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Factors Associated with Placenta Accreta Spectrum among Women Presenting with Antepartum Haemorrhage: A Retrospective Study at a Tertiary Hospital in Bangladesh

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Abstract

Background: Placenta accreta spectrum (PAS) is an important cause of severe maternal morbidity, particularly among women presenting with antepartum haemorrhage (APH). Early identification of women at increased risk may facilitate timely referral and appropriate obstetric planning. This study aimed to identify predictors of PAS among women presenting with APH. ***Methods:*** This retrospective observational study was conducted in the Department of Obstetrics and Gynaecology, Sylhet Women's Medical College Hospital, Sylhet, Bangladesh, from January to December 2025. A total of 110 women presenting with APH after 28 weeks of gestation admitted to the Department during the study period were included. ***Results:*** Among 110 women, 25 (22.7%) had PAS. Significant associations were observed with maternal age ≥35 years, multiparity, ≥2 previous cesarean deliveries, previous uterine surgery, previous dilatation and curettage, placenta previa, anterior placenta, recurrent APH, and multiple ultrasonographic features suggestive of PAS. On multivariable analysis, ≥2 previous cesarean deliveries (adjusted OR=5.76, 95% CI: 2.01–16.53), placenta previa (adjusted OR=6.92, 95% CI: 2.41–19.86), and ≥2 suggestive ultrasonographic features (adjusted OR=18.64, 95% CI: 5.02–69.19) were independent predictors of PAS. Cesarean hysterectomy, blood transfusion, ICU admission, preterm delivery, and low birth weight were significantly more common among women with PAS. ***Conclusion:*** PAS was relatively common among women presenting with APH, particularly those with previous cesarean delivery, placenta previa, and characteristic ultrasonographic findings. Early identification of these risk factors may help improve antenatal risk stratification and obstetric preparedness.

Keywords: Placenta accreta spectrum, Antepartum haemorrhage, Placenta previa, Factors.

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INTRODUCTION

Antepartum haemorrhage (APH) is defined as bleeding from or into the genital tract after 28 weeks of gestation and before delivery. It complicates approximately 2–5% of pregnancies and is an important obstetric emergency associated with increased maternal and perinatal morbidity and mortality [1]. Common causes include placenta previa, placental abruption, vasa previa, and local genital tract lesions [1]. Among these, placenta accreta spectrum (PAS) is of particular concern because of its association with severe obstetric haemorrhage and potentially life-threatening maternal complications.

Placenta accreta spectrum refers to a range of abnormal placental adherence and invasion, including placenta accreta, placenta increta, and placenta percreta [2]. In placenta accreta, chorionic villi are abnormally adherent to the myometrium, whereas in placenta increta they invade the myometrium, and in placenta percreta they penetrate through the myometrium and may involve adjacent pelvic organs. The condition is primarily associated with abnormal development of the uteroplacental interface, most commonly in areas of

previous uterine injury or scarring, which facilitates abnormal trophoblastic invasion [3].

The incidence of PAS has increased substantially over recent decades, largely paralleling the rise in caesarean delivery and other uterine procedures, including curettage and myomectomy [4,5]. Previous caesarean delivery and placenta previa are among the strongest established risk factors, with the risk of PAS increasing progressively with the number of previous caesarean deliveries [6,7]. Other recognized risk factors include advanced maternal age, multiparity, previous uterine curettage or surgery, and pregnancies conceived through assisted reproductive technology [8,9].

The major clinical significance of PAS is its potential to cause sudden and massive haemorrhage, often requiring blood transfusion, intensive care, and peripartum hysterectomy [10]. APH may occur in a substantial proportion of pregnancies complicated by PAS and has been associated with emergency delivery, preterm birth, and adverse maternal outcomes [11,12]. Importantly, some cases of PAS remain unrecognized before delivery, particularly when typical risk factors such as placenta previa are absent. Consequently, women presenting with APH may occasionally have unsuspected PAS, creating a major diagnostic and management challenge [13].

