

## Original Article

# Dilation and curettage following local sclerotherapy for cesarean scar pregnancy

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**Abstract:** This study aims to investigate the value of lauromacrogol-based sclerotherapy (ST) in the treatment of cesarean scar pregnancy. We compared the effectiveness and safety of curettage following local sclerotherapy with UAE (uterus artery embolization)-based curettage, the most recommended approach for uterine scar pregnancy at the moment. In a total of 205 USP patients received curettage, we performed UAE in 46 patients and ST in 159 patients. There were no significant differences in the recovery of menstruation and HCG reduction between two groups. However, ST-based curettage significantly decreased bleeding, attenuated pain, shortened hospital days and reduced medical costs. Therefore, lauromacrogol-based sclerotherapy is a safe, effective and economic approach in the pre-treatment of the curettage for uterine scar pregnancy.

**Keywords:** Lauromacrogol, sclerotherapy, uterus artery embolization, cesarean scar pregnancy

## Introduction

As a rare ectopic pregnancy, cesarean scar pregnancy (CSP) is one of the long-term complications of the cesarean delivery. It refers to the implantation of the fertilized egg in the scar resulting from previous cesarean sections. Although the exact incidence was not unknown, one cesarean scar pregnancy was estimated to occur in around 2,000 pregnancies [1]. Around 0.15% of all pregnancies with previous cesarean deliveries will be a cesarean scar pregnancy, representing up to 6% of ectopic pregnancies with a history of caesarean delivery [1-3].

The myometrial layer of the uterine at the cesarean scar often become thin and susceptible for implantation. With the progress of pregnancy, trophoblast invasion into the scarred myometrium enables the penetration of the placenta deeply into the myometrium, even leading to massive hemorrhage or the rupture of the uterine [4, 5]. Therefore, cesarean scar pregnancy is a serious and iatrogenic consequence of a previous cesarean delivery. Early recognition and termination of pregnancy is generally recommended [6, 7].

The treatment of cesarean scar pregnancy remains a big challenge. Ultrasound-guided

methotrexate injection alone or in combination with surgical approaches used to be the major treatment [7]. Recently, minimal invasive measures such as uterus artery embolization and Foley balloon placement and were proposed to control bleedings [7, 8]. In this report, we investigated the potential application of sclerotherapy based minimally invasive treatment for cesarean scar pregnancy

## Materials and methods

### *Patients and treatments*

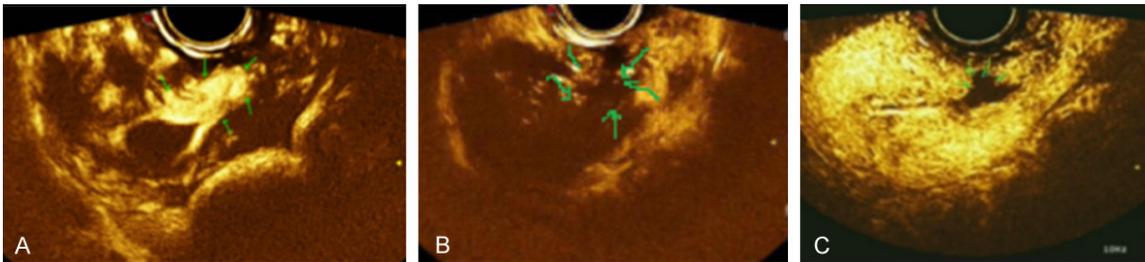
This is a retrospective analysis of 205 patients with cesarean scar pregnancy in our hospital. All patients were at early stage of pregnancy, varying from 5 to 12 weeks. The diagnostic criteria for cesarean scar pregnancy was adopted as reported [3, 5]: Patients were confirmed with a positive pregnancy and have at least one previous cesarean section; gestational sac or placenta were embedded in the scar; a thin myometrial layer (<3 mm) between the gestational sac or placenta and the bladder; abundant vascular networks in the caesarean scar and placenta. Among 205 patients, 49 patients received uterus artery embolism (UAE) and 159 patients received sclerotherapy. Informed consent were obtained from all patients included

## Local sclerotherapy for CSP

**Table 1.** Patients in two groups

	UAE (n=46)	ST (n=159)	P
Age (years)	32.5 ± 4.7	31.5 ± 5.6	0.31
Pregnancy (days)	48.7 ± 9.8	50.1 ± 13.1	0.52
Thickness (cm)	0.20 ± 0.13	0.23 ± 0.11	0.11
HCG	49,513 ± 13,628	38,454 ± 3,153	0.24

Mean ± S.D.; UAE: uterine artery embolism; Pregnancy: days from cessation of menstruation; Thickness: Myometrium thickness; ST: Sclerotherapy.



