

To Investigate Maternal and Neonatal Outcomes Associated with Placenta Accreta Spectrum at a Tertiary Care Centre: A Retrospective Study

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Abstract:

Background: Placenta accreta spectrum (PAS) is a condition characterised by aberrant placental attachment. PAS is a significant obstetric issue. The prevalence of placenta accreta spectrum (PAS) has risen with the increase in caesarean births during the last forty years.

Aim: To investigate maternal and neonatal outcomes associated with placenta accreta spectrum in a specialised hospital.

Materials and Methods: Placenta accreta spectrum (PAS) patients who visited the Department of Obstetrics and Gynaecology were part of the research. placenta accreta spectrum (PAS) patients that were discovered before birth, regardless of whether the patient had scheduled appointments or not, as well as those that were not identified before birth but were diagnosed after surgery. The research variables were age, parity, manner of presentation, risk factors, surgical details, and maternal and foetal outcomes.

Results: 50 cases of Placenta Accreta Spectrum (PAS) were studied, resulting in an incidence rate of 0.53%. Most women with Placenta Accreta Spectrum (PAS) choose to have surgery between 34 and 37 weeks of pregnancy. A classic caesarean section was performed in 76% of patients. Approximately 92% of the ladies had an obstetric hysterectomy. 92% of the research participants had postpartum haemorrhage (PPH) during surgery, necessitating the use of numerous units of blood and blood components. Grade 1: Placenta adherent or accreta: 24 cases (48%); Grade 2: Placenta increta: 10 cases (20%); Grade 3: Placenta percreta: a total of 16 cases (32%). 30 patients (60%) had large vascular ligation or clamping: 7 patients (14%) had the aorta clamped, 3 patients (6%) had the common iliac artery clamped, and 14 patients (28%) had the internal iliac artery ligated. Six patients (12%) had internal iliac artery ligation in addition to aortic clamping and pelvic packing. A large vascular ligation or clamp was not tried in 40% of the 20 cases. The research found that 80% of the kids were born prematurely between 28 and 37 weeks of gestation, displaying different neonatal abnormalities based on their birth weight and 5-minute APGAR score. Five infants were delivered prematurely at less than 28 weeks gestation and had a poor 5-minute APGAR score. 42% of the newborns did not need to be admitted to the Neonatal Intensive Care Unit (NICU).

Conclusion: The Placenta Accreta Spectrum (PAS) seems to be linked to severe maternal problems that require extensive blood transfusions in a considerable proportion of instances. The majority of the ladies had to have an obstetric hysterectomy. The primary neonatal outcome was preterm birth and its associated consequences.

Keywords: Placenta accreta spectrum, NICU, APGAR score, Birth weight.

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Introduction

Placenta accreta spectrum (PAS) is a condition characterised by aberrant placental attachment. PAS is a significant obstetric issue. The prevalence of placenta accreta spectrum (PAS) has risen with the increase in caesarean births during the last forty years [1]. Additional risk factors for placenta accreta spectrum (PAS) include prior uterine surgeries such as several endometrial curettages or caesarean sections, a previous occurrence of accreta in a past pregnancy, a history of retained

placenta, and being of advanced maternal age. Ultrasound is precise in diagnosing PAS when conducted by a proficient operator. There is currently no proven biomarker for serological screening of PAS [2,3]. Vaginal haemorrhage is the primary cause of maternal hospitalisation in patients with placenta accreta spectrum disorder (PAS). The second most frequent cause of hospitalisation is the prenatal identification of placenta accreta spectrum (PAS). There is no