Early recognition of PAS allows appropriate referral, multidisciplinary planning, optimization of blood products, and preparation for potential surgical complications, all of which may improve maternal and neonatal outcomes. This is particularly relevant in tertiary hospitals in resource-limited settings, where access to advanced imaging and specialized multidisciplinary PAS teams may be limited. Although numerous studies have examined risk factors for PAS in the general obstetric population, relatively few have specifically evaluated predictors of PAS among women presenting with APH. Identifying clinical, obstetric, and sonographic predictors in this high-risk group may facilitate earlier recognition and time management.

Therefore, this study was conducted to identify the clinical, obstetric, and sonographic predictors of placenta accreta spectrum among women presenting with antepartum haemorrhage at tertiary hospital.

METHODS & MATERIALS

This was a retrospective observational study conducted in the Department of Obstetrics and Gynaecology, Sylhet Women's Medical College Hospital, Sylhet, Bangladesh, over a period of 12 months from January 2025 to December 2025. The study included 110 pregnant women presenting with antepartum haemorrhage (APH) after 28 weeks of gestation who were admitted to the Department of Obstetrics and Gynaecology during the study period.

Eligibility Criteria

Inclusion Criteria

1. Pregnant women aged 18 years or older.
2. Women with gestational age of 28 weeks or more.
3. Presentation with antepartum haemorrhage, defined as bleeding from or into the genital tract after 28 weeks of gestation and before delivery.

Exclusion Criteria

1. Women with multiple pregnancy.
2. Women with bleeding clearly attributable to trauma or non-obstetric causes.
3. Women with known coagulation or bleeding disorders.
4. Women with incomplete or unavailable clinical records.

Data Collection and Analysis:

Data were collected using a structured data collection form through a review of medical records, including clinical findings, relevant laboratory reports, and ultrasonographic findings. Information regarding maternal demographic characteristics, obstetric history, previous cesarean delivery or other uterine surgery, gestational age, history and severity of antepartum haemorrhage, placental location, and other relevant clinical findings was recorded. The data were checked for completeness and analyzed using SPSS version 23.0. Categorical variables were expressed as frequency and percentage, while continuous variables were presented as mean ± standard deviation. The association between potential risk factors and placenta accreta spectrum was assessed using the Chi-square test or Fisher's exact test, as appropriate. Independent predictors of placenta accreta spectrum were identified using multivariable logistic regression analysis, and odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. A p-value of <0.05 was considered statistically significant.

RESULT

Table 1: Sociodemographic and obstetric characteristics of the study participants (n=110)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
<25	12	10.9
25–34	55	50.0
≥35	43	39.1
Parity		
Nulliparous	18	16.4

Primiparous	24	21.8
Multiparous	68	61.8
Gestational age at presentation		
28–32 weeks	18	16.4
33–36 weeks	37	33.6
≥37 weeks	55	50.0
Previous cesarean delivery		
None	47	42.7
1	32	29.1
≥2	31	28.2
Previous uterine surgery		
Yes	39	35.5
No	71	64.5
Previous dilatation and curettage		
Yes	27	24.5
No	83	75.5

Table 1 presents the sociodemographic and obstetric characteristics of the 110 women included in the study. Half of the participants (50.0%) were aged 25–34 years, while 39.1% were aged ≥35 years. Most women were multiparous (61.8%). Regarding gestational age at presentation, half (50.0%) was presented at ≥37 weeks. Previous cesarean delivery was reported in 57.3% of women, including 28.2% who had undergone two or more cesarean deliveries. Previous uterine surgery and dilatation and curettage were reported in 35.5% and 24.5% of participants, respectively.

Table 2: Clinical and ultrasonographic characteristics of women presenting with antepartum haemorrhage (n=110)

Characteristics	Frequency (n)	Percentage (%)
Placenta previa	42	38.2
Anterior placenta	48	43.6
Posterior placenta	62	56.4
Recurrent APH	36	32.7
Placental lacunae on ultrasound	28	25.5
Loss of retroplacental clear zone	24	21.8
Myometrial thinning/disruption	21	19.1
Abnormal uteroplacental vascularity	18	16.4
Bridging vessels	15	13.6
≥2 suggestive ultrasound features of PAS	22	20.0

Table 2 shows the clinical and ultrasonographic characteristics of the study participants presenting with antepartum haemorrhage. Placenta previa was present in 38.2% of women, while 43.6% had an anterior placenta and 56.4% had a posterior placenta. Recurrent antepartum haemorrhage was observed in 32.7% of participants. On ultrasonography, placental lacunae were observed in 25.5% patients, followed by loss of the retroplacental clear zone (21.8%) and myometrial thinning or disruption (19.1%). Abnormal uteroplacental vascularity and bridging vessels were observed in 16.4% and 13.6%, respectively, while 20.0% had two or more ultrasonographic features suggestive of PAS.