**Figure 1.** Effect of sclerotherapy on the blood flow of CSP. The blood flow of CSP was evaluated by Doppler ultrasound scanning. A. Before lauromacrogol injection; B. After lauromacrogol injection; C. After the curettage.

**Table 2.** Differential effects of two procedures

	UAE	ST	P
Bleeding (ml)			0.03
<50	46	138	
50-100	0	15	
>100	0	6	
Pain Score			<0.01
0-2	0	157	
3-6	0	2	
7-10	46	0	

and the study was approved by the ethical committee of the hospital.

### Ultrasound guided sclerotherapy

Guided by ultrasound scan via vagina, 10-20 ml lauromacrogol were injected to implanted villi with a 21 G needle until blood flow signal in the implanted villi was not displayed. The effect of sclerotherapy was confirmed by contrast-enhanced ultrasound examination and the curettage was performed within 24 hours after the operation.

### Uterine artery embolization (UAE)

After local anesthesia with 1% lidocaine, 5F catheter sheath was succeeded placed in bilateral uterine arteries as confirmed by the angiography. The embolization was performed by

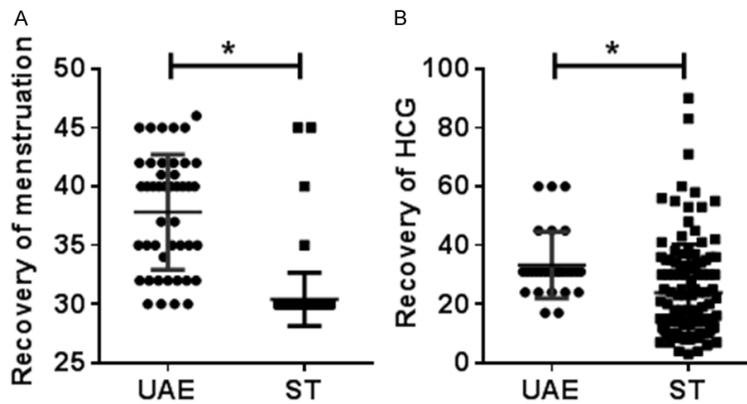
adding gelfoam granules until the angiography showed the successful embolization. Routine epidural analgesia was given for 24-48 hours and the curettage was performed 3-5 days after the operation.

### Follow-up assessments

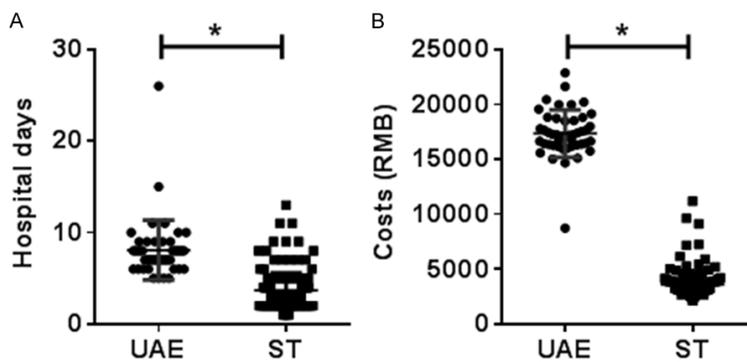
The pain scores of the patients after the treatment, the blood loss in the subsequent curettage, the number of days in hospital, the hospital costs, the time required for the serum  $\beta$ -HCG to return to normal in follow-up, and the time of the first menstrual recovery were recorded. Ultrasound examinations 1 week and 1 month after discharge were performed to observe the hemorrhage and tissue residue.

### Results

In general, there are no differences in the ages, pregnancy days, myometrium thickness and serum HCG levels of patients received uterine artery embolism (UAE) or lauromacrogol-based sclerotherapy (ST) (Table 1). As shown in Figure 1A, most of the villus tissue was located in the uterine scar, and the blood flow was abundant. After injecting various amount (10-20 ml) of lauromacrogol, no clear enhanced contrast was observed in uterine scar (Figure 1B), indicating that sclerotherapy succeed to block the blood supply. No complaints of patients were noted and all patients received the curettage suc-



**Figure 2.** Effects of two procedures on patients' recovery. A. The mean recovery time for menstruation in patients from two groups; B. The average days for HCG return to normal in patients from two groups. The asterisks indicate the significant difference ( $P < 0.05$ , Student's t test).



