with antepartum diagnosis of PAS as compared to women with diagnosis made in the intrapartum period. Further it aimed at determining the clinical characteristics and outcome of women in whom primary hysterectomy was not performed and the placenta was left in situ.

Methodology

Study design

Retrospective case control.

Setting

Vardhaman Mahavir Medical College & Safdarjung Hospital New Delhi, a tertiary care referral teaching Institute which conducts about 27,000 deliveries annually.

Study population

All patients who were identified as having PAS from January 2015 to December 2017 were included in the study.

Subject evaluation

The case records of all women identified as PAS from the hospital registers were retrieved after approval of the Institutional Ethical Committee to carry out this study. A total of 74 patients with the diagnosis of placenta accreta, increta and percreta were included in the study. The criterion for diagnosis of PAS was taken as at least one of the following:

- 1 Manual removal of the placenta being partially or totally impossible
- 2 Evidence of gross placental invasion at surgery.
- 3 In women with an ultrasound diagnosis of PAS confirmed by failed attempts to remove the placenta during the third stage of labor.
- 4 Histopathological confirmation of hysterectomy specimen.

The patients were divided into two groups: Group 1, in whom the diagnosis was made in the intrapartum period or those who were referred to the hospital with retained placenta without a prior antepartum diagnosis (Study Group) (n=35); and Group 2,

those in whom an antepartum diagnosis of PAS was established (Control group) (n=39).

Maternal demographic data, risk factors for PAS and mode of delivery were noted. From the operative notes, data on placental location, estimated blood loss, units of blood transfusion required and surgical procedure carried out to control bleeding was retrieved. Post-operative need for vasopressors, ventilator support and intensive care unit (ICU) admission was recorded. Perinatal and maternal mortality rate in both groups was also calculated.

Statistical analysis

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean \pm SD and median. Normality of data was tested by Kolmogorov-Smirnov test. If the normality was rejected then non-parametric test was used.

Statistical tests were applied as follows-

- 1 Quantitative variables were compared using Independent t test/ Mann-Whitney Test (when the data sets were not normally distributed) between the two groups.
- 2 Qualitative variables were correlated using Chi-Square test/ Fisher's Exact test.

A p value of <0.05 was considered statistically significant.

The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

Results

There were 81,480 deliveries conducted during the study period of which 74 were identified as PAS. Hence PAS was seen in 1:1101 deliveries (0.09%)

The age, period of gestation and gravidity of the patients of PAS with and without antepartum diagnosis was comparable (Table 1). It is noteworthy that ultrasound was performed in 29 of the 35 patients who had an intrapartum diagnosis of PAS whereas all the patients with antepartum diagnosis had a scan (p=0.04).

The incidence of risk factors was significantly higher in Group 1 as compared to Group 2 (p=0.005) (Table 2a). The most common risk factor was placenta previa with previous 1 cesarean section (24.32%) (Table 2b).

Majority of the patients in both groups underwent cesarean hysterectomy (59/74) (Table 3). Of these, 15 patients also had internal iliac ligation. Fifteen patients received conservative

Table 1
Clinical characteristics of patients with placenta accreta spectrum.

	Group 1 N=35	Group 2 N=39	P value
Age (Years)			
Mean \pm SD	29.34 \pm 4.04	29.03 \pm 4.23	0.64
Period of gestation			
Mean \pm SD (median)	32.06 \pm 7.34 (36)	33.87 \pm 3.99 (35)	0.741
Booking Status			
Booked	9	17	0.108
Unbooked	26	22	
Gravidity			
<3	26	30	0.781
>4	9	9	
Ultrasound/MRI			
performed in antenatal period	29	39	0.04

SD, Standard deviation; MRI, Magnetic Resonance Imaging.

Table 2a

Incidence of Risk factors in patients without and with antepartum diagnosis of PAS.

Risk Factor	Group 1 (N=35) n (%)	Group 2 (N=39) n (%)	Total (N=74) n (%)	P value
None	9 (25.71%)	1 (2.56%)	10 (13.51%)	0.005
Yes	26(74.29%)	38(97.44%)	64(86.49%)	
Total	35 (100.00%)	39 (100.00%)	74 (100.00%)	Fisher's Exact test

Table 2b

Details of risk factors in patients without and with antepartum diagnosis of PAS.

