

Study of maternal and neonatal outcomes of placenta accreta spectrum in a tertiary care hospital



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ABSTRACT

Background: Placenta accreta produces significant maternal morbidity and mortality. A detailed knowledge of outcome is needed to develop a standardized risk appropriate maternal care system. **Aims and Objectives:** The aim of the study was to study the maternal and neonatal outcome of women with placenta accreta spectrum (PAS) in a tertiary care hospital. **Materials and Methods:** A hospital-based prospective observational study was conducted among the 40 women with PAS during a period of 3 years. Exposure factors such as previous caesarean sections, previous uterine procedures, and present or previous placenta previa; maternal outcome factors include obstetric hysterectomy, massive blood transfusion, bowel and bladder injury, and death; neonatal outcome factors include prematurity, newborn intensive care unit (NICU) admissions, APGAR scores, and birth weight. The data were analyzed by calculating frequency and percentage. **Results:** Of the 40 cases studied, 25 were known cases of PAS, and the remaining was diagnosed intraoperatively. About 90% (36 cases) underwent an obstetric hysterectomy. In 62.5% of patients, large vessel ligation and a clamp were applied. About 32.5% of patients required massive blood transfusions, 20% sustained bladder injuries, and there was 1 maternal death. About 76% of babies born to mothers with PAS were preterm, 43% required NICU admission, and there were 5 neonatal deaths (12%). **Conclusion:** The PAS is associated with significant maternal morbidity in the form of severe postpartum hemorrhage requiring massive blood transfusions and bladder injury. There is also increased neonatal morbidity and mortality. Hence, there is a need for early termination in anticipation of grave complications.

Key words: Obstetric hysterectomy; Placenta accreta spectrum; Postpartum hemorrhage

INTRODUCTION

Obstetric hemorrhage is one of the leading causes of maternal death in developing countries, especially India. Due to increasing rates of cesarean sections, abnormal placentation has become a leading cause of obstetric hemorrhage leading to peripartum hysterectomy.¹ Placenta accreta spectrum (PAS) was earlier called morbidly adherent placenta; and refers to the varying degrees of pathological adherence of placenta, including placenta accreta, placenta increta and placenta percreta. Maternal morbidity and mortality occur because of uncontrolled bleeding from the placental bed due to abnormal

placentation, which would ultimately require hysterectomy and massive blood transfusion to save the patient. Risk factors for PAS include uterine surgery, which causes an endometrial defect which leads to abnormal placentation in subsequent pregnancies. PAS is diagnosed by imaging modalities such as ultrasonography (USG) and magnetic resonance imaging (MRI). PAS is considered a high-risk condition, with serious associated morbidities. Therefore, American College of Obstetricians and Gynaecologists recommends that these patients receive level 3 or higher care.² Early diagnosis and elective procedures have decreased maternal mortality to a great extent. Hence, anticipation based on risk factors, early antenatal diagnosis,

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and proper follow-up is very crucial to reduce morbidity and mortality of PAS. The maternal near miss review of the state Kerala, where this study was conducted, has observed that 40% of the cases of obstetric hemorrhage were due to PAS, which is a cause for concern.³ Due to the increasing prevalence and significant morbidity related to PAS worldwide, this study was conducted with an intention to better understand the risk factors, clinical presentation, outcome, and morbidity associated with PAS.

Aims and objectives

The aim was to study the maternal and neonatal outcomes of women with placenta accreta spectrum (PAS) presented in a tertiary care hospital.

MATERIALS AND METHODS

A prospective observational study was conducted for a period of 3 years from January 1, 2020 to December 31, 2022. All cases of PAS who attended the Department of Obstetrics and Gynecology, Government Medical College, Kannur were included in the study. This included all antenatally diagnosed cases, whether booked or unbooked and antenatally undiagnosed, but diagnosed intraoperatively, of PAS. Patients were followed up from the point of entry into the study up to 6 weeks postnatally. Antenatal patients were reviewed during their regular antenatal check-ups and postnatally during their routine postnatal check-up at 6 weeks when both maternal and neonatal status was assessed. All cases with history of previous uterine surgery (Caesarean section/myomectomy) and procedures such as dilatation and curettage and cases with anterior low-lying placenta were asked to do a dedicated scan at 32–34 weeks, to look for features of PAS. MRI was done in those cases of placenta previa with suspicion of higher grades of PAS, placenta extending posteriorly and inconclusive ultrasound findings. The study variables included the age, parity, mode of presentation, risk factors, operative details, and the maternal and fetal outcome.

