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Outcome of Conservative Management of Placenta Previa with Accreta Spectrum Disorder by Applying Continuous Squeezing Suture with Cervical Lifting

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ABSTRACT

Objective: To evaluate the effectiveness of the Continuous Squeezing Suture (CSS) as a conservative surgical technique for controlling hemorrhage in placenta previa and placenta accreta spectrum (PAS) disorders, with the aim of reducing the need for hysterectomy. **Study Setting:** This cross-sectional study was conducted at the Department of Gynecology, DHQ Hospital, Faisalabad, over six months. **Duration of Study:** From 8 October 2024 to 8 April 2025. **Data Collection:** A total of 95 women aged 18–35 years with an ultrasound-confirmed diagnosis of placenta previa with PAS (Creta, Increta, Percreta) without bladder or pelvic organ involvement were included. Elective cesarean sections were performed between 37 and 38 weeks of gestation, and the CSS technique was applied intraoperatively to control hemorrhage. Preoperative and postoperative hemoglobin levels were measured, and the mean hemoglobin drop was recorded. Postoperative hematoma formation was assessed clinically. **Results:** The mean hemoglobin drop postoperatively was 1.19 ± 0.93 g/dL, which, while statistically significant, indicated effective hemorrhage control without excessive blood loss. Hematoma formation occurred in 27.4% of cases, a rate comparable to previous studies. The findings suggest that CSS effectively controls bleeding in PAS cases and may help reduce hysterectomy rates. **Conclusion:** CSS appears to be a simple, effective, and safe surgical technique for hemorrhage control in placenta previa and PAS disorders, demonstrating comparable hemostatic effectiveness to other conservative surgical techniques. Future research should focus on comparing CSS with ACCSS and other hemostatic suturing methods to further establish its role in reducing the need for hysterectomy and optimizing maternal outcomes.

INTRODUCTION

Postpartum hemorrhage (PPH) has consistently been a leading cause of maternal morbidity and mortality worldwide,[1] with uterine atony being the most common underlying factor and peripartum hysterectomy remaining the only definitive treatment.[2] Over the time, researchers have been striving to ascertain alternative treatment techniques that involve lower morbidity and preserve fertility.[3] Meanwhile, the cases of placenta previa surged to 5.6 per 1,000 pregnancies, with abnormally adherent placenta occurring in 24% of women after their first cesarean section and escalating to 67% after four or more.[4-5]

The increasing incidence of repeat cesarean sections is largely responsible for both conditions. Placenta accreta spectrum disorders have introduced a new chapter in the management of PPH, as the forcible removal of an abnormally adherent placenta results in severe hemorrhage from the placental bed.[6] Consequently, peripartum hysterectomy has re-emerged as the gold standard treatment for this form of PPH, occurring three times more frequently than uterine atony. However, it carries a morbidity rate of 40-50% and a mortality rate of 7-10% in cases of placenta percreta.[7–8]

In an effort to develop a conservative approach for managing PPH due to uterine atony, B-Lynch introduced an innovative compression suture. This breakthrough led to the emergence of multiple variations worldwide, significantly reducing the need for peripartum hysterectomy in cases of uterine atony. As a result, the time is ripe for advancements in the management of placenta previa and placenta accreta spectrum (PAS) disorders.[9] Chohan MA et al.[10] evaluated the Continuous

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Squeezing Suture (CSS) as a simple, effective, and safe technique for managing hemorrhage from the lower uterine segment in cesarean sections performed for placenta previa and PAS. Among the 47 cases studied, 7 (15%) had placenta creta, 29 (61.7%) had placenta increta, and 11 (23.3%) had placenta percreta (grade 3a), with 36 (76.6%) exhibiting a central anterior placenta. The technique successfully prevented peripartum hysterectomy in 97.8% of cases. Preoperatively, the mean hemoglobin level was 10.6 ± 0.52 g/dL, which dropped to 9.28 ± 1.48 g/dL postoperatively, indicating a decline of 1.3 ± 0.96 g/dL. Furthermore, 12 patients (25.5%) developed minor intraoperative hematomas near the suturing site.

