

Effect of Adjunctive Mifepristone Pre-treatment on Operative Efficiency and Postoperative Recovery in Cesarean Scar Pregnancy Undergoing Curettage After Uterine Artery Embolization

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AIM: This study aims to evaluate whether short-course mifepristone pre-treatment improves procedural efficiency and early recovery after uterine artery embolization (UAE), followed by dilation and curettage (D&C) for cesarean scar pregnancy.

METHODS: This retrospective study recruited 108 patients with cesarean scar pregnancy who underwent dilation and D&C between January 2020 and July 2023. Patients were divided into 2 groups according to the pre-treatment approach. The control group (n = 65) received pre-treatment with UAE alone, while the study group (n = 43) received pre-treatment with mifepristone in addition to the treatment used in the control group. The two groups were compared for operative metrics, early recovery, and postoperative adverse events. Serum β -human chorionic gonadotrophin (β -hCG) levels were evaluated upon admission and again on postoperative day 1. Patients were followed for one year to assess pregnancy-related outcomes, and the findings were compared between the two groups.

RESULTS: In the study group, the surgery duration was shorter, and the intraoperative blood loss was lower than in the control group ($p < 0.05$). The length of hospital stay was comparable between the two groups ($p > 0.05$). Similarly, the incidences of repeat D&C, massive hemorrhage, and re-embolization of the uterine artery were also comparable between groups ($p > 0.05$). There were no cases of conversion to laparotomy or hysterectomy in either group. At the time of admission, the β -hCG levels in the study group were not significantly different from those in the control group. However, on the first day after the procedure, the β -hCG levels in the study group were lower than those in the control group, but the difference did not reach statistical significance ($p = 0.051$). The study group had a shorter duration of vaginal bleeding and achieved normal menstrual function earlier than the control group ($p < 0.05$). The menstrual cycle was comparable between the two groups ($p > 0.05$). The incidences of fever, gastrointestinal symptoms, abnormal liver function, and intrauterine adhesions were also comparable between the two groups ($p > 0.05$). Follow-up analysis showed no significant differences between the two groups in subsequent pregnancy or recurrence of cesarean scar pregnancy ($p > 0.05$). Time to pregnancy was descriptively reported only among patients who achieved pregnancy and was not statistically compared because of the small number of events.

CONCLUSIONS: Incorporating short-course mifepristone pre-treatment to a standard uterine artery embolization–D&C strategy for cesarean scar pregnancy was associated with shorter operative time and better early recovery profiles, with satisfactory safety outcomes.

Keywords: mifepristone; uterine artery embolization; cesarean scar pregnancy

Introduction

Cesarean scar pregnancy (CSP) is a rare but potentially life-threatening form of ectopic implantation in which an embryo implants at the fibrous tissue of a previous cesarean section scar. It poses a serious threat to both the mother and developing fetus, such as preterm birth, uterine rupture, miscarriage, and fetal growth restriction [1,2,3,4]. Early diagnosis and effective intervention are therefore crucial to minimizing maternal complications and maintaining the re-

productive cycle. Currently, CSP is commonly managed through dilation and curettage approaches. However, this procedure is associated with considerable risks of intraoperative bleeding and uterine perforation. Effective preoperative preconditioning thus serves as a key measure to improve surgical safety and clinical outcomes [5,6].

UAE, as a key step before curettage, lays a solid foundation for the safety and success of the procedure [7,8]. However, the UAE primarily works by physically occluding blood flow and may not sufficiently inhibit abnormal trophoblastic activity. Persistent trophoblastic activity may lead to a slower decline in β -human chorionic gonadotropin (β -hCG) levels, prolonged postoperative vaginal bleeding, and impaired early endometrial repair and menstrual recovery [9,10]. As a potent antiprogesterin, mifepristone can competitively bind to progesterone receptors, induce trophoblastic cell apoptosis, reduce β -hCG secretion, and facilitate necrosis and detachment of the gestational sac [11,12]. Building

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upon the potent hemostatic effect of UAE, the combined administration with mifepristone may further attenuate trophoblastic activity via pharmacologic mechanisms. This combined approach has the potential to improve procedural efficiency, accelerate postoperative physiological recovery, and maintain surgical safety.

