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## CLINICAL ARTICLE

# Uterine artery embolization followed by dilation and curettage within 24 hours compared with systemic methotrexate for cesarean scar pregnancy

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## ABSTRACT

**Objective:** To assess the efficacy of uterine artery embolization (UAE) combined with dilation and curettage (D&C) within 24 hours for the treatment of a cesarean scar pregnancy (CSP), compared with methotrexate and D&C. **Methods:** A retrospective cohort study of 119 women with CSP was conducted at two tertiary hospitals in Guangzhou and Shenzhen, China, during 2009–2012. Twenty-six women received systemic methotrexate followed by D&C, and 93 women were treated with UAE followed by D&C within 24 hours. **Results:** Mean blood loss was  $261.0 \pm 357.4$  mL in the methotrexate group versus  $14.1 \pm 40.6$  mL in the UAE group ( $P < 0.001$ ). The time to resolution of the level of  $\beta$ -human chorionic gonadotropin was  $40.5 \pm 17.2$  days versus  $15.4 \pm 7.7$  days ( $P < 0.001$ ), respectively. The duration of hospitalization was  $14.6 \pm 9.2$  days versus  $6.2 \pm 3.7$  days ( $P < 0.001$ ), respectively. An additional intervention was needed in 9 (35%) women in the methotrexate group and in 5 (5%) in the UAE group ( $P < 0.001$ ). **Conclusion:** UAE combined with D&C within 24 hours was an effective uterine preservation treatment for CSP, and was associated with less blood loss and a shorter hospital stay than administration of methotrexate followed by D&C.

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## 1. Introduction

Cesarean scar pregnancy (CSP) is a rare form of ectopic pregnancy, with a reported incidence of 1 in 1800–2200 pregnancies [1,2]. It occurs at the site of a previous uterine scar and is associated with serious complications, such as uterine rupture and life-threatening hemorrhage. With the rising incidence of cesarean delivery in China [3], the incidence of CSP is expected to rise accordingly. Yet, there seems to be a lack of consensus in China on the best approach to managing CSP—hence the need for a study with a sufficiently large sample number to assess the safety and efficacy of any proposed treatment for CSP.

Hysterectomy is a radical treatment option for CSP; conservative options that preserve the uterus would be favored. Women with CSP respond well to systemic methotrexate, especially those with a serum  $\beta$ -human chorionic gonadotropin ( $\beta$ -hCG) level of more than 5000 IU/mL [4,5]. However, it takes time for the  $\beta$ -hCG level to normalize after methotrexate treatment and the strategy can be complicated

by a long hospital stay ( $\geq 1$  month), persistent vaginal bleeding, and massive hemorrhage [6–10], which may lead to hysterectomy.

The main aim of conservative treatment is to remove the gestational sac, excise the trophoblastic tissue, control hemorrhage, and preserve the uterus. A direct method of gestational sac and trophoblastic tissue removal is dilation and curettage (D&C). Unfortunately, in CSP the trophoblastic villi implant deeply into the myometrium and are therefore likely to be unreachable by a curette. As a result, attempts at curettage can potentially rupture the uterine scar, leading to severe hemorrhage and further damage [11,12].

Various hemostatic measures have been used successfully as an adjunct to the conservative treatment of CSP to prevent and control massive bleeding. One such measure is selective bilateral uterine artery embolization (UAE) [13–15]. By obliterating the uterine arteries, UAE can potentially lead to the cessation of blood supply to the CSP. This will reduce or prevent massive bleeding in subsequent procedures to remove the CSP.

However, despite the performance of UAE prior to D&C, there remains a risk of active vaginal bleeding ( $>200$  mL) several days after curettage. By using transvaginal ultrasound and digital subtraction angiography, Li et al. [10] demonstrated the establishment of an extensive collateral circulation and the recanalization of the embolized uterine artery within 48 hours after UAE, which might explain the occurrence of

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bleeding despite this hemostatic measure. It is therefore recommended to perform curettage within 24 hours of UAE once the absence of intraliesional blood flow has been confirmed by ultrasonography [10, 16, 17], to allow removal of the CSP before formation of the collateral circulation and recanalization of the embolized uterine arteries.

On the basis of the limited data available, UAE followed by D&C within 24 hours seems to be the most beneficial treatment approach for CSP. To confirm this hypothesis, the aim of the present study was to examine the effectiveness and the complications of performing D&C within 24 hours after UAE and to compare this approach with methotrexate administration before D&C in women with CSP.

## 2. Materials and methods

The present study included women who were diagnosed with CSP at the First Affiliated Hospital of Jinan University in Guangzhou or at the Women's and Children's Hospital in Shenzhen, China, between January 1, 2009, and December 31, 2012. These hospitals are the only tertiary obstetrics and gynecology units in Guangdong Province. The CSP cases were identified by searching through the institutional gynecological databases using the terms "scar" and "pregnancy." The ethics committees of the two study hospitals approved the review of the women's records; formal consent was not necessary because the study had a retrospective design and the patients' details were anonymous.

