Is preprocessing helpful for suction and curettage in treating cesarean scar pregnancy?

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Summary

Objective: To evaluate the efficacy of suction and curettage (SC), with and without preprocessing, as a therapeutic strategy for cesarean scar pregnancy (CSP). Materials and methods: This retrospective study included 257 patients with CSP who received ultrasound-guided SC. Patients were grouped into the direct SC group (122 cases) and the preprocessing SC group (135 cases). The preprocessing SC group was further divided into four subgroups based on the different preprocessing methods (methotrexate injection, oral mifepristone, methotrexate with mifepristone, and uterine artery embolization/chemoembolization). Results: There was no significant difference in success rates between the preprocessing SC group and the direct SC group (94.07% vs. 97.54%, p > 0.05). The preprocessing SC group had increased intraoperative bleeding, longer operation times, prolonged hospital stays, and increased in-hospital costs (all p values < 0.05, compared with the direct SC group). Among the preprocessing SC group, the in-hospital cost for the uterine artery embolization/chemoembolization subgroup was significantly higher than that for the other subgroups. Conclusions: Preprocessing steps may not increase the success rate of SC for CSP under certain conditions. Optimization of the preprocessing step requires further research. Content: The effectiveness of suction and curettage and other methods in treating cesarean scar pregnancy has been evaluated.

Key words: Cesarean section; Ectopic pregnancy; Cesarean scar pregnancy; Termination of pregnancy.

Introduction

Cesarean scar pregnancy (CSP) is a particular form of ectopic pregnancy caused by the embryo’s implanting into a cesarean scar [1]. In the general obstetric population, CSP is related to the number of cesarean sections, and the incidence is estimated at about 1/3000 [2]. To distinguish CSP from intrauterine pregnancy in the early first trimester, ultrasound is the most commonly used and most important visual assessment [3]. The main risk in CSP is abnormal bleeding, and worse, catastrophic hemorrhage during the first trimester. Recent systemic reviews demonstrated that the success rates of various treatment modalities were about 60%-95% [4-7]. For patients choosing to continue with a CSP pregnancy, the risks of placenta accreta, uterine rupture, massive hemorrhage, and even hysterectomy must be considered [2]. To reduce the risks of these complications, termination of pregnancy is usually considered at the time of CSP diagnosis.

Currently, there is no ideal CSP treatment. As a noninvasive procedure, suction and curettage (SC) is sometimes used as one of the treatment options [8-12]. SC with ultrasonic monitoring is an effective treatment for some types of CSP [13, 14]. When considering the treatment plan, it is important that the thickness of postoperative incisions and several other clinical features be considered [15].

To reduce the risk of bleeding, several preprocessing steps before SC have been suggested, such as injection of methotrexate (MTX) [16] and uterine artery embolization (UAE) [17]. These preprocessing steps may reduce the bleeding risk of SC to a certain extent [13]. However, contrary to their intended purpose, preprocessing steps may also increase the risk of bleeding because of the prolonged treatment time [13]. In addition, preprocessing steps increase medical costs. As there is no consensus, it is necessary to evaluate the risks and benefits of preprocessing steps before SC to enable evidence-based recommendations. We retrospectively collected the data of patients who had undergone SC for the treatment of CSP in our hospital, and evaluated the efficacy and safety of SC with and without preprocessing steps.

Materials and Methods

Clinical data of patients who were diagnosed with CSP and treated with SC between 1 July 2010 and 1 August 2016 in the Second Xiangya Hospital of Central South University were collected and analyzed. This study included only patients treated by SC for the first time and in the first trimester. Patients only treated with conservative methods such as UAE and other non-SC treatments such as surgical resection, hysteroscopic excision, and hysterectomy were excluded.

The authors had no access to information that could identify individual participants during and after data collection.

CSP was diagnosed by a history of previous cesarean delivery, elevated serum β-human chorionic gonadotrophin (β-hCG), and ultrasound characteristics, which included an
empty uterine cavity and cervical canal, a myometrial defect between the sac and the bladder wall, and a gestational sac located at the anterior part of the uterine isthmus.

SC was performed in this study when the thickness of the previous scar was more than 3 mm during the first trimester, according to our classification and therapeutic strategy for CSP [13]. Our SC procedures were performed with suprapubic ultrasonic monitoring to reduce the bleeding risk. After successful SC treatment, patients were treated for the first time with SC. Thus, we only compared outcomes between groups. We collected data from patients who were treated for the first time with SC. Some patients were excluded from the analysis. Serum biomarkers were tested using the Mann-Whitney U test, or Kruskal-Wallis H test. Categorical variables were presented as percentages and were tested using the Chi-square or Fisher exact test. All tests of hypotheses were two tailed with the type 1 error rate fixed at 5%.