Despite the widespread clinical application of this approach, evidence regarding its influence on the long-term postoperative outcomes, ovarian function, and future fertility consequences in patients with CSP remains insufficient [13]. This retrospective cohort analysis aims to assess the impact of pre-treatment with UAE combined with mifepristone on intraoperative conditions, short-term postoperative recovery, and safety in patients with cesarean scar pregnancy undergoing dilation and curettage. The observations of this study may provide a reference to optimizing clinical decision-making and enhancing treatment strategies for this high-risk clinical condition.

Methods

Baseline Characteristics and Study Design

This retrospective study enrolled 108 individuals who underwent dilation and curettage for CSP at The First Hospital of Jiaxing between January 2020 and July 2023. Patients were divided into two groups according to the preoperative treatment they received. The control group ($n = 65$) received UAE as pre-treatment before dilation and curettage, while the study group ($n = 43$) underwent combined pre-treatment with mifepristone and UAE. The pre-treatment regimen was recommended by the attending physician after a comprehensive preoperative assessment, which involved considering several factors such as gestational sac location, thickness of the cesarean scar, degree of vascularization based on ultrasound or imaging findings, serum β -hCG levels, and estimated intraoperative bleeding risk.

Patients and their families received detailed counseling on the potential benefits and risks associated with each treatment option, and the final treatment decision was made jointly by the clinician and patient (and their family), and written informed consent was obtained from each patient before treatment. Patients were then assigned to groups based on the actual pre-treatment regimen received. The study protocol was approved by the Ethics Committee of The First Hospital of Jiaxing, Affiliated Hospital of Jiaxing University (No.2024-KY-639) and was conducted in accordance with the principles of the Declaration of Helsinki.

Patients were enrolled if they met the following criteria: (1) a history of cesarean section, with imaging confirmation of CSP by ultrasonography or magnetic resonance imaging (MRI), and gestational age ≤ 10 weeks; (2) preoperative evaluation suggesting suitability for dilation and curettage, with no known hypersensitivity and contraindications to the drugs used in this study; (3) stable vital signs and no coagulation dysfunction before surgery; and (4) willingness to participate with informed consent.

Patients were excluded from the study cohort if they had (1) a history of abnormal uterine bleeding unrelated to current pregnancy; (2) diagnosed coagulation dysfunction; (3) known immune system defects; (4) psychiatric illness that could interfere with treatment adherence; and (5) diagnosis of other major systemic diseases or failed to complete the scheduled treatment protocol.

Treatment Protocol: Preoperative Intervention and Surgical Procedures

Patients in the control group received UAE as the only pre-treatment regimen. Before starting intervention, all patients underwent a comprehensive clinical evaluation, including assessment of blood β -hCG, coagulation indicators, and liver and renal function tests, to confirm the absence of contraindications to surgery or therapy.

Patients were placed in a supine position, and the UAE procedure was performed under appropriate anesthesia. Right femoral artery puncture was performed using standard sterile technique, and a 5 French (5F) arterial sheath was inserted to facilitate vascular access. Angiography was then conducted to clearly visualize uterine arterial anatomy and confirm the vascular supply to the CSP site by angiography. Methotrexate (50 mg/m^2 ; National Drug Approval No. HJ20140205; Pfizer (Perth) Pty Limited, New York, NY, USA) was injected through bilateral uterine arteries at a dosage calculated and adjusted based on body surface area (BSA). The dose was increased to 75 mg/m^2 when the serum β -hCG levels exceeded $50,000 \text{ mIU/mL}$, and further increased to 100 mg/m^2 when levels were greater than $100,000 \text{ mIU/mL}$.