Table 3: Association between potential risk factors and placenta accreta spectrum

Risk factors	PAS (n=25) n (%)	Non-PAS (n=85) n (%)	p-value
Age ≥35 years	15 (60.0)	28 (32.9)	0.017
Multiparity	20 (80.0)	48 (56.5)	0.035
≥2 previous cesarean deliveries	15 (60.0)	16 (18.8)	<0.001
Previous uterine surgery	14 (56.0)	25 (29.4)	0.014
Previous D&C	10 (40.0)	17 (20.0)	0.047
Placenta previa	19 (76.0)	23 (27.1)	<0.001
Anterior placenta	16 (64.0)	32 (37.6)	0.021
Recurrent APH	13 (52.0)	23 (27.1)	0.020
≥2 suggestive ultrasound features	20 (80.0)	2 (2.4)	<0.001

Table 3 demonstrates that several factors were significantly associated with PAS, including maternal age ≥35 years, multiparity, two or more previous cesarean deliveries, previous uterine surgery, previous dilatation and curettage, placenta previa, anterior placenta, and recurrent APH. The presence of two or more ultrasonographic features suggestive of PAS showed a particularly strong association with PAS, occurring in 80.0% of women with PAS compared with only 2.4% of those without PAS (p<0.001).

Table 4: Multivariable logistic regression analysis of independent predictors of PAS

Predictors	Adjusted OR	95% CI	p-value
Age ≥35 years	1.92	0.72–5.11	0.192
≥2 previous cesarean deliveries	5.76	2.01–16.53	0.001
Previous uterine surgery	2.21	0.82–5.95	0.116
Placenta previa	6.92	2.41–19.86	<0.001
Recurrent APH	1.87	0.69–5.08	0.218
≥2 suggestive ultrasound features	18.64	5.02–69.19	<0.001

Table 4 shows that two or more previous cesarean deliveries, placenta previa, and the presence of two or more ultrasonographic features suggestive of PAS remained significant independent predictors. Among these, the presence of two or more suggestive ultrasonographic features showed the strongest association with PAS (adjusted OR=18.64, 95% CI: 5.02–69.19, p<0.001), followed by placenta previa (adjusted OR=6.92, 95% CI: 2.41–19.86, p<0.001). Age ≥35 years, previous uterine surgery, and recurrent APH were not independently associated with PAS after adjustment for other factors.

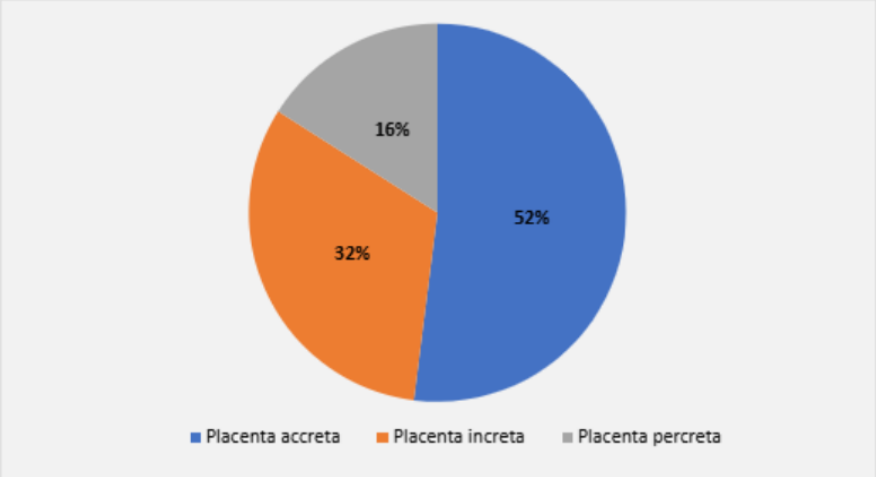


Figure 1: Types of placentas accreta spectrum among affected women (n=25)

Figure 1 illustrates the distribution of different types of placentae accreta spectrum among the 25 affected women. Placenta accreta was the most common type, accounting for 52.0% of cases, followed by placenta increta (32.0%) and placenta percreta (16.0%).