agreement on a singular method for managing PAS diseases, and the best strategy relies on the knowledge available locally. The placenta accreta spectrum (PAS) is linked to higher rates of health problems and death for both mothers and newborns. These risks may be lessened by having a diverse team of specialists available, along with quick access to blood products and intensive care unit resources [2]. These illnesses are associated with significant maternal and newborn morbidity and death, even in wealthy countries with advanced resuscitative and supportive resources [4]. Prenatal diagnosis and care in a specialised medical facility are crucial for improving results. Caesarean hysterectomy is the preferred therapy for placenta accreta syndrome (PAS) due to the high risk of haemorrhage associated with attempting to remove the placenta in situ [1]. It is associated with significantly reduced morbidity (36% compared to 67% in instances of attempted manual placental removal), highlighting the need for prenatal diagnosis in such situations [5]. Currently, studies have not shown that methotrexate and arterial embolisation are beneficial in reducing these hazards; hence, they are not advised [6]. The procedure of placing inflated balloons into the pelvic arteries, usually in the front sections of the internal iliac arteries, has become more common recently. An author's paper emphasises a steady reduction in surgical blood loss due to the gradual enhancements in surgical skills [7].

Delivering the baby from 35+0 to 36+6 weeks of gestation, without any additional risk concerns, offers the best balance for the health of both the mother and the newborn. Placenta accreta rates are believed to have significantly increased in the 1950s. The current incidence rate is estimated to be between 1 in 533 and 1 in 2510 deliveries, which is much higher than the rates of 1 in 30,000 births reported in the 1930s and 1950s. Placenta accreta incidence estimates vary widely owing to variances in diagnostic criteria and study population. However, the literature clearly shows a large increase in the rate over time [8]. A recent meta-analysis of population-based studies found the incidence of PAS to range from 0.01% to 1.1%, with a pooled prevalence of 0.17% [9]. Studies have utilised different diagnostic criteria, some considering both clinical and pathologic evidence while others only rely on histopathologic diagnosis, usually from hysterectomy specimens. This discrepancy contributes to the wide range of estimates regarding the incidence of placenta accrete [8].

Aims and Objective: To investigate maternal and neonatal outcomes associated with the placenta accreta spectrum in a specialised hospital

Materials and Methods

The present retrospective cohort study included pregnant patients diagnosed with placenta accreta spectrum disorder (PAS) and treated at the Department of Obstetrics and Gynaecology, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar, India. Data was collected from the departmental records and registry system of the obstetric department. This data formed the basis for analysis in the present study. Demographic characteristics were obtained from each patient's medical record, including age, parity, place of residence, socioeconomic status, obstetric history, history of uterine surgery, maternal and perinatal treatment, and outcomes of the pregnancy. The study duration was from August 2023 to February 2024. The Institutional Ethics Committee gave the study its approval.

Inclusion Criteria: The study included all patients with placenta accreta detected by USG or MRI scans, as well as those without a preoperative diagnosis whose placenta had been found adherent during surgery and required active medical management.

Exclusion Criteria: The study excluded all antenatal patients who did not have placenta accreta spectrum.

Preoperative Evaluation: Patients were monitored until 6 weeks after giving birth. Antenatal patients were examined at their normal check-ups, and postnatal patients were evaluated during their standard 6-week postnatal check-up to determine the status of both the mother and the newborn. Patients with a history of prior uterine surgery (caesarean section or myomectomy) and operations like dilatation and curettage, as well as those with an anterior low-lying placenta, were required to have a specialised scan at 32–34 weeks to identify signs of placenta-accreta spectrum (PAS). MRI was performed in instances of placenta previa with suspected higher grades of placenta accreta spectrum (PAS), placenta expanding posteriorly, and equivocal ultrasound results. The research variables were age, parity, manner of presentation, risk factors, surgical details, and maternal and foetal outcomes. The research characterised severe consequences as instances of major blood transfusion (greater than 10 pints of blood or blood products), coagulopathy, cases necessitating relaparotomy, and maternal mortality. Following data collection, the data was inputted into an Excel spreadsheet. The variables were then summarised by calculating frequency and percentage and presented in tables and bar graphs.

Statistical Analysis: The data thus obtained were subjected to statistical analysis using Microsoft and SPSS versions. The data were presented as frequency and percentages.