This study seeks to determine the efficacy of the Continuous Squeezing Suture (CSS) as a conservative surgical approach for placenta previa and placenta accreta spectrum during cesarean section, with the intention of providing a safe, simple, and viable alternative to hysterectomy.

METHODOLOGY

The study was conducted as a cross-sectional study at the Department of Gynecology, DHQ Hospital, Faisalabad, over six months following the approval of the synopsis From 8 October 2024 to 8 April 2025. The sample size was determined using the WHO sample size calculator, based on a confidence interval of 95%, a population mean of 9.28±1.48 g/dl, and an absolute precision of 0.30, resulting in a total of 95 participants. Women aged 18–35 years with an ultrasound diagnosis of asymptomatic low-lying placenta and placenta previa with placenta accreta spectrum disorder (PAS) without bladder or other pelvic organ involvement (Creta, Increta, Percreta) and those who wished to conserve their uterus were included. Patients with PAS involving the bladder or other pelvic organs (Grade 3B and 3C), laterally situated placentae, and those requiring emergency cesarean sections were excluded.

Following approval from the hospital's ethical review committee (ERC), eligible cases were enrolled in the trial. All participants provided written informed consent. Demographic data and relevant risk factors, like maternal age, gestational age, parity, and prior history of placenta previa and cesarean sections, were documented. All patients received corticosteroids at 34 weeks of gestation, and their hemoglobin levels were assessed. They were admitted at 36 weeks and provided with counseling regarding the surgical procedure. Elective cesarean sections were conducted between 37 and 38 weeks of gestation, employing the Continuous Squeezing Suture (CSS) technique for hemorrhage control. All surgeries were conducted following standard operative protocols. Patients were reviewed on the seventh postoperative day. Postoperative hemoglobin concentration was measured, and the difference from the preoperative concentration was recorded to determine the mean drop in hemoglobin. The presence of hematoma was assessed based on clinical signs, including the presence of red, black, or blue lumps indicative of vascular trauma. Data were documented in a predesigned proforma. SPSS version 25 was utilized for statistical analysis. Continuous variables were summarized as mean ± SD, and categorical variables as frequencies and percentages. The independent sample t-test and chi-square test were applied, with stratification for effect modifiers, using $p \leq 0.05$ for significance.

RESULTS

The demographic characteristics of the study population indicate that the majority of patients (80.0%) were aged between 18 and 30 years, while a smaller proportion (20.0%) were between 30 and 35 years. The mean age of participants was 25.53 years (SD ± 4.78). Regarding gestational age, most patients (54.7%) delivered before 36 weeks, whereas 45.3% had gestational ages between 37 and 38 weeks. The mean gestational age was recorded as 36.45 weeks (SD ± 0.50).

In terms of clinical history, a significant proportion of the patients (74.7%) had a history of a previous cesarean section, while only 25.3% were undergoing their first C-section. This indicates that the majority of the cases involved repeat cesarean deliveries, which is an important consideration when evaluating placental adherence and surgical complications. Placental characteristics revealed that the most common placental location was anterior dominant (55.8%), followed by a posterior location in 31.6% of cases. Additionally, a small proportion (12.6%) had a low-lying anterior placenta. The severity of placental adhesion spectrum (PAS) varied, with increta being the most frequently observed type (55.8%), followed by percreta (24.2%) and creta (20.0%). In terms of placental grading, 71.6% of cases were diagnosed with placenta praevia, whereas 28.4% were classified as having a low-lying placenta. Postoperative outcomes were assessed based on hematoma formation, which was observed in 27.4% of cases, whereas 72.6% of patients had no hematoma formation. This suggests that while a significant proportion of patients experienced postoperative complications, the majority had an uneventful recovery.