Following drug infusion, gelatin sponge particles were used to embolize both uterine arteries until complete occlusion of the blood vessels was achieved. After embolization, the arterial sheath was removed, and the puncture site was immediately compressed and dressed to ensure patient safety. Vital signs, such as heart rate, blood pressure, and oxygen saturation, were closely monitored throughout the procedure to ensure safety.

In the study group, UAE was performed using the same protocol as that used for the control group. However, before embolization, patients underwent a three-day oral pre-treatment with mifepristone (National Drug Approval No. H10950347, Zhejiang Xianju Pharmaceutical Co., Ltd., Taizhou, China). The regimen consisted of 50 mg administered twice daily (two 25 mg tablets), yielding a total cumulative dose of 300 mg .

After the UAE, all patients in both groups underwent dilation and curettage within 24 to 48 hours. Thirty minutes before curettage, patients received misoprostol tablets (National Drug Approval No. H10950003; China Resources Zizhu Pharmaceutical Co., Ltd., Beijing, China) at a single oral dose of $600 \mu\text{g}$ (three $200 \mu\text{g}$ tablets). The patient was placed in the lithotomy position, followed by routine disinfection and draping. After a paracervical nerve block

with lidocaine hydrochloride, the procedure was conducted under real-time transabdominal ultrasound guidance. After confirming the position of the gestational lesion, the uterine cavity was carefully sounded, the cervix was gradually dilated, and the gestational tissue was gently evacuated using a vacuum aspirator. Particular attention was paid to identify the boundary between the gestational sac, cesarean scar tissue, and uterine serosal layer under ultrasound guidance to minimize the risk of uterine perforation. Oxytocin was routinely administered via intravenous infusion during the procedure to promote uterine contraction and reduce intraoperative bleeding.

Massive hemorrhage was defined as intraoperative blood loss exceeding 200 mL in patients with a gestational age ≤ 10 weeks.

Outcome Measures and Observational Indices

Main Outcome Measures

Intraoperative parameters included operative time and intraoperative blood loss. Early postoperative recovery was assessed by determining the duration of postoperative vaginal bleeding, time to resumption of menstruation, and serum β -hCG level on the first postoperative day. For β -hCG measurement, 2–3 mL of venous blood was collected into serum separator tubes on the first day of hospitalization and on postoperative day 1 after uterine evacuation. Samples were centrifuged at 3500 rpm for 5 minutes using a low-speed refrigerated centrifuge (JYK-JZ-LXJ-04, Zhongke Zhongjia, Hefei, China) to collect serum. Serum β -hCG levels were measured using a fully automated chemiluminescent immunoassay analyzer (JYK-JZ-FGY-01, Abbott, Chicago, IL, USA).

Safety Outcome Measures

Safety indicators assessed during this study included length of hospital stay, incidence of repeat curettage, occurrence of massive hemorrhage (intraoperative blood loss > 200 mL), requirement for repeat UAE, and conversion to laparotomy or hysterectomy. Adverse events after the procedures were also documented, including fever, gastrointestinal symptoms, abnormal liver function, intrauterine adhesions, and other intervention-related complications.

Exploratory Follow-up Outcomes

Patients were followed for one year after the intervention. Follow-up outcome measures included subsequent pregnancy, time to conception, and recurrence of CSP.

Statistical Analysis

Statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies (n) and percentages (%) and were compared using the chi-square test or rank-sum test. Pearson's chi-square test was employed for nominal categorical variables. For 2×2 contingency tables with

small, expected frequencies, the continuity-corrected chi-square test or Fisher's exact test was used, as appropriate.

Continuous variables were preliminarily assessed for distribution characteristics and normality using the Kolmogorov–Smirnov test or the Shapiro–Wilk test. Data demonstrating approximately normal distribution and homogeneity of variance were presented as mean $\pm$ standard deviation (Mean $\pm$ SD) and compared using the independent-samples *t*-test. If the assumption of normality or homogeneity of variance was not satisfied, data were presented as median and interquartile range (M, P25, P75) and analyzed using nonparametric tests such as the Mann–Whitney U test. A two-sided *p*-value of < 0.05 was considered statistically significant.