Results

The mean maternal age was 30.50 ± 4.01 years. The mean gestational age at the time of diagnosis was 32.25 ± 1.61 weeks. Table 1 displays the demographic and patient characteristics data. The research group consisted mostly of women aged 30–40 years (58%), with 10 patients beyond the age of 35 years. Most women were second-time mothers who had undergone a prior caesarean section. Only one example of a primigravida with a placenta accreta spectrum was documented. The

majority of the patients were recommended cases, which were booked elsewhere. Antepartum haemorrhage was the most frequent way in which the condition presented. PAS is primarily diagnosed with ultrasonography, although in 38% of cases, ultrasound failed to detect PAS. The placenta was located in the bottom part of the uterus in every instance. The placenta was situated anteriorly in 26 cases, posteriorly in 8 cases, both anterior and posteriorly covering the OS in 6 cases, and in 10 cases on the lateral wall.

Table 1: Basic Socio-demographic characteristics of the participants

Parameter	Number	Percentage
Age (years)		
18–30 years	21	42
30–40 years	29	58
Parity		
Primi	1	2
Multi	46	92
Grand multi	3	6
Booked/unbooked		
Booked in	11	22
Booked out	39	78
Mode of presentation		
Vaginal bleeding	28	56
No complaints	22	44
Diagnosis by imaging		
USG done cases	40	100
Placenta accreta spectrum diagnosed by USG	31	62
Not diagnosed by USG	19	38
MRI done cases	12	24
Placenta accreta spectrum diagnosed by MRI	10	88.33
Not diagnosed by MRI	2	16.67

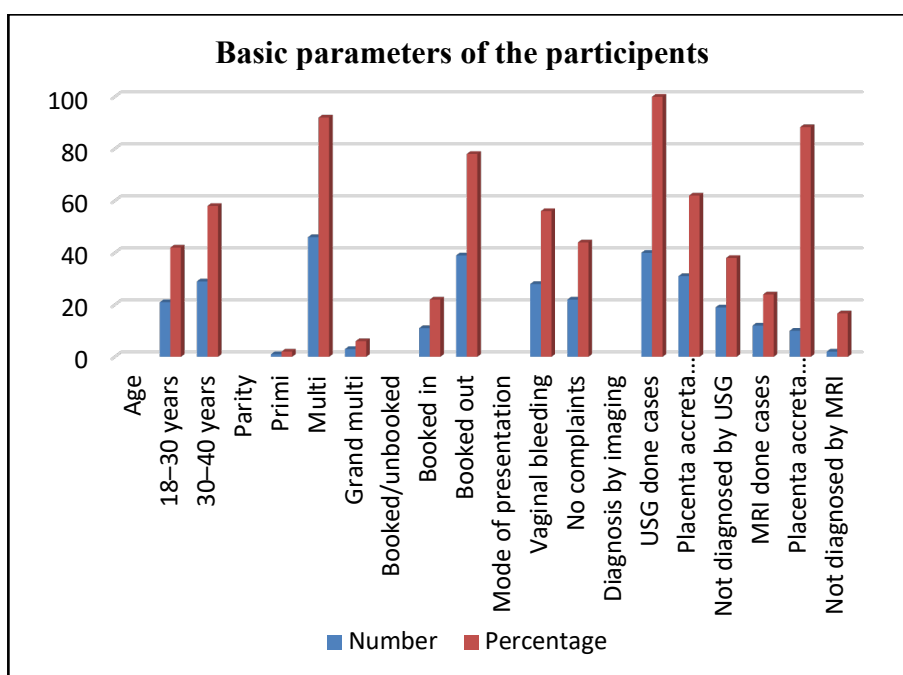


Figure 1: Basic parameter of the participants

Table 2: Obstetric risk factors

Parameter	Number	Percentage
Maternal age >35 years	11	20
Multiparity	49	98
Previous 1 LSCS	23	46
Previous 2 LSCS	10	20
Previous ≥3 LSCS	3	6
Previous LSCS and D&C	9	18
Previous 2 LSCS and D&C	1	2
Previous history of placenta previa	4	8

Table 2 displays the risk variables associated with the development of PAS. Multiparity with prior caesarean sections was identified as the predominant risk factor.

