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RESEARCH ARTICLE

PREVALENCE, RISK FACTORS AND FETO-MATERNAL OUTCOME OF PLACENTA ACCRETA SPECTRUM AT A TERTIARY CARE CENTRE

Shivangee Singh[1], Renu Gupta[2], Pavika Lal[3], Chayanika Kala[4], Neena Gupta[5], Shaily Agarwal[6], Rashmi Yadav[7] and Ashok Kumar Verma[8]

1. PG Trainee, Department of Obs. and Gynecology, GSVM Medical College.
2. Professor and Head, Department of Obs. and Gynaecology, GSVM Medical College.
3. Associate Professor, Department of Obs. and Gynaecology, GSVM Medical College.
4. Associate Professor, Department of Pathology, GSVM Medical College.
5. Professor, Department of Obs. and Gynaecology, GSVM Medical College.
6. Professor, Department of Obs. and Gynecology, GSVM Medical College.
7. Associate Professor, Department of Obs. and Gynaecology, GSVM Medical College.
8. Associate Professor, Department of Radiology, GSVM Medical College.

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Abstract

Introduction: Placenta Accreta Spectrum disorders, characterized by abnormal adherence of the placenta to the uterine wall, represent a significant obstetric challenge due to their association with severe maternal hemorrhage and increased maternal morbidity and mortality.

Material and Methods: This ambispective observational study was conducted over 4.5 years at the Upper India Sugar Exchange Maternity Hospital, GSVM Medical College, Kanpur. The study included 70 patients diagnosed with Placenta Accreta Spectrum (PAS) disorders, with data collected retrospectively for January 2020 - December 2021 and prospectively for January 2022 - July 2024. Statistical analysis was performed to assess the prevalence, risk factors, and feto-maternal outcomes associated with placenta accreta spectrum.

Results: The prevalence of PAS increased from 2.8% in the retrospective period to 6.9% in the prospective period, resulting in an overall prevalence of 4.9%. The most significant risk factor identified was a history of two or more cesarean sections, present in 36.84% of cases. Ultrasound was instrumental in antenatal diagnosis.The study also highlighted the common occurrence of preterm delivery, moderate anemia, and significant blood loss, averaging 1854.3 mL.

Conclusion: The study underscores the rising prevalence of placenta accreta spectrum, driven by the increasing rate of cesarean sections. Early and accurate diagnosis, particularly through ultrasound, combined with a multidisciplinary approach to management, is crucial for improving maternal and fetal outcomes.

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Corresponding Author:- Dr. Shivangee Singh
Address:- PG Trainee, Department of Obs. and Gynaecology, GSVM Medical College, Kanpur, India.

Introduction:-

Placenta Accreta Spectrum (PAS), encompasses abnormal adherence of the placenta to the uterine wall up to varying degrees of invasion into the myometrium resulting in failure of placental separation at the time of delivery leading to life-threatening hemorrhage [(1).] Over the past two decades, there has been a tremendous rise in the incidence of PAS worldwide, which correlates closely with the increasing rates of cesarean sections [(2).]

PAS seems to grow potentially in the near future and is an important concern for maternal health. Given the potential for adverse outcomes, including severe maternal hemorrhage and increased maternal mortality, there is an urgent need for improved awareness, diagnostic accuracy, and management strategies for PAS [(3).] This study addresses the pressing need for comprehensive data on the prevalence, risk factors, and feto-maternal outcomes associated with PAS at our center.

Additionally, the study aimed to assess the correlation between transabdominal ultrasonography and histopathological diagnosis of PAS.

Material and Methods:-

This study was an ambispective observational study, comprised women of reproductive age who presented either antenatally or during labor with suspected or confirmed PAS carried out in the Department of Obs. and Gynae, GSVM medical college Kanpur, prospective data was taken from January 2022 to July 2024 based on antenatal imaging, clinical suspicion or intraoperative findings, and obstetrical medical records from January 2020 to December 2021 were reviewed for cases of PAS that were diagnosed via ultrasound or during cesarean section for retrospective data.A total number of cases included were 70 which were diagnosed as PAS, either antenatally or during the intraoperative period.

Clinical diagnosis of PAS was confirmed during cesarean section according to FIGO classification. Transabdominal ultrasound served as the primary imaging tool for antenatal cases in which there was a high index of suspicion of PAS, while MRI was employed as a second-line imaging method in cases where ultrasound results were inconclusive or faced technical limitations. Maternal outcomes were evaluated by assessing complications such as estimated blood loss, the necessity for blood transfusions, ICU admissions, total duration of hospital stay, and near-miss mortality parameters. Fetal outcomes were measured in terms of neonatal admissions and mortality rates. Ethical approval for the study was obtained from the institutional ethics committee of GSVM Medical College, Kanpur. The statistical analysis was conducted for various quantitative variables, mean, standard deviation, and paired t-tests were employed. Data analysis was performed using OriginPro software, ensuring robust and reliable results.