The diagnosis of CSP had been confirmed by transvaginal ultrasound based on the following criteria: an empty uterine cavity and cervical

canal; a gestational sac located anteriorly at the uterine isthmus within a visible myometrial defect at the site of a previous lower-segment cesarean delivery scar; and evidence of a functional trophoblastic/placental circulation on color Doppler examination [1]. Women with a CSP (confirmed by ultrasonography in women with a clinical history of previous cesarean delivery, serial monitoring of serum  $\beta$ -hCG, and repeat ultrasonography by experienced sonographers in complex cases) and a pregnancy duration of 6–12 weeks were included. In total, 173 women were identified from the databases of the two hospitals. Fifty-four women were excluded from the analyses based on the following exclusion criteria: inevitable abortion; previous cesarean delivery for incomplete abortion; misdiagnosis of an intrauterine or cervical pregnancy; and initial treatment of the abnormal pregnancy by D&C, medical abortion, or another intervention differing from the study treatments. In total, 119 women met the study criteria and were included in the analyses (Fig. 1).

Upon diagnosis of the CSP, the women had been informed and counselled about the potential risks of the condition and the available treatment plans. The choice of treatment was based on the women's informed consent.

Twenty-six women from the two hospitals underwent systemic methotrexate injection followed by D&C as their initial treatment (Fig. 1) because the treatment costs were lower. They received an intramuscular injection of methotrexate ( $50 \text{ mg/m}^2$  of body surface area in one dose) within 2 days of the CSP diagnosis. Prior to the administration of methotrexate, the serum  $\beta$ -hCG level was measured (although one woman had no baseline  $\beta$ -hCG level recorded), and a total blood cell

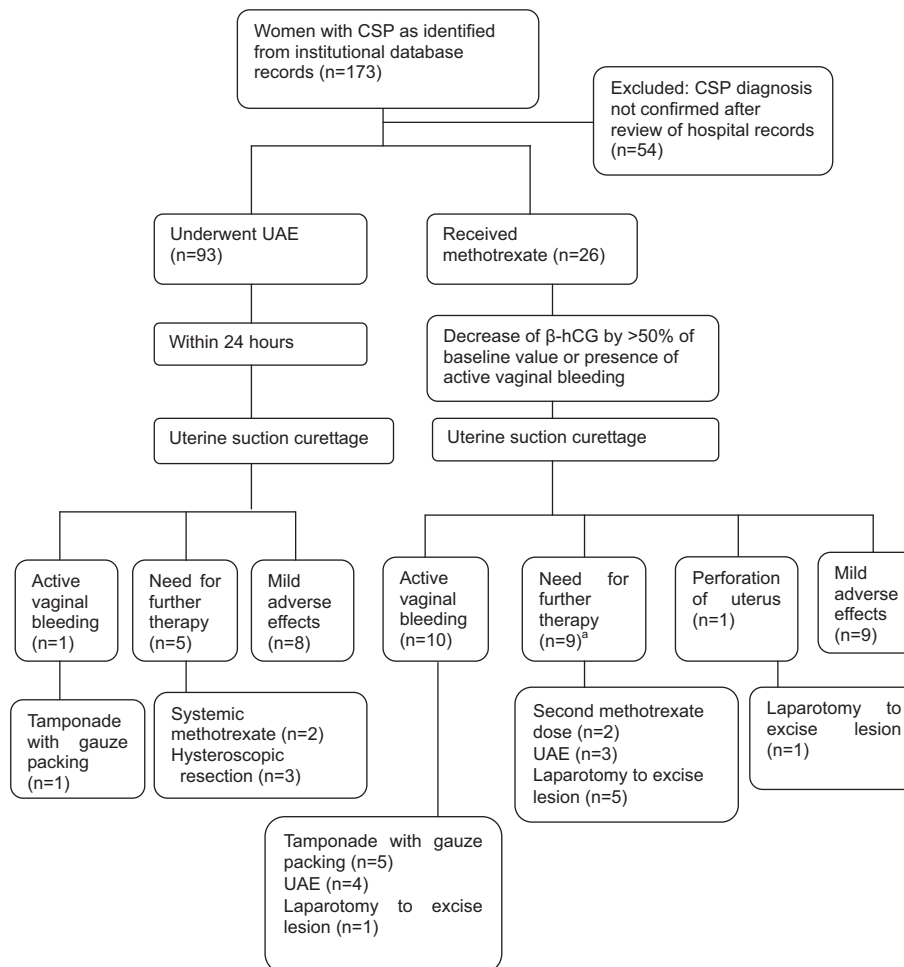


Fig. 1. Flow diagram of the study participants. Abbreviations: CSP, cesarean scar pregnancy; UAE, uterine artery embolization;  $\beta$ -hCG,  $\beta$ -human chorionic gonadotropin. <sup>a</sup> One woman needed more than one further therapy.

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