Table 3: Operative details

Parameters	Number	Percentage
Gestational age at the time of surgery		
<34 weeks	14	28
34–37 weeks	31	62
37–40 weeks	5	10
Mode of surgery		
Elective	31	62
Emergency	19	38
Indication for Caesarean		
Placenta accreta spectrum	36	72
Placenta previa	14	28
Type of caesarean		
Classical	38	76
Lower segment caesarean section	11	22
Laparotomy	1	2
Type of surgery		
Obstetric hysterectomy	46	92
Conservative surgery	4	8
Large vessel ligation		
Aortic clamp	7	14
Common iliac artery clamp	3	6
Internal iliac artery ligation	14	28
Aortic clamp+Internal iliac artery ligation	6	12

Table 3 displays the intraoperative information of the research patients. Most women with Placenta Accreta Spectrum (PAS) choose to have surgery between 34 and 37 weeks of pregnancy. A classic caesarean section was performed in 76% of patients. Approximately 92% of the ladies had an obstetric hysterectomy.

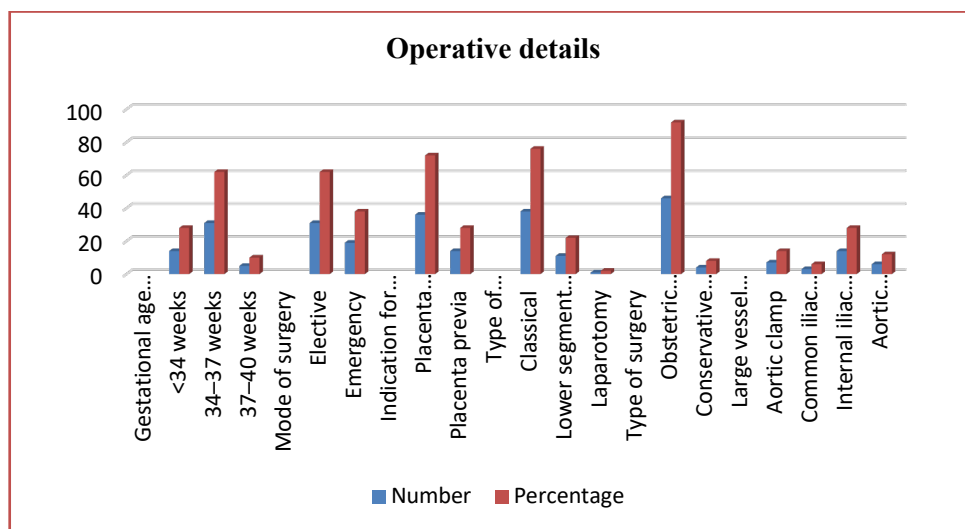


Figure 2: Operative details

Table 4: Maternal outcome

Intra operative complications		
Complications	Number	Percentage
Postpartum hemorrhage	46	92
Blood component requirements		
<5 units	21	42
5–10 Nits	8	16
>10 units	16	32
Organ injury	9	18
Post-operative complications		
Complications	Number	Percentage
ICU admissions	46	92
No complications	38	76
Surgical site infection	4	8
Pneumonia	1	2
Transfusion reaction	1	2
Metabolic complication	1	2
Vesicovaginal fistula	1	2
Relaparotomy	2	4
Coagulopathy	1	2
Maternal death	1	2

Table 4 displays the maternal outcome in relation to intraoperative and postoperative problems. 92% of the research participants had postpartum haemorrhage (PPH) during surgery, necessitating the use of numerous units of blood and blood components. Grade 1: Placenta adherent or accreta: 24 cases (48%); Grade 2: Placenta increta: 10 cases (20%); Grade 3: Placenta percreta: a total of 16 cases (32%). 30 patients (60%) had large vascular ligation or clamping: 7 patients (14%) had the aorta clamped, 3 patients (6%) had the common iliac artery clamped, and 14 patients (28%) had the internal iliac artery ligated. Six patients (12%) had internal iliac artery ligation in addition to aortic

clamping and pelvic packing. A large vascular ligation or clamp was not tried in 40% of the 20 cases.

