International Journal of Women's Health

Dovepress
Taylor & Francis Group

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ORIGINAL RESEARCH

Comparison of Maternal Outcomes Between Cesarean Hysterectomy and Wedge Resection in Pregnant Women with Figo Grade 2 Placenta Accreta Spectrum

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Objective: To compare maternal outcomes between cesarean hysterectomy and wedge resection in pregnant women diagnosed with FIGO grade 2 placenta accrete spectrum (PAS).

Methods: This retrospective cohort study with a cross-sectional design included pregnant women diagnosed with FIGO grade 2 PAS by ultrasonography who underwent either cesarean hysterectomy or wedge resection at Hasan Sadikin General Hospital between 2022–2025. The maternal outcomes analyzed included the amount of bleeding, duration of surgery, and the need for transfusion. Statistical analyses were conducted using the chi-square test ($p < 0.05$).

Results: A total of 83 patients were included, 49 patients underwent cesarean hysterectomy and 34 wedge resection. Based on the characteristics of the study participants, no significant differences were found in age or parity between the groups. Patients in the wedge resection group had significantly shorter operative duration and lower amount of bleeding compared with the hysterectomy group ($p<0.05$). Transfusion requirements of <4 units were comparable (63% vs 62%, $x^2=0.019$, $p=0.88$).

Conclusion: Both WR and CH are viable surgical options for FIGO grade 2 PAS. The increasing incidence of PAS is associated with previous cesarean section and multiparity. WR was associated with a shorter duration of surgery than CH. However, differences in blood loss and transfusion requirements were not statistically significant. These findings highlight the importance of individualized surgical planning and the potential role of postoperative management in optimizing maternal outcomes.

Keywords: placenta accreta spectrum, maternal outcome, cesarean hysterectomy, wedge resection

Introduction

PAS is a life-threatening obstetric condition characterized by abnormal placental adherence to the myometrium that potentially extending to the uterine serosa or adjacent pelvic organs.[1] The incidence of PAS has risen significantly over the past two decades from 1 in 30,000 to 1 in 533 pregnancies.[2,3] The incidence of placenta accreta spectrum in Indonesia has reached 2% of all deliveries and continues to increase until now.[4] Early diagnosis and appropriate surgical management are critical to reducing maternal morbidity and mortality.

The increased incidence of PAS is closely associated with prior uterine procedures that damage the endometrium, such as cesarean section (CS), curettage, hysterescopy surgery, endometrial tissue ablation, uterine embolization, and pelvic radiation.[2,5,6] As CS rates have increased from 10% to over 30%, the incidence of PAS has risen nearly tenfold.[6] Inadequate endometrial re-epithelialization and poor vascularization at the scar area allows trophoblasts and villous tissue to invade the myometrium, in severe cases, into adjacent pelvic organs.[5,7]

The FIGO classification divides PAS into three degrees: grade 1 (placenta adherenta or creta), grade 2 (placenta increta), and grade 3 (placenta percreta), which can be assessed clinically or through histological examination.[8]

Received: 29 July 2025
Accepted: 16 November 2025
Published: 27 November 2025

Management of FIGO grade 2 PAS remains challenging, as it involves deeper myometrial invasion without full-thickness penetration. The management of PAS varies from radical approaches such as cesarean hysterectomy (CH) to conservative management. Recently, a topographic classification has emerged as an alternative to the FIGO grading system to assist in surgical decision-making in PAS management.[9,10]

The American College of Obstetricians and Gynecologists (ACOG) recommends CH as the first-line treatment for PAS. However, this approach is associated with high maternal morbidity rates (40–50%) and risk of complications, with mortality rates reaching up to 7% due to uncontrollable massive bleeding.[6,11] In women of reproductive age with PAS, conservative approaches may be considered to preserve the uterus.

Wedge resection (WR) is a conservative surgical technique involving placental resection of the invaded myometrium, preceded by ligation of neovascular connections followed by uterine reconstruction.[12,13] A study conducted in Argentina in 2020 reported that the WR technique reduced maternal morbidity and intraoperative blood loss.[10] WR aims to reduce surgical morbidity, preserve fertility, and shorten recovery especially in women of reproductive age.

This study aims to compare maternal outcomes between CH and WR in women with FIGO grade 2 PAS. By focusing on this intermediate grade, we aim to provide clinically relevant data to guide surgical decision-making and balancing fertility preservation, maternal safety, and risk of recurrence.

Method

This study used an retrospective cohort study with a cross-sectional approach. The study conducted at Hasan Sadikin General Hospital between 2022–2025. Ethical approval was obtained from the instutional review board and written informed consent to the patients.

The subject of this study was a women diagnosed with FIGO grade 2 PAS, who underwent cesarean delivery followed by either WR or CH. The inclusion criteria were patients diagnosed with PAS by ultrasonography by maternal-fetal medicine specialists trained in PAS imaging. Diagnosis was based on the FIGO 2018 ultrasonography criteria, including absent of the clear zone, abnormal placenta lacunae, bladder wall involvement, bridging vessels.

