

INPLASY PROTOCOL

To cite: Li et al. Comparison of the Efficacy and Subsequent Pregnancy Outcomes of High-intensity Focused Ultrasound and Uterine Artery Embolization in the Chinese Population: Meta-analysis. Inplasy protocol 2022100053. doi: 10.37766/inplasy2022.10.0053

Received: 14 October 2022

Published: 14 October 2022

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Support: ZR2020QH043.

Review Stage at time of this submission: Data analysis.

Conflicts of interest:
None declared.

Comparison of the Efficacy and Subsequent Pregnancy Outcomes of High-intensity Focused Ultrasound and Uterine Artery Embolization in the Chinese Population: Meta-analysis

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Review question / Objective: The combination of high-intensity focused ultrasound (HIFU), and uterine artery embolization (UAE) with uterine curettage has been proposed as a therapy strategy for cesarean scar pregnancy (CSP), which can provide a high success rate while reducing blood loss, adverse events, hospital time and cost. Therefore, we performed this meta-analysis to assess the effects of this combination therapy on the efficacy, safety, and pregnancy outcomes in patients with CSP.

Eligibility criteria: (1) Study design: Cohort, case-control, or randomized controlled trials that compare the efficacy, safety, and recurrence of UAE combined with curettage and HIFU combined with uterine scraping in the treatment of cesarean section scar pregnancy. (2) Outcome: Success rate, blood loss, time of β -hCG normalization, adverse events, length of stay, hospital costs, menstrual recovery, re-pregnancy status, and pain score.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 October 2022 and was last updated on 14 October 2022 (registration number INPLASY2022100053).

INTRODUCTION

Review question / Objective: The combination of high-intensity focused ultrasound (HIFU), and uterine artery embolization (UAE) with uterine curettage has been proposed as a therapy strategy for cesarean scar pregnancy (CSP), which can provide a high success rate while reducing blood loss, adverse events,

hospital time and cost. Therefore, we performed this meta-analysis to assess the effects of this combination therapy on the efficacy, safety, and pregnancy outcomes in patients with CSP.

Rationale: HIFU is a kind of non-invasive local thermal ablation technology of lesions, the ultrasonic mechanical energy through moderately filling bladder precision

focus on the uterine incision target area, local pregnancy tissue instantly reached 60°C ~ 100°C high temperature, the embryo, and villous tissue coagulation necrosis cause coagulation necrosis, necrotic tissue is gradually fibrosis and volume. With UAE' or HIFU' pretreatment, this will reduce the risk of massive bleeding during subsequent resection of CSP. First, the cavitation effect of ultrasound can damage the cell DNA, change the lipid duplex structure of the cell membrane, promote cell apoptosis, and inhibit cell growth and proliferation. Second, high-intensity ultrasound focuses on a uterine scar, less affecting the ovarian blood circulation and endocrine function. Finally, this combination may reduce intrauterine adhesions, perinatal syndrome (placental implantation, uterine rupture), premature birth, and increase the rate of postoperative pregnancy, which can further reduce the risk of cesarean section scar pregnancy on fertility in female.

Condition being studied: Cesarean scar pregnancy (CSP).

METHODS

Search strategy: We have searched the Scope, Embase, PubMed, Cochrane, China National Knowledge Infrastructure, Wanfang database, and the relevant literature.

Participant or population: Cesarean scar pregnancy (CSP) is an infrequent ectopic pregnancy where the pregnancy sac (GS) is usually implanted in the anterior wall of the uterus.

Intervention: The combination of HIFU and uterine curettage achieves the ideal treatment effect in the therapy of CSP.

Comparator: The combination of high-intensity focused ultrasound (HIFU), and uterine artery embolization (UAE) with uterine curettage has been proposed as a therapy strategy for cesarean scar pregnancy (CSP).

Study designs to be included: The combination of high-intensity focused ultrasound (HIFU), and uterine artery embolization (UAE) with uterine curettage has been proposed as a therapy strategy for cesarean scar pregnancy (CSP).

Eligibility criteria: (1) Study design: Cohort, case-control, or randomized controlled trials that compare the efficacy, safety, and recurrence of UAE combined with curettage and HIFU combined with uterine scraping in the treatment of cesarean section scar pregnancy. (2) Outcome: Success rate, blood loss, time of β -hCG normalization, adverse events, length of stay, hospital costs, menstrual recovery, re-pregnancy status, and pain score.