Severe complications in cases were defined in the study as blood or blood product transfusion of more than 10 pints (massive blood transfusion), coagulopathy, cases requiring re-laparotomy, and maternal death. After data collection, data were entered into Excel sheet and the variables measured were summarized through the calculation of frequency, and percentage and expressed in terms of tables and bar diagrams. Association of each significant variable (age, previous LSCS, grade of placenta accreta, use of aortic clamp, and mode of surgery) with severe complications of PAS were analyzed using logistic regression analysis.

Table 1: Demographic and patient characteristics

Parameter	Cases (n)	Frequency (%)
Age		
18–30 years	17	42.5
31–40 years	23	57.5
Parity		
Primi	1	2.5
Multi	37	92.5
Grand multi	2	5
Booked/unbooked		
Booked in	9	22.5
Booked out	31	77.5
Mode of presentation		
Vaginal bleeding	22	55
No complaints	18	45
Diagnosis by imaging		
USG done cases	40	100
Placenta accreta spectrum diagnosed by USG	25	62.5
Not diagnosed by USG	15	37.5
MRI done cases	10	25
Placenta accreta spectrum diagnosed by MRI	8	80
Not diagnosed by MRI	2	20

USG: Ultrasonography, MRI: Magnetic resonance imaging

RESULTS

Among 8779 deliveries, 40 cases of PAS were included in the study with an incidence of 0.45%. Table 1 shows the demographic and patient characteristics variables.

Majority of the women in the study group belonged to the age group 30–40 years (57.5%) with eight patients above the age of 35 years. Maximum women were second gravida with previous caesarean section. Only a single case of primi gravida with PAS was observed. Majority of the patients were referred cases which were booked outside. Antepartum hemorrhage was the most common mode of presentation. PAS is mostly diagnosed by USG, but in 37.5% of the cases, ultrasound was not able to diagnose PAS. Placenta was in the lower uterine segment in all cases. Placenta was anteriorly located in 21 cases, posteriorly in 6 cases, both anterior and posterior covering the OS in five cases and in eight cases in the lateral wall. The risk factors for the development of PAS are shown in Table 2.

Multiparity with the previous caesarean sections was found to be the most common risk factor. The details of the study subjects intraoperatively are shown in Table 3.

Majority of the women with PAS underwent elective surgery at 34–37 weeks. Classical caesarean was done in 75% of cases. About 90% of the women had to undergo obstetric hysterectomy.

Parameter	Cases (n)	Frequency (%)
Maternal age >35 years	8	20
Multiparity	39	97.5
Previous 1 LSCS	19	47.5
Previous 2 LSCS	8	20
Previous ≥3 LSCS	2	5
Previous LSCS and D&C	7	17.5
Previous 2 LSCS and D&C	1	2.5
Previous history of placenta previa	3	7.5

Parameter	Cases (n)	Frequency (%)
Gestational age at the time of surgery		
<34 weeks	11	27.5
34–37 weeks	25	62.5
37–40 weeks	4	10
Mode of surgery		
Elective	25	62.5
Emergency	15	37.5
Indication for Caesarean		
Placenta accreta spectrum	28	70
Placenta previa	12	30
Type of caesarean		
Classical	30	75
Lower segment caesarean section	9	22.5
Laparotomy	1	2.5
Type of surgery		
Obstetric hysterectomy	36	90
Conservative surgery	4	10
Large vessel ligation		
Aortic clamp	6	15
Common iliac artery clamp	3	7.5
Internal iliac artery ligation	11	27.5
Aortic clamp+Internal iliac artery ligation	5	12.5

Intra operative complications		
Complications	Cases (n)	Frequency (%)
Postpartum hemorrhage	36	90
Blood component requirements		
<5 units	17	42.5
5–10 Nits	6	15
>10 units	13	32.5
Organ injury	8	20
Post-operative complications		
Complications	Cases (n)	Frequency (%)
ICU admissions	36	90
No complications	30	75
Surgical site infection	3	7.5
Pneumonia	1	2.5
Transfusion reaction	1	2.5
Metabolic complication	1	2.5
Vesicovaginal fistula	1	2.5
Relaparotomy	2	5
Coagulopathy	1	2.5
Maternal death	1	2.5

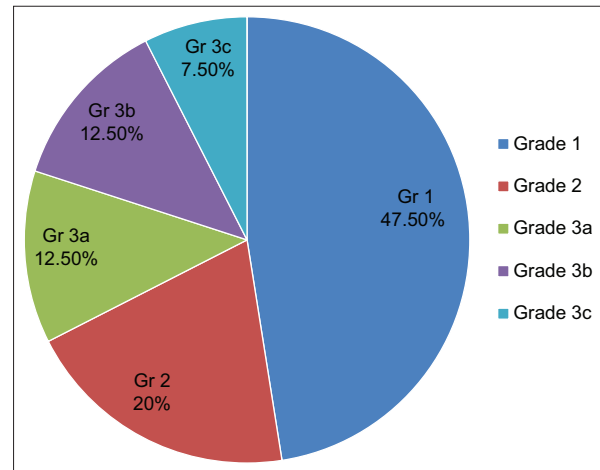


Figure 1: Frequency of grades of placenta accrete spectrum (%)

The grades of PAS detected at surgery were classified according to the FIGO 2019 classification of PAS⁴ as shown in Figure 1.