Table 5: Maternal and neonatal outcomes according to PAS status

Maternal outcomes	PAS (n=25) n (%)	Non-PAS (n=85) n (%)	p-value
Cesarean delivery	25 (100.0)	72 (84.7)	0.046
Cesarean hysterectomy	12 (48.0)	1 (1.2)	<0.001
Blood transfusion	18 (72.0)	22 (25.9)	<0.001
ICU admission	6 (24.0)	5 (5.9)	0.008
Preterm delivery	12 (48.0)	19 (22.4)	0.014
Neonatal outcomes			
Birth weight <2.5 kg	11 (44.0)	20 (23.5)	0.047
NICU admission	9 (36.0)	17 (20.0)	0.094
Low Apgar score at 5 min	5 (20.0)	7 (8.2)	0.099
Stillbirth	2 (8.0)	2 (2.4)	0.194
Live birth	23 (92.0)	83 (97.6)	0.194

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Table 5 compares maternal and neonatal outcomes between women with and without placenta accreta spectrum. Cesarean delivery was performed in all women with PAS compared with 84.7% of women without PAS (p=0.046). Cesarean hysterectomy and blood transfusion were significantly more common in the PAS group than in the non-PAS group (48.0% vs. 1.2% and 72.0% vs. 25.9%, respectively; both p<0.001). ICU admission and preterm delivery were also significantly higher among women with PAS. Regarding neonatal outcomes, low birth weight (<2.5 kg) was significantly more frequent in the PAS group (44.0% vs. 23.5%, p=0.047). NICU admission and low Apgar score at 5 minutes were more common among neonates born to women with PAS, although these differences were not statistically significant. Stillbirth was observed in 8.0% of the PAS group compared with 2.4% of the non-PAS group, with no statistically significant difference.

DISCUSSION

Placenta accreta spectrum (PAS) is an important cause of severe obstetric morbidity because abnormal placental invasion can result in massive haemorrhage and major surgical intervention. In the present study, 25 of 110 women (22.7%) presenting with antepartum haemorrhage (APH) were diagnosed with PAS. Majority of women in this study were multiparous, and more than half had a previous cesarean delivery. Among the 25 women with PAS, placenta accreta was the most common subtype (52.0%), followed by increta (32.0%) and percreta (16.0%). This distribution is consistent with hospital-based reports in which placenta accreta generally represents the largest proportion of PAS cases, while the more deeply invasive forms are less frequent [15].

Several established risk factors were significantly associated with PAS on univariate analysis, including maternal age ≥35 years, multiparity, two or more previous cesarean deliveries, previous uterine surgery, and previous dilatation and curettage. The association was particularly strong among women with multiple previous cesarean deliveries, consistent with evidence showing that PAS risk increases progressively with the number of prior cesarean sections [16]. Similarly, a North Indian tertiary-centre study reported a history of previous cesarean delivery in approximately 75% of PAS cases, with placenta previa present as an additional risk factor in about half of the cases [17]. Previous cesarean delivery is considered one of the most important risk factors for PAS, probably because disruption of the uterine scar and endometrial–myometrial interface may facilitate abnormal placental implantation and invasion [18].

Placenta previa was another important predictor in the present study. It was significantly more common among women with PAS and remained independently associated with PAS after adjustment for other factors, with affected women having approximately seven times higher odds. This finding agrees with previous evidence identifying placenta previa, particularly in combination with a previous cesarean scar, as one of the strongest clinical predictors of PAS [18]. Other factors, including maternal age ≥35 years, multiparity, previous uterine surgery, previous dilatation and curettage, and recurrent APH, were significant on univariate analysis but did not remain independently associated after adjustment. Nevertheless, previous uterine surgery and instrumentation remain clinically relevant because disruption of the uterine lining and endometrial–myometrial interface may contribute to abnormal placental implantation [18,19].