**Figure 3.** Differential outcomes of two procedures. A. The average length of hospitalization for patients in two groups; B. The medical cost charged to patients in two groups. The asterisks indicate the significant difference ( $P < 0.05$ , Student's t test).

cessfully within 24 hours. After the curettage, there was no contrast enhancement (**Figure 1C**), confirming the successful clearance of pregnancy at the scar site. All of these data suggested that laurmacrogol-based sclerotherapy is an effective pretreatment for the subsequent surgical clearance.

However, the bleeding seems to be severer in ST group (**Table 2**), although most of them (92.6%, 138/149) had slight bleeding (<50 ml) during the curettage. Nearly all patients (98.7%, 147/149) in ST group complained slight pain (pain score <2) and only 2 patients complained moderate pain (pain score: 3-6). In contrast, all patients in UAE group complained sever pain (pain score: 7-10), accompanied by slight bleeding (**Table 2**).

Interestingly, the mean recovery times for menstruation in patients from the ST group were

significantly shorter than that of UAE group (**Figure 2A**,  $P < 0.05$ ). In addition, patients in ST group took significantly shorter average days for HCG reduce to normal (**Figure 2B**,  $P < 0.05$ ). As a consequence, the average length of hospitalization for patients in the ST group were significantly reduced (**Figure 3A**), accompanied by significant decrease in the total costs (**Figure 3B**). Therefore, laurmacrogol-based sclerotherapy is an effective, safe and economic procedure for the subsequent curettage.

## Discussion

Being considered as a special type of ectopic pregnancy, CSP refers to the implantation of the gestational sac at the scar of the previous cesarean section [1-3, 9]. The incidence of CSP keep rising recently due to the increase of cesarean section rate [5]. As a long-term dangerous complication of cesarean section, its treatment has received more and more attention.

Once diagnosed, CSP is generally recommended to be terminated as soon as possible [1-3, 10]. In 1978, Larsen and Solomon reported the first case of scar pregnancy and applied abdominal uterine incision plus uterine scar repair as the treatment of choice. So far, many surgical treatments such as transabdominal, transvaginal, and laparoscopic operations [4]. The main serious and common symptoms of CSP are persistent bleeding during or after treatment [11]. Patients after caesarean section have weak or missing muscles at the site of uterine scars. Due to the loss or absence of elastic fibers during or after treatment, blood vessels cannot be closed and cause massive bleeding and even life-threatening injuries [5, 6]. Therefore, pretreatment of blood vessels in the uterine scar to prevent continuous bleeding during or after treatment was usually recommended [12, 13]. There are many pretreatment

options alone or in combination, such as drug treatment, UAE, and ultrasound-guided ablation [14, 15]. Most treatments are slow, invasive, or have major complications. For example, UAE was used to close the “valve” of the uterine artery and reduce the blood supply to the entire uterus. However, most of patients receiving UAE often complained severe pain. In addition, it takes longer hospital stay to wait for the curettage after pretreatment. In this study, we reported lauromacrogol-based sclerotherapy as a new minimal invasive pretreatment. It is an effective, safe and economic approach with significant potential for clinical application. In contrast to completely reduce the vascular supply for the gestational sac and the muscles, UAE blocked the uterine artery, lauromacrogol-based sclerotherapy only partially blocked the vascular supply around the gestational sac but not the blood supply of the whole uterus. Therefore, it significantly relieved the pain caused by uterine ischemia. In addition, the uterus can be quickly revascularized faster after the curettage. Lauromacrogol is widely used in the clinic [16-19]. Intravenous and intraluminal local injection of lauromacrogol can directly damage the vascular endothelium, and promote thrombosis [20, 21]. Fibroblasts can be recruited 24 hours after the injection of lauromacrogol to promote fibrosis [16, 22]. Subsequent curettage can be performed within 24 hours. Patients receiving such a pretreatment complained less pain, and recovered much faster than patients undergoing UAE.

In conclusion, transvaginal ultrasound-guided injection of lauromacrogol is an ideal pretreatment before uterine curettage. The procedure is easy to perform, safe, effective and economic. Therefore, we propose that it should be propagated in the clinical management of CSP.

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### Disclosure of conflict of interest

None.

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