Results:-

Prevalence of Placenta Accreta Spectrum (PAS) Disorders

The prevalence of Placenta Accreta Spectrum (PAS) disorders during two different periods: January 2020 – December 2021 (retrospective) and January 2022 – July 2024 (prospective) showed that prospective period shows a significantly higher prevalence (6.9%) compared to the retrospective period (2.8%), leading to an overall cumulative prevalence of 4.9%. This indicates an increasing trend in the incidence of PAS disorders, which may reflect better diagnostic methods, increased awareness, or an actual rise in cases.

Risk Factors for Placenta Accreta Spectrum (PAS) and placental position

Table 1 outlines the distribution of various risk factors for PAS among the study participants. A history of two previous LSCS (lower segment cesarean sections) is the most prevalent risk factor (36.84%), followed by one LSCS (28.94%). Other risk factors such as three previous LSCS, D&C (dilation and curettage), and myomectomy are less common but still present. The data suggest that prior cesarean sections are a significant risk factor for the development of PAS. Table 2 suggests that a low lying placenta may be a critical factor in the development of PAS as it a most common position observed which is statistically significant .

Table 1:- Percentage distribution of risk factors among the study participants.

Parameters	N	%
1 LSCS	22	28.94
2 LSCS	28	36.84

3 LSCS	12	15.78
D&C	11	14.47
Myomectomy	03	3.94
Total	**76**	**100**

Table 2:- Percentage distribution of position of placenta among study subjects.

Placental Position	**N**	**%**
Low lying placenta	46	65.72
Others	24	34.28
Total	**70**	**100**

Age Characteristics of PAS Patients

The mean age of the participants is 29.771 years, with a standard deviation of 3.547 years. The median age is 29 years, with the youngest participant being 22 years old and the oldest 42 years. This suggests that PAS can affect a broad age range, although the majority of patients are in their late twenties to early thirties

Operative Outcomes in PAS Patients

Table 3 outlines the operative outcomes for PAS patients. The majority (81.42%) underwent cesarean hysterectomy, which is a significant surgical intervention often required for severe cases. A smaller percentage of patients had a cesarean section with or without ligation. There was one case of mortality (1.42%), highlighting the potential severity and risks associated with PAS.

Table 3:- Operative outcomes in PAS patients.

Outcome	**Number (n)**	**Percentage (%)**
Cesarean hysterectomy	57	81.42
Cesarean section with ligation	7	10
Cesarean section without ligation	5	7.14
Death	1	1.42