The research found that 80% of the kids were born prematurely between 28 and 37 weeks of gestation, displaying different neonatal abnormalities based on their birth weight and 5-minute APGAR score. Five infants were delivered prematurely at less than 28 weeks gestation and had a poor 5-minute APGAR score. 42% of the newborns did not need to be admitted to the Neonatal Intensive Care Unit (NICU). There were six instances (12%) of infant mortality, all attributed to severe preterm.

Table 5: Neonatal outcome

Outcome	Number	Percentage
NICU admission		
Yes	29	58
No	21	42
Prematurity		
Extreme pre term (<28 weeks)	5	10
Pre-term (28–37 weeks)	40	80
Term (>37 weeks)	5	10
Birth weight		
<1.5 kg	10	20
1.5–2.5 kg	18	36
>2.5 Kg	22	44
APGAR score at 5 min		
>6	35	70
4–6	10	20
<4	5	10
Neonatal death	6	12

Table 5 displays the neonatal outcome. 80% of the infants in our research were born prematurely, although only 58% of them needed hospitalisation

in the neonatal intensive care unit (NICU). There is a substantial association between LSCS ≥ 2 and the grade of PAS with problems. These two variables

are used in the logistic regression model to get the crude odds ratio (OR). The likelihood of LSCS is significantly higher with a crude odds ratio of 5.25 (95% CI 1.33–20.76, $P = 0.03$), and the likelihood of Grade of PAS is significantly higher with a crude odds ratio of 3.11 (95% CI 1.66–7.03, $P =$

0.02). They are then subjected to multivariate logistic regression analysis. The study revealed that only the grade of the PAS had a meaningful impact. The risks of complications rose by about 2.4 times (95% confidence range: 1.21–4.98, $P = 0.03$) with each grade.