Information sources: The PubMed, EMBASE, Cochrane, China National Knowledge Infrastructure, and Wanfang databases were systematically searched to find controlled trials (published until September 2022) to compare the combination of HIFU and uterine curettage with UAE and uterine curettage.

Main outcome(s): On the one hand, the pooled blood loss study data showed that HIFU blood loss was significantly reduced compared with UAE (SMD = -1.46, 95%CI, 2.22 to -0.69; $p < p = 0.001$). On the other hand, the study showed that adverse events were significantly less than those (OR = 0.34, 95%CI, 0.21 to 0.54; $p < 0.001$), and the success rate of treatment effect was 1.58 times higher than that of the control group (OR = 1.58, 95%CI, 1.06 to 2.36; $p = 0.025$). Also, β -hCG normalization was not significantly different when treated together (SMD = 0.08, 95%CI, 0.56 to 0.40; $p = 0.74$). Finally, study on duration of postoperative vaginal bleeding of UAE showed its advantages (SMD = -0.23, 95%CI, 0.49 to 0.03; $p = 0.08$). Sensitivity analysis of the statistically significant pooled inter-study heterogeneity (blood loss, adverse events, normal time of β -hCG recovery, and vaginal bleeding duration), but the sensitivity analysis did not show inter-study heterogeneity.

Additional outcome(s): We also evaluated the treatment benefits of uterine artery embolism and uterine embolism, including the length of hospitalization, hospitalization costs, menstrual recovery time, menstrual recovery, uterine adhesions, and pain scores. First, the meta-analysis showed that it significantly reduced hospital stay (SMD = -0.57, 95%CI, -0.86 to -0.27; $p < 0.001$) and hospital costs (SMD = -4.21, 95%CI, -5.26 to -3.17; $p < 0.001$), respectively. Meanwhile, the menstrual recovery after the treatment was significantly stronger than that in the control (SMD = -0.82, 95%CI, -1.4 to -0.24; $p = 0.006$) (OR = 5.62, 95%CI, 2.88 to 11.00; $p < 0.001$). Finally, the study of postoperative pain score and the occurrence of intrauterine adhesion was better than the control group (SMD = -1.56, 95%CI, -2.4 to -0.72; $p < 0.001$; OR = 0.14, 95%CI, 0.03 to 0.64; $p = 0.01$). Sensitivity analysis of statistically significant heterogeneity results showed no significant heterogeneity in meta-analysis for inclusion across studies.

Data management: We evaluated the effect of HIFU and curettage therapy on the outcome: success rate, β -hCG, blood loss, adverse events, menstrual recovery days, second pregnancy, hospital stays, intrauterine adhesion, and pain scores. We analyzed β -hCG, menstrual duration, hospitalization duration, continuous allelic variables and reported standard mean difference (SMD) and 95% confidence interval (CI). We calculated the odds ratio (OR) for dichotomous variables, including adverse events, pregnancy, menstrual recovery, and intrauterine adhesions. To fully explain therapeutic strategy efficacy and inter-study heterogeneity using random effects models (DerSimonian-Laird method) or fixed-effect models (Mantel-Haenszel method).

Quality assessment / Risk of bias analysis: The risk of bias for each included study was assessed using criteria in the Cochrane Systematic Evaluation of interventions. They judged each item as "low risk," "high risk," or "unclear risk."

Strategy of data synthesis: Heterogeneity between studies and their magnitude was assessed by the Cochrane Q test and the I^2 test, with values greater than 50% considered moderate to high heterogeneity. The possibility of publication bias was evaluated by constructing funnel plots, and Begg's and Egger's tests were used to assess whether or not publication bias existed, such as $P < 0.05$.

Subgroup analysis: Subgroup analyses were not performed because the study did not require grouping.

Sensitivity analysis: We performed sensitivity analysis by removing one study and looking at the stability of the data.

Language restriction: No language restrictions were imposed.

Country(ies) involved: China.

Keywords: HIFU; UAE; CSP; Repeat ectopic; Efficacy; Pregnancy.

Contributions of each author:

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