Results

This study included 257 women who were diagnosed with CSP and received SC treatment during the time of hospitalization. The average age was 32.34 ± 4.81 years (22 to 44), gravida 4.25 ± 1.71 (2 to 11) and para 1.39 ± 0.54 (1 to 3). The average gestational age was 50.87 ± 10.66 days (30 to 83), and average β-hCG was 40939.58 ± 62873.15 mIU/mL. Of this group, 122 patients (122/257, 47.47%) received SC without preprocessing steps (the direct SC group), and the other 135 patients (135/257, 52.53%) received SC after a preprocessing step (the preprocessing SC group).

Table 1 shows the general characteristics of the 257 patients. There were no significant differences in the variables examined between the preprocessing SC and the direct SC groups (p > 0.05). The overall success rate of the 257 patients was 95.72% (246/257). The success rate was 94.07% (127/135) for the preprocessing SC group and 97.54% (119/122) for the direct SC group. Although the direct SC group showed a higher success rate (97.54% vs. 94.07%), the difference was non-significant (p > 0.05) (Table 1).

Table 2 shows the perioperative outcomes in patients with successful SC. Compared with the direct SC group, the preprocessing SC group had longer operation times, greater blood loss, longer hospital stays, and higher in-hospital costs (all p-values < 0.05).

In the preprocessing SC group, patients were given one of four preprocessing methods: MTX injection (9/127, 7.09%), oral mifepristone (48/127, 37.80%), MTX with mifepristone (60/127, 47.24%), or UAE/UACE (10/127, 7.87%). Perioperative outcomes in the four subgroups were presented in Table 3. There was no significant difference in the volume of intraoperative blood loss among the four preprocessing subgroups, although between-group differences were observed in operation time, hospital stay, and in-hospital cost. The MTX and mifepristone group showed the longest operation times and hospital stays. The hospital stay for the mifepristone group was significantly shorter than those for the MTX and mifepristone and the UAE/UACE groups (Kruskal-Wallis H test, p < 0.05), and the in-hospital cost was significantly higher for the UAE/UACE group than for the other three groups (Kruskal-Wallis H test, p < 0.05).

Discussion

Sel et al. reported that vacuum extraction could be a useful and practical method for treating CSP; validation studies with larger sample sizes are needed [8]. Our research focused on comparing the effectiveness of prepro-
Figure 1. — Flow-chart of the cesarean scar pregnancy cases. CSP: cesarean scar pregnancy; SC: suction and curettage; MTX: methotrexate; UAE: uterine artery embolization; UACE: uterine artery chemoembolization.

Table 1. — General characteristics and SC success rates by study groups.

| Characteristic                        | Preprocessing SC Group (N = 135) | Direct SC Group (N = 122) | p  
|---------------------------------------|----------------------------------|---------------------------|---
| Age (years)                           | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 32.72 ± 4.76                    | 31.93 ± 4.85              | 0.20  
|                                       | 33.00 (29.00, 36.00)             | 31.50 (28.00, 35.00)      |   
| Gravidity (N)                         | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 4.24 ± 1.63                     | 4.00 (3.00, 5.00)         | 0.98  
|                                       | 4.00 (3.00, 5.00)                | 4.00 (3.00, 5.00)         |   
| Parity (N)                            | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 1.41 ± 0.55                     | 1.00 (1.00, 2.00)         | 0.57  
|                                       | 1.00 (1.00, 2.00)                | 1.00 (1.00, 2.00)         |   
| Previous cesarean delivery (N)        | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 1.30 ± 0.47                     | 1.33 ± 0.51               | 0.66  
|                                       | 1.00 (1.00, 2.00)                | 1.00 (1.00, 2.00)         |   
| Gestational age (days)                | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 51.67 ± 11.00                   | 49.98 ± 10.25             | 0.16  
|                                       | 49.00 (44.00, 57.00)             | 47.00 (43.00, 54.00)      |   
| Preoperative $\beta$-hCG (mIU/mL)     | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 41422.58 ± 43239.59              | 40348.25 ± 80899.71       | 0.36  
|                                       | 25505.00 (10258.50, 55544.00)    | 23596.00 (9168.00, 50340.85) |   
| Minimum thickness of myometrial wall (mm) | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 4.19 ± 2.11                     | 4.24 ± 2.33               | 0.98  
|                                       | 4.00 (3.00, 5.00)                | 4.00 (3.00, 5.00)         |   
| Time between previous cesarean delivery and index pregnancy (years) | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 6.86 ± 4.27                     | 6.90 ± 3.74               | 0.74  
|                                       | 6.00 (3.00, 10.00)               | 6.50 (4.00, 9.00)         |   
| Maximum diameter of sac (mm)          | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 29.73 ± 12.47                   | 26.51 ± 13.76             | < 0.01  
|                                       | 30.00 (21.00, 37.00)             | 23.00 (16.25, 31.75)      |   
| Success suction and curettage         | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 127 (94.07%)                     | 119 (97.54%)              | 0.17  
|                                       | 3 (2.22%)                       | 2 (1.64%)                 | 1.00  
| Massive bleeding                      | Mean ± SD, Median (Q1, Q3)       |                           |   
|                                       | 6 (4.44%)                       | 2 (1.64%)                 | 0.35  