The maternal outcome with intraoperative and post-operative complications is shown in Table 4.

Among the intraoperative complications, 90% of the study subjects had postpartum hemorrhage (PPH) requiring multiple units of blood and blood components.

The neonatal outcome is shown in Table 5.

In our study, there were a total of 42 neonates, which included two cases with twin gestation. 76% of the babies were preterm, but only 57.1% of them required newborn intensive care unit (NICU) admission.

Association of variables with severe complications is given in Table 6.

From the above table, it is seen that LSCS ≥2 and Grade of PAS are significantly associated with complications. These 2 variables are put into the Logistic regression model, to get Crude OR. LSCS ≥2 (Crude Odds Ratio 4.886, 95% Confidence Interval 1.211–19.714, P=0.026) and Grade of PAS (Crude Odds Ratio 2.896, 95% Confidence Interval 1.290–6.497, P=0.01). They are then put into multivariate logistic regression. Only the grade of the PAS was found to be significant, implying that the odds of complication increased nearly 2.4 times (95% confidence interval 1.042–5.641, P=0.04) with each increase in Grade.

Table 5: Neonatal outcome

Outcome	Cases (n)	Frequency (%)
NICU admission		
Yes	24	57.1
No	18	42.9
Prematurity		
Extreme pre term (<28 weeks)	5	12
Pre-term (28–37 weeks)	32	76
Term (>37 weeks)	5	12
Birth weight		
<1.5 kg	8	19
1.5–2.5 kg	15	35.7
>2.5 Kg	19	45.3
APGAR score at 5 min		
>6	29	69
4–6	9	21.5
<4	4	9.5
Neonatal death	5	12

NICU: Newborn intensive care unit

Table 6: Association of variables with severe complications**1. Association of age with severe complications**

Age	Severe complications		Total	P-value
	No (%)	Yes (%)		
<35 years	19 (59.4)	13 (40.6)	32 (100)	0.999
≥35 years	5 (62.5)	3 (37.5)	8 (100)	
Total	24	16	40	

2. Association of previous LSCS with severe complications

Number of LSCS	Severe complications		Total (%)	P
	No (%)	Yes (%)		
LSCS <2	19 (73.1)	7 (26.9)	26 (100)	0.021
LSCS ≥2	5 (35.7)	9 (64.3)	14 (100)	
Total	24	16	40	

3. Association of Grade of PAS with severe complications

Grade of PAS	Severe complications		Total	P=0.003
	No (%)	Yes (%)		
Grade 1	14 (73.7)	5 (26.3)	19 (100)	
Grade 2	7 (87.5)	1 (12.5)	8 (100)	
Grade 3	3 (23.1)	10 (76.9)	13 (100)	
Total	24	16	40	

4. Association of Aortic clamp application with severe complications

Aortic clamp	Severe complications		Total	P=0.665
	No (%)	Yes (%)		
Not applied	18 (62.1)	11 (37.9)	29 (100)	
Applied	6 (54.5)	5 (45.5)	11 (100)	
Total	24	16	40	

5. Association of mode of surgery with severe complications

Surgery	Severe complications		Total	P=0.999
	No (%)	Yes (%)		
Elective	15 (60)	10 (40)	25 (100)	
Emergency	9 (60)	6 (40)	15 (100)	
Total	24	16	40	

DISCUSSION

PAS was seen in 8779 deliveries in our hospital over a 3-year study period with an incidence of 0.45%. Farquhar et al.,⁵ found an incidence rate of 44.2/100000 (0.044%) women giving birth in a case–control study of morbidly adherent placenta in 2017. Recently, Carusi⁶ reported that the true incidence of PAS is difficult to ascertain but likely falls near 1/1000 deliveries. The higher incidence in our study may be due to the fact that our center was the referral hospital for a large geographic area for high risk cases. The incidence is increasing along with the number of risk factors. PAS has risen dramatically in recent decades as the number of caesarean deliveries has increased.