Surgical approach was planned preoperatively based on antenatal counseling and adjusted intraoperatively according to the surgical findings. All surgeries were performed by two maternal-fetal medicine specialists experienced in PAS management. Blood loss estimation using combined suction volume measurement and sponge weighing, cross-checked with anesthetic records.

During this period, 49 and 34 patients underwent WR and HS, respectively. Surgical approaches was determined to the difference the proportion of surgery duration, amount of bleeding, and transfusion requirements. The calculated sample size indicated a minimum 21 subjects, assuming 95% of confidence interval and 80% of power.[14] The duration of the operation was divided into groups ≤ 2 hours and > 2 hours, the amount of bleeding was divided into groups ≤ 2500 mL and > 2500 mL, and the transfusion needs were divided into groups ≤ 4 units and ≥4 units. Statistical analyses were performed using the chi-square test. In this study, maternal outcomes were analyzed by comparing the proportion of surgery duration, amount of bleeding, and need for transfusion. Statistical significance was defined as a p-value < 0.05.

Result

During the study period, 49 patients who underwent wedge resection and 34 who underwent hysterectomy were included.

Table 1 shows that the differences between the age groups were not significant. An interesting finding from this study was that the history of a one-time cesarean section was 63% in WR and 53% in HS. The procedure based on the severity of PAS can lead to selection bias in research because the research uses a cross-sectional method.

Table 2 shows that bleeding > 2500 mL was more common in the hysterectomy group (62%) than in the wedge resection group (57%).

Table 3 shows that the duration of surgery in both groups shows a higher percentage with a > 2-hours duration of surgery with 94% of patients in the WR group and 65% in the HS group.

Table 4 shows that the number of transfusions in both groups shows a higher percentage in ≤ 4 units of transfusion.

Table 1 Description of the Characteristics of Patients with Placenta Accreta Spectrum

Characteristic	*Wedge Resection* (n = 49) (%)	Hysterectomy (n = 34) (%)	P-value*
Age	25.84 ± 5.13	33.8 ± 5.79	
Parity			0.64**
• 1-4	46 (94)	31 (91)	
• >4	3 (6)	3 (9)	
History of Cesarean Section			0.48**
• 0	4 (8)	2 (6)	
• 1	31 (63)	18 (53)	
• >2	14 (29)	14 (41)	
Curettage history			0.61**
• Never	32 (65)	24 (71)	
• ≥ 1 time	17 (35)	10 (29)	
History of Cesarean section and Curettage			0.68**
Yes	15 (31)	9 (27)	
No	34 (69)	25 (73)	

Notes: Remarks: *Categorical data of p-values calculated based on the *T test*. **Categorical data of p-values calculated based on *the Chi-square test.*

Table 2 Comparison of the Patient's Bleeding Amount with the Placenta Accreta Spectrum

Variable	Bleeding		P-value
	≤ 2500 mL	> 2500 mL	
• *Wedge resection* n(%)	28 (57%)	21(43%)	0.17
• Hysterectomy n(%)	21 (62%)	13 (38%)	

Note: Remarks: Categorical data for p-values were calculated using the chi-squared test *Chi-square.*

Table 3 Comparison of Surgery Duration in Placenta Accreta Spectrum Patients

Variable	Duration of Surgery		P-value
	≤ 2 hours	> 2 hours	
• *Wedge resection* n(%)	17 (35%)	32 (65%)	**0.002**
• Hysterectomy n(%)	2 (6%)	32 (94%)	

Notes: Remarks: Categorical p-values were calculated using *the Chi-square test.* Bold values indicate statistically significant results (p<0.05).

Table 4 Comparison of the Number of Transfusions in Placenta Accreta Spectrum Patients

Variable	Number of Transfusion		P-value
	≤ 4 units	> 4 units	
• *Wedge resection* n(%)	31 (63%)	18 (37%)	0.88
• Hysterectomy n(%)	21 (62%)	13 (38%)	

Note: Remarks: Categorical p-values were calculated using *the Chi-square test.*

Discussion

PAS is defined as abnormal a penetration of the trophoblast tissue through the basal decidua into the uterine myometrium, where it is attached, the uterine serosa, or even outside, extending to the pelvic organs.[1] The condition remains a major cause of obstetric morbidity, particularly during cesarean delivery.[6] Various studies have identified several risk factors associated with the incidence of PAS, including maternal age, parity, and history of procedures that cause endometrial injury.[2,5,6] In our study, the predominant risk factor was a history of one prior CS, aligning with previous reports showing PAS incidence rises with increasing number of CS. However, our study highlights that even women with only one prior CS are not exempt, emphasizing the need for vigilance during antenatal screening and surgical planning. In a study conducted in the United States, it was stated that the incidence of PAS increased significantly from 3% in the first CS to 11%, 40%, 61%, and 67% in the second, third, fourth, and fifth CS. As the number of CS increases, the extent of uterine scarring also increases, which becomes a major pathological factor contributing to abnormal placental invasion in subsequent pregnancies.[15]