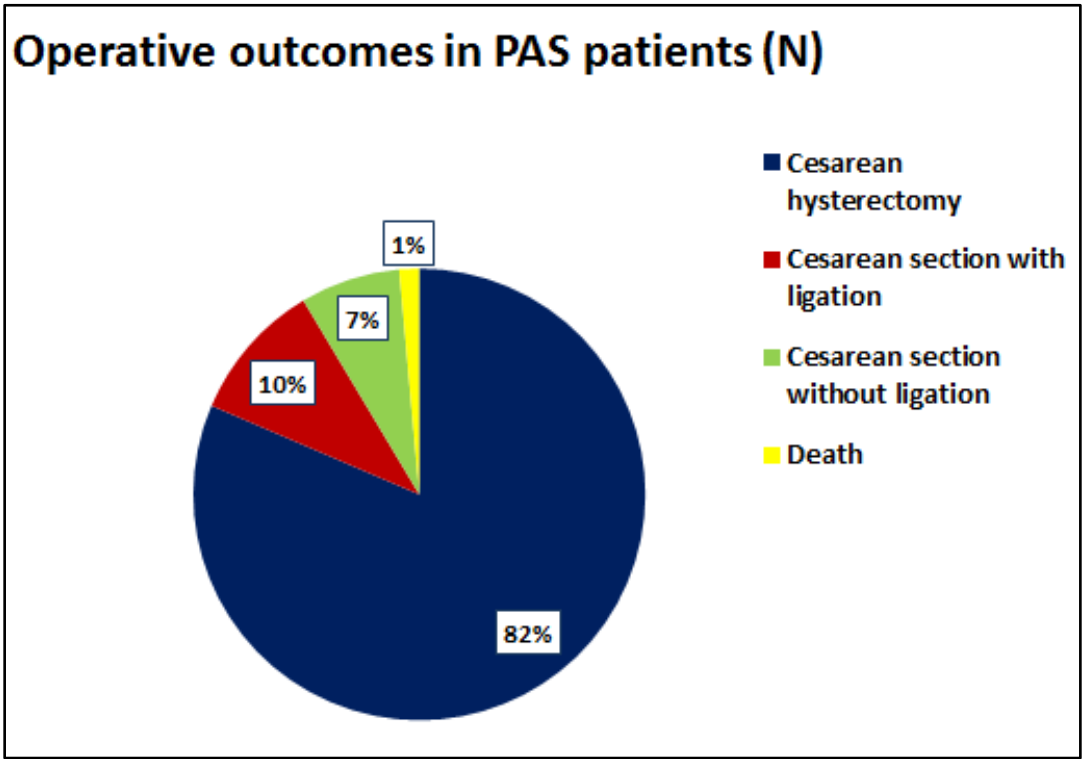

Figure 1:- Operative outcomes in PAS patients.

Descriptive Analysis of Study Variables

Table 4 provides a comprehensive descriptive analysis of the study variables among 70 participants, including measures such as mean, and standard deviation. The participants' average age is approximately 29.77 years, with a range from 22 to 42 years, indicating moderate variability. Hemoglobin levels average 9.57 gm%, with some variability as indicated by a standard deviation of 1.61 gm%, ranging from 5 to 13.2 gm%. Platelet counts show an average of 128.11 x 10^3/µL, with a wide range from 68 to 200 x 10^3/µL, reflecting significant variability. The average gestational age (Weeks) is about 32 weeks, with a range from 16 to 39 weeks. Blood loss during procedures averages 1854.29 mL, with a range from 900 to 3000 mL. Participants stayed in the ICU for an average of 1.46 days, with a maximum stay of 7 days. The total duration of hospitalization averages 6.91 days, with a range from 2 to 20 days, indicating variability in recovery times among participants. This analysis highlights the diversity in clinical and demographic characteristics of the study population.

Table 4:- Descriptive analysis of study variables among the study participants.

Descriptive Statistics	N total	Mean	Standard Deviation
Age (Years)	70	29.77143	3.54749
Hb (gm%)	70	9.56714	1.60865
Platelet counts	70	128.11429	28.28455
Weeks	70	31.98571	5.60665
PRBC	70	1.94286	1.27274
FFP	70	1.42857	1.36110
Blood loss (mL)	70	1854.2857	417.26706
ICU stay (days)	70	1.45714	1.62129
Total duration (days)	70	6.91429	2.70664

Types of Placenta Accreta Spectrum (PAS) Disorders

The types of Placenta Accreta Spectrum (PAS) disorders observed among the study participants showed placenta accreta was the most common type, diagnosed in 65.72% of the cases, where the placenta attaches firmly into the uterine wall. Placenta increta, where the placenta invades into the uterine muscle, accounted for 21.43% of cases. Placenta percreta, the most severe form where the placenta penetrates through the uterine wall and potentially affects other organs, was observed in 12.85% of cases. This distribution indicates that placenta accreta is the predominant form of PAS in the study population.

Diagnostic Methods for PAS

The different diagnostic methods used to identify PAS disorders among the participants showed that intraoperative diagnosis was made in all 70 cases, reflecting its critical role in confirming PAS during surgery. Clinically, 46 cases were suspected based on symptoms and physical examination. Ultrasound (USG) antenatally identified 52 cases, making it a key non-invasive diagnostic tool. MRI, though less frequently used, diagnosed 2 cases, possibly due to its limited availability or higher cost. Histopathological examination, which provides definitive diagnosis, confirmed PAS in 58 cases following all the hysterectomy sample sent, underscoring the importance of multiple diagnostic approaches.

Comparative analysis of study characteristics based on USG V/s Histopathology

The comparative analysis of study characteristics based on USG V/s Histopathology was observed and found that on USG diagnosed placenta accreta was much lesser compared to histopathology, however, similar findings were found on histopathology when compared with the data of Placenta increta and percreta shows the distribution of PAS types diagnosed via antenatal ultrasound (USG).

Table 5:- Comparison of characteristics of USG vs Histopathology.

	Placenta accreta	Placenta increta	Placenta percreta
USG	**26**	**17**	**9**
Histopathology	**32**	**17**	**9**

Discussion:-

The increase in the prevalence of Placenta Accreta Spectrum (PAS) disorders observed in this study, particularly the significant rise from 2.8% in the retrospective period (January 2020 – December 2021) to 6.9% in the prospective

period (January 2022 – July 2024), aligns with other studies. Similar increases in PAS prevalence have been documented in studies conducted in the United States and Europe, where enhanced diagnostic capabilities and heightened clinical awareness have contributed to higher detection rates. The cumulative prevalence of 4.9% in this study is consistent with other studies like Silver et al. [4] reporting PAS prevalence ranging from 3% to 7%, depending on the population and diagnostic criteria used.