The majority of the women in this study belonged to the age group of 31–40 years (57.5%). Among them, eight patients were over the age of 35 years. This was apparently because placenta accreta is seen in subsequent pregnancies and the maternal age advances then. This is similar to the study conducted by Bailit et al.,⁷ in 2015, where 65% of women with placenta accreta were 30 years of age or older. About 37 patients (92.5%) in the study were multigravida, with a history of one or more previous caesarean sections. We had one primi gravida with placenta accreta, which was diagnosed incidentally during cesarean delivery. The primi gravida in the study was conceived by *in vitro* fertilization after 17 years of married life. The placenta was posterior in the lower uterine segment covering the os. There was no history of any uterine surgeries in the past.

About 55% of patients presented with antepartum hemorrhage, while 18 patients (45%) were asymptomatic. This was similar to the study conducted by Agarwal et al.,⁸ where 60% of women presented with antepartum hemorrhage and the remaining 40% were asymptomatic. USG, along with Doppler, is the mode of imaging used to diagnose PAS. But in 11 cases in our study, ultrasound misdiagnosed as placenta previa along with no signs of placental invasion, whereas four patients (11.1%) had no evidence of placenta previa or placenta accreta on ultrasound and were diagnosed only intraoperatively. An MRI diagnosis of placenta accreta was done in eight patients, and one patient had a diagnosis of placenta previa alone without detecting placenta accreta in the MRI. In the study conducted by Bailit et al., only 53% of the women were suspected to have PAS by imaging techniques in the antenatal period; the remaining were diagnosed intraoperatively or postoperatively. All these studies show that many patients were not diagnosed in the antenatal

period, which could have led to significant complications in the intraoperative period. Thus, women with risk factors have to be investigated for placenta accreta with proper expertise, and no diagnosis should be missed.

Risk factors

The present study reveals that risk factors for placenta accreta were maternal age >35 years, multiparity with the previous cesarean, history of the previous cesarean and dilatation and evacuation and previous history of placenta previa. There were no women with previous histories of vaginal delivery alone or of miscarriage alone. These results agreed with many authors. Fitzpatrick et al.,⁹ studied risk factors for placenta accreta and found that high maternal age, prior cesarean delivery, and placenta previa were considered significant risk factors. In the study conducted by Chaudhari et al.,¹ all were multiparous. In our study, we had one primi gravida with no identifiable risk factors.

Maternal outcome

In this study, 25 women (62.5%) underwent surgery between 34 and 37 weeks of gestation. 11 women underwent surgery before 34 weeks, and those were emergency surgeries done in view of antepartum hemorrhage. We had one case that underwent emergency surgery at 20 weeks due to severe bleeding per vaginam. As per guidelines by the American College of Obstetricians and Gynecologists,² the ideal gestational age for elective surgery for PAS is 34–35 weeks of gestation, and our study shows consistency with these guidelines. The study conducted by Chaudhari et al., is similar to ours.

25 out of 40 cases (62.5%) were done as elective cesarean sections, whereas 15 cases (37.5%) were done as emergency cesarean sections for antepartum hemorrhage. The majority of cases (62.5%) were done in anticipation of placental accreta, which was diagnosed using ultrasound, MRI, or both. 11 cases (27.5%) were done for placenta previa and diagnosed with placenta accreta intraoperatively due to non-separation of the placenta or excessive bleeding from the placental bed. 30 cases (75%) underwent a classical cesarean, and 9 cases (22.5%) underwent a lower segment cesarean. We had one case of a ruptured uterus with placental tissue protruding out and severe intraperitoneal bleeding, for which we had to proceed with an obstetric hysterectomy. In the study conducted by Chaudhari et al., they had three women who had undergone vaginal delivery and were diagnosed with PAS on ultrasound when they presented with PPH. This shows that in our study, since the majority of cases were diagnosed before as PAS, it helped in anticipating complications, setting up a multidisciplinary team whenever needed, and ensuring expertise.

The grades of PAS detected at surgery were classified according to the FIGO 2019 classification of PAS⁵ as shown in Figure 1.

Grade 1: Placenta adherent or accreta: 19 in number (47.5%); Grade 2: Placenta increta: 8 in number (20%); Grade 3: Placenta percreta: Total 13 (32.5%), out of which 5 were in Grade 3a, 5 were in Grade 3b, and 3 were in Grade 3c. All patients with Grade 3 Placenta percreta had significant risk factors, either a previous history of 2 cesarean sections or a previous caesarean section along with a history of curettage for a miscarriage. This could indicate that the higher the number of risk factors, the higher the grade of placenta accreta encountered. In the study conducted by Bailit et al., and Agarwal et al., 70–75% had placenta accreta, 15–17% had placenta increta, and 5–10% had placenta percreta. These two studies had more placenta accreta than the higher grades. The reason for this could not be elicited in our study.