Table 1

Demographic Profile, Clinical History, Placental Characteristics, and Postoperative Outcomes (n=95)

Variables		Category	Count	Percent
Demographics	Age (years)	18-30	76	80.0
		>30-35	19	20.0
	Gestational Age (weeks)	<36 weeks	52	54.7
		37-38 weeks	43	45.3
Clinical history	Previous C-Section	Yes	71	74.7
		No	24	25.3

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Placental Characteristics	Placental Location	Anterior dominant	53	55.8
		Posterior	30	31.6
		Low lying (anterior)	12	12.6
	PAS Grade	Creta	19	20.0
		Increta	53	55.8
		Percreta	23	24.2
	Placental Grade	Low lying	27	28.4
		Placenta praevia	68	71.6
Postoperative Outcome	Hematoma Formation	Yes	26	27.4
		No	69	72.6

Perioperative Hemoglobin Levels and Changes

The perioperative hemoglobin levels were assessed to evaluate blood loss and its impact on patient outcomes. The preoperative hemoglobin levels had a mean value of 10.58 g/dL (SD ± 0.56), which was significantly higher than the postoperative hemoglobin levels (9.38 g/dL, SD ± 1.02). The mean hemoglobin drop recorded postoperatively was 1.19 g/dL (SD ± 0.93), indicating a notable decline in hemoglobin levels after surgery. The p-value for preoperative hemoglobin levels was 0.000, suggesting a statistically significant difference, likely highlighting the impact of surgical blood loss.

Table 2

Perioperative Hemoglobin Levels and Changes

Variable	Mean	N	Standard deviation	P value[a]
Preoperative Hemoglobin (g/dl)	10.58	95	0.56	0.000
Postoperative Hemoglobin (g/dl)	9.38	95	1.02	
Hemoglobin Drop (g/dl)	1.19	95	0.93	

DISCUSSION

Placenta accreta spectrum (PAS) disorders remain a significant challenge in obstetric practice due to their association with massive hemorrhage, high maternal morbidity, and an increased risk of hysterectomy. The complexity of lower uterine segment (LUS) vascularization and its limited contractile ability contribute to excessive bleeding when the placenta is separated, especially in placenta previa-associated PAS cases. Our study highlights key demographic characteristics, perioperative blood loss, and postoperative outcomes, which are compared with existing literature to contextualize findings and suggest improvements in surgical management strategies.

Our study found that 74.7% of patients had a previous cesarean section, confirming the well-established association between prior uterine surgery and PAS development. This is consistent with Chohan et al. (2023),[10] who reported that the incidence of PAS disorders increases dramatically with repeated C-sections, rising to 67% in women with four or more cesarean deliveries. Similarly, Yiu Fai Wong et al. (2023)[11] and Lei Zhu et al. (2021)[12] emphasized that prior cesarean delivery is the most significant risk factor for PAS. These findings underscore the need for strict clinical monitoring and planned delivery in high-risk pregnancies. The mean gestational age in our study was 36.45 weeks, with 54.7% of cases delivering preterm (<36 weeks), a finding consistent with Lei Zhu et al. (2021),[12] where a high preterm delivery rate was observed due to maternal and fetal risks associated with PAS. This further supports the recommendation that delivery planning in PAS cases should involve multidisciplinary decision-making to optimize both maternal and neonatal outcomes.

The classification of PAS in our study showed that placenta increta was the most common type (55.8%), followed by percreta (24.2%) and creta (20.0%). This distribution aligns with findings from Jie Qin et al. (2024)[13] and Chohan et al. (2023),[10] both of which reported placenta increta as the predominant form of PAS. Additionally, 71.6% of our cases were associated with placenta previa, reinforcing the strong correlation between PAS and abnormal placentation, as highlighted by Wenxia Pan et al. (2023).[14] These findings suggest that antenatal diagnosis of placental invasion depth is crucial for preoperative planning to minimize surgical complications.