Ultrasonography provided important additional evidence for identifying women with PAS. Placental lacunae were the most frequently observed individual feature, followed by loss of the retroplacental clear zone and myometrial thinning or disruption. These findings correspond with established sonographic markers of PAS, including placental lacunae, loss of the clear zone, myometrial thinning, bridging vessels, and abnormal uterovesical vascularity [18,20]. A recent prospective study using a standardized sonographic checklist similarly found that placental lacunae and myometrial thinning were particularly associated with PAS [21].

The strongest association in the present study was observed with the presence of two or more suggestive ultrasound features, which occurred in 80.0% of women with PAS compared with only 2.4% of those without PAS and remained an independent predictor (adjusted OR=18.64, 95% CI: 5.02–69.19, p<0.001). This finding supports a combined assessment of sonographic features rather than reliance on a single sign. A systematic review and meta-analysis of 54 studies involving more than 5,000 women reported a sensitivity of 87.0% and specificity of 86.3% for third-trimester two-dimensional ultrasound, with placental lacunae showing high sensitivity [20]. However, individual signs may have limited specificity when considered in isolation [22]. Recent evidence therefore supports a multi-marker sonographic approach [23], while emerging markers such as intracervical lakes may provide additional diagnostic value [24].

The maternal outcomes observed in this study demonstrate the considerable morbidity associated with PAS. Cesarean hysterectomy was required in 48.0% of women with PAS compared with only 1.2% of those without PAS, while blood transfusion was required in 72.0% and 25.9%, respectively. ICU admission and preterm delivery were also significantly more common in the PAS group. These findings are consistent with the substantial surgical and haemorrhagic morbidity reported in other PAS cohorts. A Bahraini study reported hysterectomy in 65% of PAS cases [16], while a large historical cohort of women undergoing cesarean hysterectomy for PAS reported high rates of severe maternal morbidity and ICU admission [25]. Similarly, a

12-year multidisciplinary cohort identified placenta previa and PAS grade as important contributors to surgical and intensive-care morbidity [26].

Low birth weight was also significantly more common among neonates born to women with PAS (44.0% vs. 23.5%), which may partly reflect the higher rate of preterm delivery in this group. Although NICU admission, low 5-minute Apgar scores, and stillbirth were numerically more frequent among PAS cases, these differences were not statistically significant. Similar findings regarding neonatal intensive care admission, gestational age, and Apgar scores have been reported in comparative PAS studies [27]. The lack of statistical significance may partly be related to the relatively small number of women with PAS in the present study.

The clinical relevance of these findings is particularly important in tertiary hospitals, where women with APH may present without a prior diagnosis of PAS. Early recognition of high-risk women allows timely referral, multidisciplinary preparation, optimization of blood products, and appropriate planning for delivery and possible hysterectomy. This may be especially valuable in resource-limited settings, where delays in diagnosis or access to specialized care can further increase maternal morbidity.

LIMITATIONS OF THE STUDY

The present study has several limitations. It was conducted at a single tertiary hospital with a relatively small sample size, which may limit the generalizability of the findings. Because the study included only women presenting with APH, the results should not be directly extrapolated to the general obstetric population. In addition, the relatively small number of PAS cases limits the statistical power of subgroup analyses according to the depth of placental invasion.

CONCLUSION

Placenta accreta spectrum represents an important obstetric concern among women presenting with antepartum haemorrhage, particularly in those with previous cesarean delivery and placenta previa. In this study, multiple previous cesarean deliveries, placenta previa, and the presence of multiple ultrasonographic features suggestive of PAS were identified as independent predictors. Women with PAS also had a higher frequency of major maternal complications, including cesarean hysterectomy, blood transfusion, ICU admission, and preterm delivery, as well as an increased risk of low birth weight.

Therefore, careful assessment of clinical risk factors and targeted ultrasonographic evaluation should be emphasized in women presenting with APH to facilitate early recognition of PAS and appropriate obstetric planning.

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