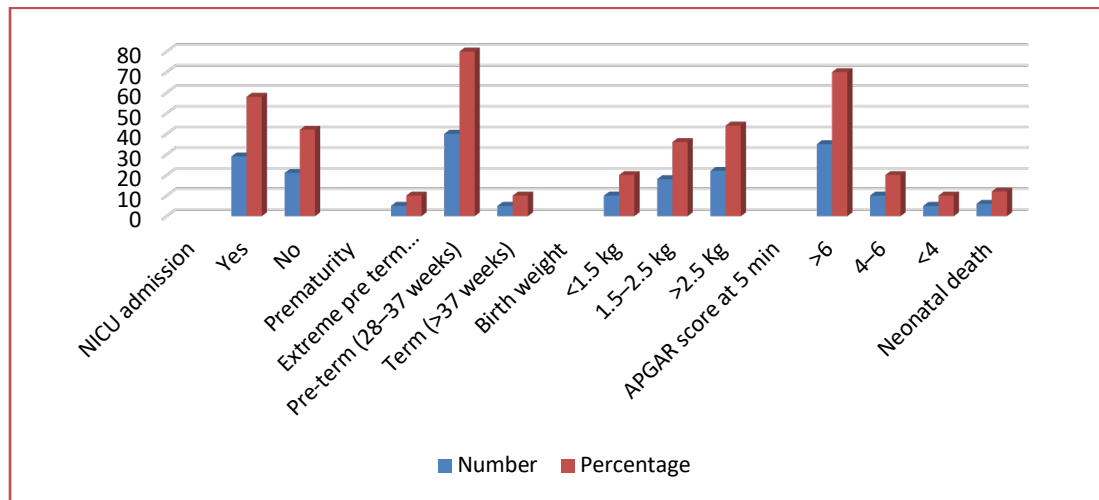


Figure 3: Neonatal outcome

Discussion

In the present study, the incidence rate was 0.53%. Farquhar et al. discovered an incidence rate of 44.2 per 100,000 (0.044%) women who gave birth in a case-control study on morbidly adherent placentas in 2017 [10]. Carusi et al. recently said that determining the actual occurrence of PAS is challenging but probably hovers around 1 in 1000 deliveries [11]. The increased occurrence in our research might be attributed to our institution serving as the referral hospital for a vast geographical region for patients considered high-risk. The incidence is rising in correlation with the growing number of risk factors. The prevalence of PAS has significantly grown in recent decades due to the growth of caesarean births. Most women in the research group were aged between 30 and 40 years (58%), with 10 patients above the age of 35 years. Placenta accreta is more likely to occur in future pregnancies as maternal age increases. This mirrors the research carried out by Bailit et al. in 2015, which found that 65% of women diagnosed with placenta accreta were aged 30 years or older. 92% of the patients in the research were multigravida and had undergone one or more prior caesarean procedures. During the caesarean birth, we inadvertently identified placenta accreta in a primigravida. The placenta was located at the back of the uterus in the lowest portion, covering the cervical opening. There was no previous record of uterine procedures. 56% of patients had antepartum haemorrhage, whereas 44% were symptomatic [12]. This research resembled the one done by Agarwal et al., in which 60% of women had

antepartum haemorrhage while the other 40% were asymptomatic [13]. PAS is primarily diagnosed with ultrasonography, but in 38% of instances, ultrasound failed to detect PAS. 12 individuals were diagnosed with placenta accreta using MRI, whereas 2 patients were diagnosed with placenta previa only, without evidence of placenta accreta in the MRI. In the Bailit et al. [12] investigation, imaging methods suspected PAS in only 53% of women during the prenatal period; the rest were identified either intraoperatively or postoperatively. These investigations indicate that several individuals were not diagnosed during the prenatal period, perhaps resulting in major problems after surgery. Therefore, women with risk factors should be thoroughly examined for placenta accreta by skilled professionals to ensure no diagnosis is overlooked.

The research shows that risk factors for placenta accreta include maternal age above 35 years, multiparity with a prior caesarean, history of previous caesarean with dilatation and evacuation, and previous history of placenta previa. No woman had a history of vaginal delivery or miscarriage. These findings were consistent with those of several writers. Fitzpatrick et al. researched risk factors for placenta accreta and identified high maternal age, previous caesarean birth, and placenta previa as important risk factors [14].

In the study conducted by Chaudhari et al., all were multiparous [15]. In our study, we had one primigravida with no identifiable risk factors. 31 women (62%) in the research had surgery performed from the 34th to the 37th week of

pregnancy. Fourteen women had surgery performed before 34 weeks due to antepartum haemorrhage, which were emergency procedures. One patient had emergency surgery at 20 weeks owing to acute vaginal bleeding. Our results align with the American College of Obstetricians and Gynaecologists' recommendation that elective surgery for PAS should ideally be performed during 34–35 weeks of gestation. Chaudhari et al.'s research is comparable to the present study [15]. 62% of the cases were elective caesarean sections, whereas 38% were emergency caesarean sections due to antepartum haemorrhage. 72% of the cases were performed in anticipation of placental accreta, which was identified using ultrasonography, MRI, or a combination of both. Placenta previa was identified as placenta accreta intraoperatively in 14 instances (28%) owing to the placenta not separating or significant bleeding from the placental bed. 38 patients (76%) had a traditional caesarean, whereas 11 cases (22%) had a lower segment caesarean. We saw a case of a ruptured uterus with placental tissue protruding and significant intraperitoneal haemorrhage, necessitating an obstetric hysterectomy. Chaudhari et al. performed research including three women who had vaginal deliveries and were identified with placenta accreta spectrum (PAS) on ultrasonography after experiencing postpartum haemorrhage (PPH) [15].