In this study, PAS was found in four patients in the WR group and two patient in the CH group. After further analysis, four patients had a history of curettage and one patient was multiparous, and one patient had no identifiable risk factors. According to previous studies, curettage is the most common risk factor. However, this study is limited by the small number of samples.[21] The history of procedures that cause damage to the endometrium; however, this history cannot be used as a single factor in the PAS event process.[2,5,6,14]

This study provides a unique perspective by comparing outcomes of wedge resection (WR) and cesarean hysterectomy (CH) in patients all classified as FIGO grade 2 PAS. Despite similar preoperative risk factors and classifications, uterine-sparing surgery was not always feasible. This reflects the intraoperative complexity of PAS, where surgical decisions are often guided by placental location, depth of invasion, bleeding risk, and patient hemodynamic stability. The ability to perform WR successfully depends on the focality of placental invasion and availability of experienced surgeons, consistent with the IS-AIP definition of "appropriate cases" involving <50% of the anterior uterine wall.

In our study, the WR group had a younger mean age (25.84 years) compared to the CH group (>32 years), possibly reflecting reproductive preference— younger women and their surgeons were more likely to opt for fertility-preserving approaches.[13] This age imbalance may also explain some outcome variations, as older maternal age has been associated with higher PAS severity.[7,14] Nevertheless, despite higher intraoperative blood loss (>2500 mL) in the WR group, the difference was not statistically significant, supporting previous findings that meticulous vascular control during WR can mitigate hemorrhage risk.

These findings suggest that the main determinant for choosing WR over CH lies not only in the FIGO classification but also in intraoperative findings such as vascular involvement, invasion extent, and surgical accessibility. Previous studies, including Palacios-Jaraquemada et al and recent FIGO recommendations, have shown that WR can be considered in grade 2 PAS without parametrial invasion, provided adequate hemostasis is achievable.[6,12,13] Our data align with this, showing WR as a viable option in selected cases with acceptable morbidity and no significant increase in transfusion rates.

In this study, WR was performed by ligating of new vascular connections between the uterus and the structures surrounding the placenta such as blood vessels in vesicouterina and colpo-uterina to achieve hemostasis, then followed by placental resection to the margin of healthy tissue.[12,13] Although this approach can be an option for women who want to have children, clinicians should inform them of the risk of PAS events in subsequent pregnancies.[13]

While WR offers advantages such as shorter operative time and preservation of fertility, it requires specialized expertise and is not suitable for all clinical contexts. Intraoperative decision-making, surgeon experience, and institutional resources are critical factors influencing outcomes.[10] Most patients in both groups experienced more than two hours of surgery, with a statistically significant result. However, there was a significant difference in the number of patients in each group: only approximately 6% of the CH group underwent less than two hours, whereas the WR group underwent approximately 35%. In low-resource settings, where hysterectomy remains the default approach, expanding capacity for conservative management could reduce morbidity and psychological distress in women desiring future fertility.

However, caution is warranted. This retrospective study was limited by its small sample size and lack of histopathological confirmation of invasion depth. The intraoperative choice between WR and CH introduces selection bias, and arbitrary categorical cutoffs for blood loss and operative time may oversimplify real variations. Future research should focus on prospective standardization of intraoperative decision-making criteria, ultrasound-based preoperative risk stratification, and long-term fertility outcomes after conservative surgery.

In summary, our findings reinforce that uterine-sparing surgery such as WR can be a safe and effective alternative to CH in selected patients with FIGO grade 2 PAS when performed by experienced surgeons. Clear intraoperative assessment protocols and multidisciplinary preparation are essential to optimize maternal outcomes and preserve fertility.

Conclusion

Wedge resection (WR) may serve as a safe and effective alternative to cesarean hysterectomy (CH) in selected women with FIGO grade 2 placenta accreta spectrum (PAS). The choice of procedure should be guided by intraoperative findings, extent of invasion, and surgical expertise rather than FIGO grade alone. WR offers the advantage of fertility preservation and shorter operative duration with comparable blood loss and transfusion needs. Strengthening surgical skills and multidisciplinary preparation is essential, particularly in low-resource settings. Future prospective studies are needed to validate these findings and assess long-term reproductive outcomes, aiming to ensure both maternal safety and the preservation of fertility.

Ethical Approval

This study was approved by the Ethics Committee of Dr. Hasan Sadikin General Hospital (Approval number DP.04.03/D.XIV.6.5/196/2024) and was carried put in accordance with the Declaration of Helinski. Written informed consent was obtained from all rhe participants included in this study.

Acknowledgment

The authors would like to thank our colleagues in the Obstetrics and Gynecology Department and Cardiology Department of Hasan Sadikin General Hospital for their contributions to the diagnosis and management of this case.

Disclosure

The authors declare that they have no conflicts of interest in relation to this work.

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