Data are presented as mean ± standard deviation, median (quartile 1, quartile 3) or n (%). Abbreviations: SC, suction and curettage; $\beta$-hCG, $\beta$-human chorionic gonadotrophin. 1 Mann-Whitney U test or Chi-square test. 2 Intraoperative blood loss more than 500mL. 3 After the failure of SC, different methods including laparotomy, laparoscopic surgery, or hysteroscopy were used for reoperation.
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Table 2. — Perioperative outcomes in patients with successful SC by study groups.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Preprocessing SC Group (N = 127)</th>
<th>Direct SC Group (N = 119)</th>
<th>p 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation time (minutes)</td>
<td>26.85 ± 15.55</td>
<td>21.18 ± 11.30</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Blood loss (ml)</td>
<td>93.73 ± 140.19</td>
<td>56.84 ± 96.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>30.00 (20.00, 100.00)</td>
<td>30.00 (20.00, 50.00)</td>
<td></td>
</tr>
<tr>
<td>In-hospital cost (yuan)</td>
<td>9652.47 ± 5071.58</td>
<td>6566.11 ± 1948.45</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation, median (quartile 1, quartile 3). Abbreviations: SC, suction and curettage. 1 Mann-Whitney U test.

Table 3. — Perioperative outcomes in four subgroups of preprocessing suction and curettage.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>MTX group (N = 9)</th>
<th>Mifepristone group (N = 48)</th>
<th>MTX &amp; mifepristone group (N = 60)</th>
<th>UAE/UACE group (N = 10)</th>
<th>p 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation time (minutes)</td>
<td>25.56 ± 9.82</td>
<td>23.52 ± 16.63</td>
<td>30.37 ± 15.58</td>
<td>22.20 ± 10.39</td>
<td>0.02</td>
</tr>
<tr>
<td>Blood loss (mL)</td>
<td>53.33 ± 61.44</td>
<td>88.77 ± 88.62</td>
<td>110.21 ± 182.00</td>
<td>53.50 ± 65.91</td>
<td>0.17</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>8.33 ± 4.44</td>
<td>6.56 ± 2.50</td>
<td>11.47 ± 4.83</td>
<td>10.70 ± 5.23</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>In-hospital cost (yuan)</td>
<td>8193.50 ± 3733.30</td>
<td>7401.18 ± 2109.24</td>
<td>10079.18 ± 3547.04</td>
<td>21853.20 ± 8589.75</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Data are presented as mean ± standard deviation, median (quartile 1, quartile 3). Abbreviations: MTX, methotrexate. UAE, uterine artery embolization. UACE, uterine artery chemoembolization. 1 Kruskal-Wallis H test.

itoring in our treatment methods. Not all CSPs are suitable for SC treatment [13]; our study focused on comparing different SC processing methods for cases that could receive SC after assessment. According to Polat et al., with early diagnosis, CSP with a β-hCG level < 17,000 mIU/mL and a myometrial thickness > 2 mm can be treated with SC [11]. Therefore, for each patient, the choice of CSP treatment should be based on the patient’s condition and severity. The average myometrial thickness of our SC cases was about 4 mm. In this regard, we have been somewhat conservative in choosing SC treatment methods.

The success rates for the preprocessed SC group and the direct SC group were 94.07% and 97.54%, respectively; the between-group difference was not significant. This suggested that the preprocessing steps did not significantly increase the success rate of the operation. However, significant differences were found in other outcomes. The operation time in the preprocessing group was significantly longer than that in the direct SC group, although the two groups had the same median operation time of 20 min, suggesting that direct SC may not have an obvious disadvantage over preprocessing SC in operation time.