In 36 cases (90%), obstetric hysterectomy was performed, whereas in 4 cases (10%) obstetric hysterectomy was not done. Conservative surgery was attempted in these cases, with satisfactory results. Large vessel ligation or clamping was done in 25 patients (62.5%), 6 patients (15%) had the aorta clamped, 3 patients (7.5%) had the common iliac artery clamped, and 11 patients (27.5%) had the internal iliac artery ligation done. Five patients (12.5%) had internal iliac artery ligation along with an aortic clamp and pelvic packing. In 15 patients (37.5%), no large vessel ligation or clamp was attempted. Thus, it was noted that in our institution, the majority of surgeons prefer to do large vessel ligation or clamping as a means of reducing hemorrhage. This measure has contributed to a minor reduction in blood loss during caesarean sections, reducing the need for massive blood transfusions in some cases.

In this study, on evaluating the intraoperative complications, it was found that 13 patients (90%) had PPH, requiring massive blood transfusion.

And six patients (22.2%) had organ injury; the organ involved was the bladder. No other organ injury was encountered during this study. In the study conducted by Fitzpatrick et al., the mean total number of blood and blood products transfused was 7; this was different from our study, as the majority of our patients needed <5 units of transfusion.

On evaluating the post-operative complications in this study, it was noted that there was an unfortunate event of 1 maternal death (2.5%), following emergency cesarean section and obstetric hysterectomy for antepartum hemorrhage in a known case of PAS (Gr 3 b), in which an aortic clamp, internal iliac artery ligation, and pelvic packing were done. We had 2 cases of postoperative intraperitoneal bleed that required relaparotomy. In a study conducted by Hoffman et al.,¹⁰ at Tampa General Hospital from 2003 to 2009, 17% of patients had postoperative hemorrhage, of which 2 required a relaparotomy. In the study conducted

by Chaudhari et al., 20% of the patients had coagulopathy, 13% had surgical site infection, 3% had postpartum depression, and there was 1 case of maternal death, which is almost consistent with our results.

Neonatal outcome

In this study, the majority of the babies (76%) were preterm and delivered between 28 and 37 weeks of gestation with varying neonatal conditions as seen in their birth weight and 5-min APGAR score. Five babies were born before 28 weeks with a low 5-min APGAR score. The majority of the babies (57.1%) did not require NICU admission. We had 5 cases (12%) of neonatal death, all of them due to extreme prematurity. Most of the neonatal outcome variables were comparable to the study conducted by Chaudhari et al., in which 50% were preterm babies, 27% required NICU admission, and 14% had neonatal death. In another study by Agarwal et al., perinatal mortality was 33.3%. Better neonatal intensive care facilities may be the reason for the low perinatal mortality in our study. PAS is a maternal condition that may require early termination, leading to poor neonatal outcomes with regard to prematurity, which may cause perinatal mortality.

All patients with known risk factors, that is, previous caesarean sections with an anterior low-lying placenta, should undergo a dedicated ultrasound at 32–34 weeks of gestation for placental localization and to rule out PAS, and these patients should be referred to a center where a multidisciplinary team is available. Anticipation in terms of known risk factors, early diagnosis, and planned intervention help to prevent the disastrous outcomes of massive PPH and organ injury. The most commonly used treatment method has been cesarean hysterectomy with placenta *in situ*. With conservative and expectant management modalities on the rise, the decision lies in the hands of the surgeon and a properly informed patient.

Limitations of the study

Our study was conducted in those patients, who were admitted in our hospital only, hence it will not reflect data from an entire community. The result could have been affected by small sample size. The cases were followed up to 6 weeks only. Hence, long-term complications could not be studied.

CONCLUSION

The PAS appears to be associated with adverse maternal complications requiring massive blood transfusion in significant number of cases. Most of the women had to undergo obstetric hysterectomy. The major neonatal outcome was prematurity and its related complications. Early antenatal diagnosis and delivery planning at a tertiary care center with the assistance of a multidisciplinary team

improves maternal and neonatal outcomes.

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ETHICAL APPROVAL

The study was approved by the institutional ethics committee.

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Authors Contribution:


AN- Literature survey, data collection, manuscript preparation, design of study, and preparation of tables; **VP**- Concept, design, coordination, and clinical protocol; **SK**- Prepared first draft, data analysis, submission of article, editing, and manuscript revision; **AS**- Definition of intellectual content, concept, study design, and literature survey.


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