Details of Risk Factor	Group 1 (N=26) n (%)	Group 2 (N=38) n (%)	Total (N=64) n (%)	P value
PP + >2 Miscarriages	0 (0.00%)	1 (2.63%)	1 (1.56%)	0.453
PP	5 (19.23%)	5 (13.16%)	10 (15.63%)	
previous 1 LSCS	5 (19.23%)	5 (13.16%)	10 (15.63%)	
previous 1 LSCS + PP	6 (23.08%)	12 (31.58%)	18 (28.13%)	
previous 1 LSCS + >2 Miscarriages	3(11.54%)	2(5.26%)	5(7.81%)	Chi square test
Previous 2 LSCS	4 (15.38%)	3 (7.89%)	7 (10.94%)	
Previous 2 LSCS + PP	1 (3.85%)	8 (21.05%)	9 (14.06%)	
Previous 3 LSCS + PP	2 (7.69%)	2 (5.26%)	4 (6.25%)	
Total	26 (100.00%)	38 (100.00%)	64 (100.00%)	

PP, Placenta praevia; LSCS, Lower segment caesarean section.

Table 3

Primary surgical interventions in patients without and with antepartum diagnosis.

Intervention	Group 1 N=35	Group 2 N=39	Total N=74	P value
Cesarean hysterectomy	19	25	44	0.600
Cesarean hysterectomy + Internal iliac ligation	8	7	15	0.600

Table 4

Interventions and outcome of patients with placenta left in situ.

Intervention	Number
Total number of patients with placenta left in situ	15
Patients requiring secondary hysterectomy	6
Adjunctive treatment	
Methotrexate	1
UAE	1
UAE+Methotrexate	1
None	3
Number of patients with placental resolution	9
Adjunctive treatment	
Methotrexate	0
UAE	3
UAE+Methotrexate	2
None	4

UAE- Uterine artery embolization.

management (Table 4). The mean duration of placental resolution in 9 patients who did not have secondary hysterectomy was 4.89 ± 1.83 months, at a median interval of 5 months.

There was a statistically significant difference in the estimated blood loss, blood product requirement and ICU stay between the 2 groups (Table 5). The perinatal mortality was significantly higher in group 1 (45.71% vs. 23.08%; $p=0.04$) though there was no difference in the maternal mortality rate (2.86% vs. 2.56%; $p=1$) (Table 6).

Discussion

PAS was seen in 1:1101 (0.09%) deliveries in our Hospital over a 3 year period. This figure though lower than reported from

Table 5

Maternal and fetal outcome in patients without and with antepartum diagnosis of PAS.

Number of Blood products	Group 1 N=35	Group 2 N=39	P value
Mean \pm SD	10.17 \pm 5.12	6.77 \pm 4.42	0.005
Median	10	6	
Min-Max	1-20	2-20	
Inter quartile Range	7 - 14	4 - 8.750	
Estimated blood loss(L)			
Mean \pm SD	2.36 \pm 0.77	1.8 \pm 0.91	0.002
Median	2.5	1.9	
Min-Max	0.7-4	0.6-4.2	
Inter quartile Range	2 - 3	1 - 2	
Total stay(days)			
Mean \pm SD	10.74 \pm 3.24	12.34 \pm 10.78	0.248
Median	10	8.5	
Min-Max	5-20	5-62	
Inter quartile Range	8 - 12	7 - 12	
ICU Stay n(%)	22 (62.86%)	13 (33.33%)	0.011

SD, Standard Deviation; Min, Minimum; Max, Maximum; ICU, Intensive Care Unit.

Table 6

Maternal & Perinatal Mortality in patients without and with antepartum diagnosis of PAS.

	Group 1 (N=35) n (%)	Group 2 (N=39) n (%)	P value
Maternal Mortality	1(2.86%)	1(2.56%)	1
Perinatal Mortality	16(45.71%)	9 (23.08%)	0.040

Western literature, probably due to the lower cesarean rates in India, is in itself a real cause for concern, considering that the reported incidence in another busy tertiary referral hospital of New Delhi over a 5 year period about a decade ago (2001–2006)

was 1:2699 (0.04%) [15]. The more than 2-fold increase over one decade is chiefly due to the rapid increase in cesarean rate in this period. In fact, the estimated rate of caesarean section in India was 7.1 per cent in 1998 and there has been a 16.7% change in the rates annually in India which is one of the highest in the world [16,17].

It was seen that majority of the patients without an antepartum diagnosis were unbooked and even amongst those with a prior diagnosis, 56% were unbooked. This was because many of these patients were referred to our hospital when the ultrasound diagnosis of PAS was made. Majority of patients who were not diagnosed prior to labour (29/35) had also undergone an ultrasound examination but were not suspected to have a placenta accreta spectrum disorders.

Seventy one percent patients had a previous cesarean section and 58.4% of them also had placenta praevia. It was noteworthy that as many as 13.5% (10/74) patients had no identifiable risk factor for PAS. It was observed that all the risk factors were more commonly seen in women who had a prenatal diagnosis of PAS which was also observed by Warshak et al [14]. Majority of the women who had no identifiable risk factor in our study, were diagnosed in the intrapartum period, in spite of the fact that 8 out of the 9 had undergone an obstetric ultrasound examination, indicating the importance of presence of risk factors for the diagnosis of PAS. This observation was also noted in previous studies wherein it was found that when the observers were blinded to the clinical history of the patient the sensitivity of ultrasonography for diagnosing PAS was significantly lower [18].