Similarly, the difference in the volumes of blood loss between the two groups was statistically significant, but the difference in the median blood loss (20 mL) was clinically negligible. Therefore, the preprocessing steps did not seem better in terms of controlling blood loss in SC. When MTX and mifepristone are used, atrophy or bleeding may occur in the lesion, and the invasiveness of trophoblasts is reduced. These changes may cause adhesions to surrounding tissues, which makes SC more difficult and requires a longer operation time. In addition, blood clots from bleeding lesions may block the tube at the beginning of SC, which also increases the operation time and bleeding. Notably, in the preprocessing SC group, one patient suffered a massive hemorrhage (1,000 mL). However, there was also one case of massive hemorrhage in the direct SC group, with an 800 mL blood loss. Therefore, for SC both with and without preprocessing steps, attention should be paid to the risk of massive hemorrhage. We speculate that there were two reasons for the low average bleeding volume in our study population. First, patients with a high risk of bleeding did not receive SC treatment in our study; in those cases, other treatments such as laparotomy were performed [13]. Therefore, our data may only show treatment results for low-risk CSP patients (suitable for SC). Second, the representativeness of the average volume of blood loss may be limited by the small sample size, as there were only nine cases in
the MTX group. With respect to hospital stay, when pre-
processing was performed, sufficient monitoring time was 
required to observe a decline in serum β-hCG, which re-
flected the therapeutic effect. For the mifepristone group 
(oral mifepristone therapy before SC), SC was performed 
after 3 days of hospitalized observation following the med-
ication due to the potential risk of hemorrhage and for mon-
itoring the level of β-hCG.

Shu et al. reported a CSP patient who previously 
received MTX and mifepristone and was treated by 
laparoscopy-guided curettage and aspiration [18]. Ozypuncu 
et al. reported that CSP could be successfully treated by 
MTX as a potential treatment option for ectopic pregnancies 
under certain conditions. These experiences suggest the effec-
tiveness of MTX for treating CSP [19]. Mifepristone can 
reduce the risk of bleeding by reducing progesterone and 
villous activity, although it is no longer commonly used for 
CSP. In conservative treatment of CSP, MTX is used both 
locally and systemically. The toxicity of MTX depends on 
its concentration and duration of activity. Therefore, the 
use of MTX should be fully assessed. In the preprocessing 
method using MTX, ultrasound-guided local injection of 
MTX is considered a safe and recommended procedure 
compared to systemic use of MTX [16, 20]. UAE is effective 
in controlling uterine bleeding [17, 21, 22], as the em-
bolization agents block the blood vessels, which directly 
decreases bleeding. Considering the time for absorption, SC is 
generally performed after 24-72 h of UAE [23], which may 
result in higher medical costs, as our results have shown. 
As another option, the combination of UAE, local MTX 
injection, and SC for the treatment of CSP has been eval-
uated by Liu [9]. This treatment was not included in our 
study. Our success rate was higher, possibly because we 
were more conservative in evaluating cases for suitability 
of SC treatment (such as a thicker myometrium). UAE is a 
useful method for patients with uncontrollable (preope-
ратive or intraoperative) bleeding. In the process of SC, we 
also needed to evaluate the possibility of UAE in case of 
massive hemorrhage. Therefore, it is necessary to carefully 
assessthepatient’sconditionandadoptasuitabletreatment 
plan. In our data, UAE accounted for relatively few pa-
ients, and it is difficult to draw any conclusions based on 
small amounts of data. This is one of the study limitations. 
Another limitation is that we had insufficient data to eval-
uate the incidence of MTX side effects and blood product 
use. These indicators are important for clinical treatment. 
Ultimately, the choice of CSP treatment should be based on 
the patient’s condition and severity.

Our data could provide valuable information for obstetri-
cians, gynecologists, and patients who are dealing with this 
situation. We evaluated two treatment strategies, direct SC 
and preprocessing treatment with SC. Our treatments and 
results could provide evidence-based information for the se-
lection of treatment methods. However, as a retrospective 
study, bias was unavoidable when some of the relevant data 
were not documented as required. To better understand and 
evaluate SC for CSP, larger sample sizes in other popula-
tions are still needed.

Conclusions

Preprocessing steps may not increase the success rate 
of SC for CSP under certain conditions. Optimization of the 
preprocessing step requires further research.

Ethics Approval and Consent to Participate

The study protocol was approved by the Medical Ethics 
Committee of the Second Xiangya Hospital of Central 
South University (approval number: 2017018). All proce-
dures were performed in accordance with the ethical stan-
dards of the Institutional Research Committee, and with the 
1964 Helsinki Declaration and its later amendments or com-
parable ethical standards. All subjects gave their informed 
consent for inclusion before they participated in the study.

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Conflict of Interest

The authors declare no conflict of interest.

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