The strong association between prior cesarean sections and the development of PAS, particularly the finding that two previous LSCS were the most significant risk factor (36.84%), is well-supported by the literature. Jauniaux et al., also identified previous cesarean delivery as the strongest risk factor for PAS, with the risk increasing with the number of cesarean deliveries [5]. Additionally, this study's finding that even a single LSCS significantly increases the risk of PAS (28.94%) is consistent with studies such as those by Wu et al. which reported that the risk of PAS increases dramatically with each successive cesarean section [6]

The identification of a low-lying placenta as the most common position among patients with PAS (65.72%) was in line with findings from other studies, which have consistently shown that placental location, particularly a low-lying or anterior placenta, is a significant factor in the development of PAS. Eller et al. similarly found that a low-lying placenta was strongly associated with PAS, particularly in women with a history of cesarean delivery [7]. This suggests that careful monitoring of placental position, especially in high-risk patients, is critical for early detection and management of PAS.

The data from our study showed that two previous LSCS were the most significant risk factor for placenta previa in PAS cases (35.84%) corroborates findings from other studies, including those by Silver and colleagues, which identified a strong correlation between multiple cesarean deliveries and the risk of developing both placenta previa and PAS [4]. The strong link between prior cesarean sections and placenta previa in PAS cases highlights the importance of preemptive planning and management strategies in patients with a history of multiple cesarean sections to mitigate these risks.

The age distribution finding, where the majority of PAS patients are in their late twenties to early thirties with a mean age of 29.77 years, was consistent with the demographic trends reported in studies from both developed and developing countries. Creanga et al. found that PAS most commonly affects women in their third decade of life, which aligns with the reproductive age of women who are more likely to have had previous uterine surgeries. The low prevalence of PAS in women over 40 years old (1.43%) in this study is also reflected in other research, which suggests that older maternal age is less associated with PAS compared to other age-related pregnancy complications.

The high rate of cesarean hysterectomy (81.42%) among PAS patients in this study is consistent with findings from multiple studies that indicate cesarean hysterectomy as the standard treatment for severe PAS cases. This outcome is necessary to control life-threatening hemorrhage and prevent maternal death, as highlighted in a study by Eller et al. [8]. The mortality rate of 1.42% reported in this study is within the range observed in similar studies, which emphasize the importance of experienced surgical teams and comprehensive care strategies to manage these high-risk cases effectively [8].

The association between severe maternal conditions and adverse fetal outcomes, as demonstrated in this study, is corroborated by other studies that have reported similar findings. For instance, Fitzpatrick et al. noted that severe maternal morbidity in PAS cases often correlates with preterm birth and other adverse fetal outcomes [9]. The close monitoring and timely intervention for both maternal and fetal conditions are critical in managing pregnancies complicated by PAS.

The importance of a multi-modal diagnostic approach for PAS, as emphasized in this study, is supported by current clinical guidelines and research. The use of ultrasound (USG) as a key tool for early detection, as well as the role of MRI in complex cases, is consistent with recommendations from studies by Warshak et al., which highlight the combined use of imaging techniques to improve diagnostic accuracy [10]. The study's findings that histopathological confirmation post-hysterectomy remains the gold standard for diagnosing PAS further reinforces its role in providing definitive diagnosis, as supported by research from Koyama et al. [11].

The predominance of placenta accreta (65.72%) among PAS types in this study is consistent with other reports that identify placenta accreta as the most common form of PAS. This distribution has been observed in studies such as

those by Jauniauxet al. , where placenta accreta was more frequently diagnosed compared to the more severe forms, increta and percreta[12]. The study's distribution of PAS types aligns with global data, reinforcing the need for early identification and management to reduce associated risks.

The consistency between antenatal ultrasound findings and histopathological confirmation of PAS types in this study underscores the reliability of ultrasound as a diagnostic tool, which is well-supported by the literature. D'Antonio et al. also reported high diagnostic accuracy of ultrasound in identifying PAS, particularly placenta accreta, highlighting its critical role in prenatal care [13]. The concordance between imaging and histopathological findings in this study reinforces the importance of comprehensive diagnostic strategies for effective PAS management.

Conclusion:-

Our study highlights the increasing prevalence of Placenta Accreta Spectrum (PAS) disorders, strongly associated with the rising rates of cesarean section. The findings emphasize the critical importance of early and accurate diagnosis, primarily through ultrasound, and the necessity for a multidisciplinary approach for effective and appropriate management . By adopting standardized protocols and ensuring comprehensive perinatal care, we can improve maternal and fetal outcomes, underscoring the need for heightened awareness and preparedness among healthcare providers in managing this potentially life-threatening condition.

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