In our research, the majority of patients were previously identified as PAS, which facilitated the anticipation of difficulties, the establishment of a multidisciplinary team when necessary, and the assurance of competence. The grades of placenta accreta spectrum (PAS) identified after surgery were categorised based on the FIGO 2019 classification of PAS. Grade 1: Placenta adherent or accreta occurred in 24 cases, accounting for 48%. Grade 2: Placenta increta occurred in 10 cases, representing 20%. Grade 3: Placenta percreta: total of 16 cases (32%). A correlation may exist between an increased number of risk variables and encountering a more severe grade of placenta accreta.

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 [12, 13]. These two trials showed a greater incidence of placenta accreta compared to the higher grades. The cause of this could not be determined in our investigation. Obstetric hysterectomy was performed in 46 instances (92%) and not done in 4 cases (8%). Conservative surgery was performed in these instances, with good outcomes. 30 patients (60%) had large vascular ligation or clamping; 7 patients (14%) had the aorta clamped, 3 patients (6%) had the common iliac artery clamped, and 14 patients (28%) had the

internal iliac artery ligation. Internal iliac artery ligation was performed in 6 patients (12%) in conjunction with aortic clamping and pelvic packing. A large vascular ligation or clamp was not tried in 40% of the 20 cases. In our hospital, most surgeons prefer to do big vascular ligation or clamping to reduce bleeding. This action has led to a slight decrease in blood loss following caesarean deliveries, hence decreasing the need for extensive blood transfusions in some instances. The research indicated that 46 patients (92%) had PPH necessitating large blood transfusions, and 9 patients (18%) suffered bladder organ damage as intraoperative complications. No more organ damage was seen in this investigation. Fitzpatrick et al. found a different mean total quantity of blood and blood products transfused compared to our research, where most of our patients required less than 5 units of transfusion [14].

Upon reviewing the post-operative complications in this study, it was observed that there was one maternal death (2%) after an emergency caesarean section and obstetric hysterectomy for antepartum haemorrhage in a known case of placenta accreta spectrum (Gr 3 b). The procedure involved using an aortic clamp, internal iliac artery ligation, and pelvic packing. We saw two instances of postoperative intraperitoneal bleeding that necessitated relaparotomy. A study by Hoffman et al. at Tampa General Hospital from 2003 to 2009 found that 17% of patients had postoperative bleeding, with 2 patients needing a relaparotomy [16]. In Chaudhari et al. research, 20% of patients experienced coagulopathy, 13% had surgical site infection, 3% had postpartum depression, and there was 1 occurrence of maternal mortality, aligning closely with our findings [15].

In present study, we found that 80% of the kids were born prematurely between 28 and 37 weeks of gestation, exhibiting different neonatal abnormalities reflected in their birth weight and 5-minute APGAR score. Five infants were delivered prematurely at less than 28 weeks gestation and had a poor 5-minute APGAR score. 42% of the infants did not need NICU hospitalization. There were six instances of newborn mortality, accounting for 12% of the cases, all attributed to severe preterm birth. The majority of newborn outcome measures were similar to those reported in the research by Chaudhari et al., with 50% being preterm infants, 27% needing NICU care, and 14% experiencing neonatal mortality [15]. 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 [13].

Limitations of the Study: the small sample size and short duration of the study.

Conclusion

The Placenta Accreta Spectrum (PAS) seems to be linked to severe maternal problems that require extensive blood transfusions in a considerable proportion of instances. The majority of the ladies had to have an obstetric hysterectomy. Because of the increase in placenta previa and caesarean procedures, PAS is a common obstetric emergency. A timely and accurate diagnosis of PAS is necessary to prevent maternal bleeding. Prenatal diagnosis of placenta accreta allows collaboration at a specialised hospital to prevent morbidity and mortality in the mother and infant. The primary neonatal outcome was preterm birth and its associated consequences.