Results

Comparison of Baseline Clinical Data Between the Two Groups of Patients

Baseline data were collected at the time of admission and comparatively analyzed between the two groups. Statistical analysis revealed that there were no significant differences between the two groups in terms of age, pregnancy times (gravidity), parity, number of cesarean deliveries, duration of amenorrhea, cesarean scar thickness, type of scar pregnancy, and gestational sac size ($p > 0.05$). These findings indicate that the two groups were comparable at baseline (Table 1).

Comparison of Clinical Indicators Between Groups

We observed that the surgery duration in the study group was shorter than that in the control group. Additionally, the intraoperative blood loss was lower in the study group compared to the control group ($p < 0.05$). In contrast, there was no significant difference in the length of hospital stay between the two groups ($p > 0.05$, Table 2).

Comparison of Surgical Outcomes Between Groups

Postoperative surgical and safety outcomes were compared between the two groups. There were no significant differences between the groups in the incidence of repeat curettage, occurrence of massive hemorrhage, and the need for uterine artery re-embolization ($p > 0.05$). Additionally, no individuals in either group needed conversion to laparotomy or hysterectomy (Table 3).

Comparison of β -hCG Levels Between Groups

Serum β -hCG levels were compared between groups on the first day of hospital admission and then on postoperative day one. At the time of admission, no significant difference in β -hCG levels was found between the study and control groups. On postoperative day 1, β -hCG levels were lower in the study group compared with the control group; however, the difference did not achieve statistical significance ($p = 0.051$, Table 4).

Table 1. Comparison of baseline clinical data between groups.

Group	Control group (n = 65)	Study group (n = 43)	$t/\chi^2/Z$	<i>p</i>
Age (years)	34.16 ± 3.11 [#]	34.55 ± 3.65 [#]	0.595	0.553
Gravidity (times)	4.00 (3.00, 5.00)*	4.00 (3.00, 5.00)*	0.395	0.724
Parity (times)	2.00 (1.00, 2.00)*	2.00 (1.00, 2.00)*	1.148	0.185
Number of cesarean deliveries (times)	2 (1, 2)*	2 (1, 2)*	0.481	0.630
Duration of amenorrhea (d)	48.31 ± 8.44 [#]	50.16 ± 10.65 [#]	1.004	0.318
Cesarean scar thickness (mm)	2.66 ± 0.87 [#]	2.54 ± 0.64 [#]	0.776	0.440
Type of scar pregnancy				
Type I	15 (23.08%)	11 (25.58%)		
Type II	35 (53.85%)	24 (55.81%)	0.329	0.848
Type III	15 (23.08%)	8 (18.60%)		
Gestational sac size (mm)	25.61 ± 11.65 [#]	27.11 ± 12.06 [#]	0.646	0.520

Note: * indicates the interquartile range method; data are presented as median and interquartile range [M (P25, P75)]. Comparisons between groups were performed using the Mann-Whitney U test. [#] indicates that the independent samples *t*-test was used for comparison between groups. For the type of scar pregnancy, comparisons were made using Pearson's chi-square test.

Table 2. Comparison of clinical indicators between the two groups.

Group	Operation time (min)	Length of hospital stay (d)	Intraoperative blood loss (mL)
Control group (n = 65)	24.44 ± 6.11 [#]	5.26 ± 1.45 [#]	46.59 (22.13, 51.12)*
Study group (n = 43)	20.67 ± 5.66 [#]	5.28 ± 1.23 [#]	33.02 (19.26, 45.15)*
<i>Z/t</i>	3.231	-0.074	2.213
<i>p</i>	0.002	0.941	0.030

Note: * indicates the interquartile range method; data are presented as M (P25, P75). Comparisons between groups were performed using the Mann-Whitney U test. [#] indicates that the independent samples *t*-test was used for comparison between groups.