The standard of care in a patient diagnosed with an adherent placenta is considered to be cesarean hysterectomy without any attempt to separate the placenta [19]. In our study too about 80% of the patients underwent a primary cesarean hysterectomy. Internal iliac ligation was also performed with cesarean hysterectomy in 20% of the patients due to excessive ongoing hemorrhage.

Pre-delivery diagnosis enables multidisciplinary care and can improve the maternal and fetal outcomes. Diagnosis of PAS on the operation table can lead to severe maternal hemorrhage with grave consequences. We found a significantly higher blood loss and requirement of more blood products in women diagnosed in the intra-partum period. These patients also had an increased requirement of mechanical ventilation and vasopressors. Warshaw et al. also observed that women with predelivery diagnosis had a better maternal outcome in terms of estimated blood loss and units of blood required [14].

The maternal mortality rate has been reported to be as high as 7% in the world literature and in a series from India, the maternal mortality was reported as 30% [11,15]. Most of the deaths in this study were in women who were not previously diagnosed and those who were referred to hospital in a very poor condition [15]. In our series the maternal mortality rate was 2.7% (2 mortalities in 74 cases). The first patient was a diagnosed case of placenta accreta. She was referred to our hospital after multiple episodes of bleeding and was hemodynamically unstable on arrival. She had to be taken up immediately for surgery in view of massive on-going hemorrhage. She underwent cesarean hysterectomy with internal iliac ligation performed by senior consultants and was transfused around 20 units of blood and products. She went into disseminated intravascular coagulopathy (DIC) and acute renal shutdown and expired after 14 h of hospital admission. The second case was a previous one cesarean section at term that underwent cesarean section for cephalopelvic disproportion during emergency hours. She had undergone ultrasound scans but was not suspected to be a case of PAS. Her partially separated placenta bled torrentially and hysterectomy with internal iliac ligation was performed but patient went into DIC as in the first case.

The perinatal mortality in our study was significantly lower in the patients diagnosed in the antepartum period. This may be due

to the steroid cover which was given prior to planned cesarean delivery in this group. Furthermore majority of the patients who did not have a prior diagnosis of PAS came in the emergency with life threatening bleeding, necessitating an immediate intervention.

Fifteen patients in this study were managed conservatively with the baby delivered by classical cesarean/normal delivery and placenta left in situ. Of these 2 patients were referred to us after normal vaginal delivery with retained placenta. Both of them had no risk factors for placenta accreta except high parity (one was para 3 and second was para 4). Both had secondary hysterectomy due to sepsis. Of the 13 patients who delivered at our hospital, nine had an antepartum diagnosis and had opted for this management after extensive counseling as they were desirous for retaining their reproductive functions. Amongst the 4 patients who had no antepartum diagnosis, 3 had placenta percreta and since they were hemodynamically stable, the baby was delivered without disturbing the placenta.

The success rate of conservative management in our series of 15 patients was 60%. The reported rate in literature varies from 25 to 80% [20,21]. Hsiu-Wei Su et al. reported that 75% had to undergo secondary hysterectomy. These authors concluded that the higher failure rate in their cases was due to a very low threshold for performing secondary hysterectomy [20]. Larger studies especially with long term follow up of the reproductive outcomes are required in the cases who had complete resolution of the placenta, before this modality of management can be considered as the standard of care.

The strength of this study lies in the large number of cases as most of the published series consist of a smaller number of cases. The major limitation is that, being a retrospective study, all the information was accessed from the case records. The long-term follow-up of the patients who underwent placental resolution was also not part of the study.

To summarize, it was seen that placenta accreta spectrum disorders occur commonly in women with high risk factors like previous uterine surgery and placenta praevia. About 13% of the cases had no apparent high-risk factor and most of them had no prenatal diagnosis of PAS in spite of having undergone ultrasonography. The women who were diagnosed in the antepartum period had significantly lesser morbidity as compared to those who had an intrapartum diagnosis, though there was no significant difference in the mortality between the two groups. The perinatal mortality was also higher among the women who did not have an antepartum diagnosis. Most of the patients underwent a cesarean hysterectomy; among the women who were given conservative management, 40% required secondary hysterectomy.

Based on the findings of the above study it can be concluded that antepartum diagnosis of placenta accreta spectrum disorders is one of the key factors which can improve maternal outcomes. It is therefore necessary that active effort should be made towards this end in all the gravid women undergoing ultrasound and more so in women with high risk features.

Declaration of interest

None.

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