Our study utilized the Continuous Squeezing Suture (CSS) technique as a conservative surgical approach for hemorrhage control in PAS cases. The mean hemoglobin drop of 1.19 g/dL (SD ± 0.93), while statistically significant, was not excessively high, suggesting that CSS was effective in controlling hemorrhage without leading to severe blood loss. This finding is comparable to Chohan et al. (2023)[10] where the mean hemoglobin drop was 1.3 g/dL, despite the use of a different hemostatic suturing technique. The rate of hematoma formation in our study (27.4%) was slightly higher than that reported by Chohan et al. (2023) (25.5%), but within an expected range. These findings support the role of CSS in PAS management, demonstrating its effectiveness in reducing major hemorrhagic complications.

Chohan et al. (2023)[10] introduced the A. Chohan Continuous Squeezing Suture (ACCSS), which effectively controlled hemorrhage in 97.8% of PAS cases, with a mean blood loss of 2500 ± 485 mL. Other studies, such as Wenxia Pan et al. (2023),[14] demonstrated that uterine artery ligation (UAL) combined with clover suturing significantly reduced intraoperative blood loss (by 312 mL) and RBC transfusion requirements (by 1.08 units). The hematoma formation rate in our study suggests that CSS was effective, but further refinement of technique or additional hemostatic measures might help further optimize outcomes.

Various surgical strategies have been explored to manage PAS-related hemorrhage, including

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conservative management, compression sutures, and vascular occlusion techniques. Sentilhes et al[15] introduced the expectant management (leaving the placenta in situ) approach, which has been reported to reduce hysterectomy rates by up to 78% but is associated with significant maternal morbidity, including infection and secondary postpartum hemorrhage. Other approaches, such as Triple-P procedures and one-step conservative surgeries, advocate for non-separation of the placenta with myometrial resection, but these require extensive pelvic devascularization and expensive radiological setups, making them less accessible in resource-limited settings.[16]

Studies focusing on suture techniques for hemorrhage control include uterine compression sutures, cervical tamponade, and vascular occlusion techniques. However, many of these lack standardized hemostatic suturing techniques tailored for LUS bleeding in PAS cases. Chohan et al. (2023)[10] found that ACCSS provided rapid hemostasis within 5–10 minutes in 87.2% of cases, making it a quicker alternative compared to traditional hemostatic techniques. Other suturing techniques, such as the Cho compression suture, achieve hemostasis by compressing the anterior and posterior uterine walls, but are associated with hematoma formation, intrauterine adhesions, and abscess formation. Similarly, the Nausicaa suture has been linked to uterine wall ischemia, raising concerns about its long-term effects on uterine integrity.[17-20] In contrast, CSS was successfully used in our study and showed comparable effectiveness in hemorrhage control.

The findings of our study reinforce the need for improved surgical strategies to manage PAS-related hemorrhage. The success of CSS, alongside findings from studies on ACCSS (Chohan et al., 2023)[10] and other advanced suturing techniques, suggests that adopting structured hemostatic methods may reduce transfusion requirements and improve maternal outcomes.

Future Research Directions:

- Comparing the efficacy of CSS and ACCSS in PAS cases.
- Assessing the impact of uterine artery ligation and compression suturing on blood loss and transfusion needs.
- Evaluating long-term maternal outcomes, including fertility preservation and menstrual recovery, following different PAS management approaches.

CONCLUSION

Our study confirms that previous cesarean delivery is a major risk factor for PAS, with a high prevalence of placenta increta and significant hemorrhagic complications. The 27.4% rate of hematoma formation and substantial hemoglobin drop postoperatively highlight the need for improved intraoperative hemostatic strategies. Chohan et al. (2023) concluded that ACCSS appears to be a simple, effective, and safe treatment option for placenta previa and PAS disorders, serving as an alternative to hysterectomy.[10] Given our study's findings, CSS demonstrated similar effectiveness in hemorrhage control and may offer a reliable alternative for PAS management. Future research should focus on comparing CSS with other conservative hemostatic techniques to further establish its role in reducing the need for hysterectomy.

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