Table 3. Comparison of surgical outcomes between the two groups n (%).

Group	Repeat curettage	Massive hemorrhage	Another UAE was performed
Control group (n = 65)	2 (3.08)	2 (3.08)	1 (1.54)
Study group (n = 43)	1 (2.33)	0 (0.00)	0 (0.00)
χ^2	0.000	-	-
<i>p</i>	1.000 ^b	0.516 ^c	1.000 ^c

Note: ^b Continuity-corrected chi-square test was used; ^c Fisher's exact test was applied. UAE, uterine artery embolization.

Table 4. Comparison of serum β -hCG levels between the two groups [M (P25, P75)].

Group	First day of admission (mIU/mL)	Postoperative day 1 (mIU/mL)
Control group (n = 65)	28,914.00 (13,072.25, 135,065.00)	6301.66 (2234.11, 13,167.58)
Study group (n = 43)	55,411.00 (21,961.00, 94,383.00)	3588.67 (1754.45, 6796.26)
<i>Z</i>	-0.713	-1.953
<i>p</i>	0.476	0.051

Note: Data are presented as M (P25, P75) using the interquartile method.

Recovery of Reproductive Function Between Groups

Comparison of postoperative recovery outcomes demonstrated that patients in the study group had a shorter duration of vaginal bleeding and an earlier return of menstruation than those in the control group ($p < 0.05$). There was no significant difference in menstrual cycle length between the groups ($p > 0.05$, Table 5).

Incidence of Adverse Reactions Between Groups

The occurrence of adverse events was examined in both groups. There were no significant differences in the incidence of fever, gastrointestinal symptoms, abnormal liver function, or intrauterine adhesions between the two groups ($p > 0.05$, Table 6).

Table 5. Comparison of postoperative recovery outcomes between the two groups.

Group	Time of vaginal bleeding (d)	Menstrual recovery (d)	Menstrual cycle (d)
Control group (n = 65)	10.33 ± 4.15	36.22 ± 12.13	30.44 ± 4.06
Study group (n = 43)	8.41 ± 3.66	31.16 ± 5.46	29.61 ± 2.11
<i>t</i>	2.465	2.566	1.234
<i>p</i>	0.015	0.012	0.220

Note: Data are presented as mean ± standard deviation. Comparisons between groups were performed using the independent-samples *t*-test.

Table 6. The occurrence of adverse reactions between the two groups n (%).

Group	Fever	Gastrointestinal symptoms	Abnormal liver function	Intrauterine adhesions
Control group (n = 65)	7 (10.77)	5 (7.69)	2 (3.08)	2 (3.08)
Study group (n = 43)	2 (4.65)	4 (9.30)	2 (4.65)	2 (4.65)
χ^2	1.268	0.088	-	-
<i>p</i>	0.260	0.767	1.000	1.000

Note: Comparisons for fever and gastrointestinal reaction were performed using Pearson's chi-square test. Comparisons for abnormal liver function and intrauterine adhesions were performed using Fisher's exact test.

Table 7. Comparison of follow-up outcomes between the two groups .

Group	Time to conception (months)	Pregnancy	Re-scar pregnancy
Control group (n = 65)	9.44 ± 1.22	2 (3.08%)	1 (1.54%)
Study group (n = 43)	9.51 ± 1.29	3 (6.98%)	0 (0.00)
Statistic	-	0.227	-
<i>p</i>	-	0.634 ^b	1.000 ^c

Note: ^b a continuity-corrected chi-square test was applied; ^c Fisher's exact test was employed. Pregnancy time was only calculated for the subset of patients who achieved pregnancy (n = 2 in the control group and n = 3 in the study group). Statistical comparison was not performed due to the small number of events.