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References

- Cahill AG, Beigi R, Heine RP, Silver RM, Wax JR. Placenta accreta spectrum. *Am J Obstet Gynecol.* 2018; 219:0.
- Jauniaux E, Alfirevic Z, Bhide AG, et al. Placenta praevia and placenta accreta: diagnosis and management: Green-top guideline no. 27a. *BJOG.* 2019; 126:0.
- Kasraeian M, Hashemi A, Hessami K, et al. A 5-year experience on perinatal outcome of placenta accreta spectrum disorder managed by cesarean hysterectomy in southern Iranian women. *BMC Womens Health.* 2021; 21:243.
- Nieto-Calvache AJ, Palacios-Jaraquemada JM, Osanan G, et al. Lack of experience is a main cause of maternal death in placenta accreta spectrum patients. *Acta Obstet Gynecol Scand.* 2021; 100:1445–1453.
- Wijesinghe V, Rishard M, Srisanjeevan S. Quality of surgical management of placenta accreta spectrum in a tertiary center in Sri Lanka: baseline study for quality improvement project: problems and solutions. *BMC Pregnancy Childbirth.* 2022; 22:509.
- Varlas VN, Bors RG, Birsanu S, Maxim B, Clotea E, Mihailov M. Maternal and fetal outcome in placenta accreta spectrum (PAS) associated with placenta previa: a retrospective analysis from a tertiary center. *J Med Life.* 2021; 14:367–375.
- Kingdom JC, Hobson SR, Murji A, et al. Minimizing surgical blood loss at cesarean hysterectomy for placenta previa with evidence of placenta increta or placenta percreta: the state of play in 2020. *Am J Obstet Gynecol.* 2020; 223:322–329.
- Gyamfi-Bannerman C, Gilbert S, Landon MB, et al. Risk of uterine rupture and placenta accreta with prior uterine surgery outside of the lower segment. *Obstet Gynecol.* 2012; 120:1332–1337.
- Jauniaux E, Grønbeck L, Bunce C, Langhoff-Roos J, Collins SL. Epidemiology of placenta previa accreta: a systematic review and meta-analysis. *BMJ Open.* 2019; 9:0.
- Farquhar CM, Li Z, Lensen S, McLintock C, Pollock W, Peek MJ, et al. Incidence, risk factors and perinatal outcomes for placenta accreta in Australia and New Zealand: A case-control study. *BMJ Open.* 2017; 7(10): e017713.
- Carusi DA. The placenta accreta spectrum: Epidemiology and risk factors. *Clin Obstet Gynecol.* 2018; 61(4):733-742.
- Bailit JL, Grobman W, Rice MM, Reddy UM, Wapner RJ, Varner MW, et al. Morbidly adherent placenta treatments and outcomes. *Obstet Gynecol.* 2015; 125(3):683-689.
- Aggarwal R, Suneja A, Vaid NB, Yadav P, Sharma A and Mishra K. Morbidly adherent placenta: A critical review. *J Obstet Gynaecol India.* 2012; 62(1):57-61.
- Fitzpatrick KE, Sellers S, Spark P, Kurinczuk JJ, Brocklehurst P and Knight M. Incidence and risk factors for placenta accreta/ increta/Percreta in the UK: A national case-control study. *PLoS One.* 2012; 7(12):e52893.
- Chaudhari HK, Shah PK and D'Souza N. Morbidly adherent placenta: Its management and maternal and perinatal outcome. *J Obstet Gynaecol India.* 2017; 67(1):42-47.
- Hoffman MS, Karlinski RA, Mangar D, Whiteman VE, Zweibel BR, Lockhart JL, et al. Morbidity associated with nonemergent hysterectomy for placenta accreta. *Am J Obstet Gynecol.* 2010; 202(6): 628.e1-e5.