Comparison of Follow-Up Outcomes Between Groups

Patients were followed for one year to record subsequent pregnancy outcomes, such as conception rates, time to conception, and recurrence of CSP. No significant differences were observed between the two groups in conception rates or recurrence of CSP. Time to conception was descriptively reported only among patients who achieved pregnancy and was not statistically compared because of the small number of events ($p > 0.05$, Table 7).

Discussion

Cesarean scar pregnancy is a clinically challenging condition that can irreversibly damage future fertility if not treated appropriately, and currently, curettage is an important method for treating this condition [14,15,16]. Preoperative UAE has been applied as a crucial pre-treatment approach because it effectively decreases uterine artery blood flow and significantly lowers the risk of excessive intraoperative blood loss. However, when used alone, UAE may not completely inhibit trophoblastic function and has been associated with delayed postoperative recovery and potential ovarian function impairment [17,18,19]. This study aims to explore the clinical application of combining mifepristone with UAE as a pre-treatment in the man-

agement of CSP before curettage. This study focused on comparing the effects of two different preconditioning strategies—UAE alone versus UAE combined with mifepristone—on procedural efficiency and early postoperative recovery in patients with cesarean scar pregnancy undergoing curettage.

This study conducted a comparative analysis of surgical indicators between the two groups. The results showed that, compared to the control group, the study group had significantly shorter surgery durations and a noticeable reduction in blood loss, with no significant difference in the length of hospital stay between the groups. However, there were no significant differences between the two groups in the incidence of severe complications, such as repeat curettage, massive hemorrhage, or the need for re-embolization of the uterine artery ($p > 0.05$). These results reflected the positive effects of the combined treatment strategy. By blocking the blood supply to the uterus, UAE significantly reduces the risk of intraoperative bleeding, providing a safer environment for surgery [20]. However, the UAE alone primarily addresses the “blood-flow” component and has limited direct inhibitory effects on hyperactive trophoblastic tissue itself [21,22].

As a potent antiprogesterin, mifepristone competitively binds to progesterone receptors and induces trophoblastic apoptosis as well as degenerative necrosis of decidual tissue, thereby softening and weakening the gestational products [23]. Previous studies have indicated that mifepristone can directly promote the programmed death of trophoblast cells by regulating the expression of apoptosis-related proteins [24,25]. Analyzing the results of this study, UAE rapidly controlled the risk of bleeding, while mifepristone accelerated the degeneration of pregnancy products at the cellular level. This synergistic effect facilitated easier intraoperative tissue detachment, reduced unnecessary repetitive instrumental manipulation and trauma to the uterine wall, and was consequently reflected in a shorter operative time and a further decrease in intraoperative blood loss. Although the incidence of severe complications was similar between the two groups, the significant improvements in operative time and blood loss demonstrate the clinical advantage of the combined regimen.

On the first day of admission, serum β -hCG levels were comparable between the two groups, with no statistically significant difference observed. At the first postoperative follow-up after the D&C procedure, β -hCG levels in the study group were slightly lower than those in the control group, although the difference did not reach statistical significance ($p = 0.051$). However, studies involving dynamic monitoring of postoperative β -hCG levels have shown that patients receiving combined pre-treatment with mifepristone exhibited a significantly greater decline in their levels within 1–2 weeks after surgery compared to those treated with UAE alone. This suggests that mifepristone may continuously promote the clearance of pregnancy products by accelerating trophoblast apoptosis [26,27]. The implementation of UAE significantly reduces the blood supply to the lesion area, creating a more favorable environment for the natural absorption and expulsion of pregnancy products, thereby promoting the process of degeneration and clearance [28,29,30]. The two therapeutic approaches may work synergistically to promote the clearance of pregnancy-associated products through their respective mechanisms, thereby facilitating the decline in serum β -hCG levels. In the present study, a decreasing trend in β -hCG levels was observed in the study group as early as the first postoperative day. Although this difference did not reach statistical significance, when considered together with findings from other studies, it suggests that the combined regimen may hold a potential advantage in promoting physiological recovery. This finding may be limited by the sample size, resulting in insufficient statistical power to detect subtle inter-group differences. Furthermore, the assessment of β -hCG levels solely on postoperative day 1 may not fully reflect their dynamic profile. Therefore, other relevant indicators were also compared in this study.

Compared with the control group, patients in the study group experienced a significantly shorter duration of vagi-

nal bleeding and a quicker return to normal menstruation ($p < 0.05$). However, there was no significant difference between the two groups in terms of menstrual cycle recovery ($p > 0.05$). This finding demonstrated the exceptional effectiveness of combining mifepristone with UAE in promoting the physiological recovery of patients with cesarean scar pregnancy. Mifepristone may contribute to serum β -hCG reduction in these patients, facilitating a smoother removal of the gestational sac and minimizing damage to the uterine wall, thereby significantly shortening the duration of vaginal bleeding [31]. Additionally, the UAE, by blocking the blood supply to the uterus, not only reduces the risk of intraoperative bleeding but also creates more favorable conditions for the surgery. When these two treatments are combined, they ensure the complete removal of the cesarean scar pregnancy lesion and accelerate the postoperative recovery process [32]. Compared with previous studies assessing UAE alone [33,34], the use of mifepristone appears to further enhance the effectiveness of pre-treatment before curettage, particularly in achieving more significant outcomes in promoting the physiological recovery of patients.

In terms of safety, there were no significant differences between the two groups in the incidence of adverse events, including fever, gastrointestinal reactions, abnormal liver function, and intrauterine adhesions. These findings suggest that adding short-term mifepristone at a conventional dose to UAE does not confer additional overall perioperative risk. Accordingly, the combined regimen improved procedural efficiency while maintaining a favorable safety profile [35].

The exploratory one-year follow-up results revealed no significant differences between the two groups regarding rates of subsequent pregnancy or recurrence of cesarean scar pregnancy. Time to pregnancy was not statistically compared because of the small number of events. However, due to the limited sample size and relatively short follow-up duration of this study, the number of observed pregnancy events was low. Therefore, this finding should be interpreted as descriptive and is insufficient to draw definitive conclusions about the impact of the combined regimen on reproductive safety. Furthermore, this study did not perform a stratified analysis based on the type and severity of the cesarean scar pregnancy. Additionally, while the recovery of physiological function was primarily assessed through postoperative clinical indicators such as time to resumption of menses, a systematic evaluation of ovarian function changes using objective markers like Anti-Müllerian Hormone was not conducted. Additionally, as treatment allocation was based on physicians' clinical decisions rather than randomization, potential selection bias and confounding factors cannot be completely excluded. Future research could consider expanding the sample size, incorporating stratified analyses by the type and severity of cesarean scar pregnancy, and extending the follow-up period.

This would contribute to developing more scientific and effective treatment strategies for patients with cesarean scar pregnancy.

Conclusions

In conclusion, pre-treatment with the combined regimen of mifepristone and uterine artery embolization followed by dilation and curettage appears to be an effective therapeutic strategy for cesarean scar pregnancy. It enhances treatment efficacy and supports more favorable early postoperative recovery, without increasing the risk of associated complications. These observations imply that integrating pharmacological inhibition of trophoblastic activity with vascular management may improve overall treatment efficacy while maintaining a favorable safety profile.

Availability of Data and Materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

JJL, JFP and CYZ designed the research study. XXW, FYH and CL performed the research. HX and JFP analyzed the data. JJL and CYZ drafted the article. All authors contributed to the critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was approved by the Ethics Committee of The First Hospital of Jiaying, Affiliated Hospital of Jiaying University (approval number: 2024-KY-639), and all procedures followed the principles of the Declaration of Helsinki. Written informed consent was obtained from each patient before treatment.

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Conflict of Interest

The authors declare no conflict of interest.

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