Successful Pregnancy by *In Vitro* Fertilization after Bilateral Uterine Arterial Embolization for Cesarean Scar Pregnancy: A Case Report

Qiong-fang WU, Zhi-hui HUANG, Yuan ZHU, Nie NING
Jiangxi Hospital for Women and Children, Nanchang 330006, China

A 35-year-old woman who had one delivery by cesarean section got pregnant again. Color Doppler flow imaging and Magnetic resonance imaging (MRI) showed a cesarean scar pregnancy (CSP). Uterine arterial embolization (UAE) and curettage was performed successfully to terminate the pregnancy. Six months after the curettage, the patient’s menstrual flow was reduced to one non-drenched sanitary pad per day for only 1–2 d, every 30 d. The patient underwent hysterosalpingography (HSG), which suggested the presence of a filling-defect of the left uterine cavity, with obstructed bilateral Fallopian tubes. The patient subsequently underwent lysis of adhesions by hysteroscopy plus an exploratory laparoscopy, under general anesthesia. Her menstruation gradually increased to 5–7 d every 30 d. As the patient did not become pregnant during the first year after surgery, she underwent in vitro fertilization (IVF) treatment and a repeat ultrasound showed a somewhat thin endometrial line. At last, the patient got pregnant and gave birth to a live baby by IVF.

**Key words:** cesarean scar pregnancy (CSP); *in vitro* fertilization (IVF)

The incidence of cesarean scar pregnancy (CSP) has increased substantially in recent years because of the rising number and percentage of cesarean sections[1]. CSP is a type of ectopic pregnancy and an example of a long-term complication of cesarean section. Without treatment, uncontrollable massive hemorrhage may occur because of uterine rupture, potentially resulting in hysterectomy or even death[2]. Selective uterine artery infusion with methotrexate (MTX) plus embolization is an effective way to increase the concentration of MTX within the gestation sac, which permits direct action of the drug on the fetus[3].
Embolization with gelatin sponge granules in the uterine artery can block most of the blood supply to the gestation sac, which will lead to necrosis of the villi attached to the uterine incision and eventual death of the fetus. After effective bilateral uterine arterial embolization (UAE), complete curettage of the uterine cavity may be performed under ultrasound guidance, which will reduce the difficulty and risks of the procedure and prevent the occurrence of massive hemorrhage due to CSP, residual pregnancy tissue, or complications such as uterine perforation or rupture. Overall, this approach should minimize injury to the patient, while preserving uterine function and fertility. Serious complications caused by UAE, including aberrant embolization, necrosis, sepsis, hysterectomy vesicovaginal fistula and endometrial atrophy or menopause, have been reported rarely[4].

Herein, we report a case of successful pregnancy by in vitro fertilization and embryo transfer (IVF-ET) after two procedures involving the hysteroscopic lysis of intrauterine adhesions, which were due to UAE, and complete curettage of the uterine cavity for management of a CSP.

Case report

A 35-year-old woman had five previous pregnancies: four artificial (therapeutic) abortions and one delivery by cesarean section. She was admitted 3 years after the cesarean section with a history of amenorrhea for 42 d and a bloody vaginal discharge with lower abdominal pain for 12 d. The following day, hematological results showed a human chorionic gonadotrophin (hCG) level of 16 288.3 IU/L, and pelvic ultrasound showed an anteposition uterus and a 13 mm × 7 mm × 10 mm pregnancy sac (which included the presence of a yolk sac) on the incision in the lower uterine segment. Color Doppler flow imaging showed a CSP, but with no abnormal bleeding and no abnormal mass in either adnexae. Magnetic resonance imaging (MRI) showed abnormal signals at the middle segment of the uterus body, which were consistent with the findings of a CSP.

After explaining the results to the patient, the following treatment options were discussed with her: 1) selective complete curettage of the uterine cavity after multiple doses of MTX chemotherapy; or 2) selective complete curettage of uterine cavity after UAE. The disadvantages of the first option included its long duration and the side effects of chemotherapy. The drawbacks of the second option included the risks of embolization failure, lower limb venous thrombosis, infection secondary to ischemia or necrosis, massive hemorrhage even after complete curettage of the uterine cavity, and hysterectomy if required to control the bleeding. The patient chose the second option. UAE was performed with injection of 50 mg MTX (Jiang Su Heng Rui Medicine Co. LTD) and anhydrous cefazolin following the success of puncture, uterine arteriography was performed. Once the target-vessel was confirmed, 100 mg MTX and 1 g anhydrous Cefazolin (Haikou Qili) was injected slowly,
then gelfoam particles was used to block the uterine artery completely. It was followed 2 d later by complete curettage of the uterine cavity. The curettage was completed without massive hemorrhage, and the tissue obtained was found to be degenerated deciduas and chorial tissue. Repeat hematology testing after surgery revealed a hCG of 8 232.0 IU/L. Three weeks after release from the hospital, the repeat hematology testing showed the hCG had decreased to the normal value. Six months after the curettage, the patient’s menstrual flow was reduced to one non-drenched sanitary pad per day for only 1–2 d, every 30 d. The patient underwent hysterosalpingography (HSG), which suggested the presence of a filling-defect of the left uterine cavity, with obstructed bilateral fallopian tubes. The patient subsequently underwent lysis of adhesions by hysteroscopy plus an exploratory laparoscopy, under general anesthesia. The laparoscopy showed a normal size uterus with a smooth surface, no abnormalities of the either adnexa, no adhesions in the pelvic cavity, and no effusion. The hysteroscopy revealed a barrel-shaped uterine cavity; obvious adhesions on both sides of the uterine wall and extending to the intracervical mouth; and a small muscular adhesion at the fundus of uterus, which was resected by monopolar cauterization to achieve a normal-shaped uterus cavity (Figure 1). The openings of both fallopian tubes could be visualized and 30% of the uterine cavity surface was involved in the adhesions (Figure 1). The surgery was completed without active bleeding, and one block of tampon (anti-adhesion modified chitosan; the Beijing Bailikang Biochemistry Limited Company) was inserted into the uterine cavity to prevent the further development of adhesions.

After surgery, the patient was treated with estrogen (E₂) and progesterone (P) replacement therapy for 4 months. Her menstruation gradually increased to 5–7 d every 30 d.

![Obvious adhesions on both sides of the uterine wall and extending to the intracervical mouth; and a small muscular adhesion at the fundus of uterus, which was resected by monopolar cauterization to achieve a normal-shaped uterus cavity. The openings of both fallopian tubes could be visualized and 30% of the uterine cavity surface was involved in the adhesions.](image1.png)

**Figure 1** The hysteroscopy revealed a barrel-shaped uterine cavity
As the patient did not become pregnant during the first year after surgery, she underwent IVF treatment. A repeat ultrasound showed a somewhat thin endometrial line. The husband’s semen was normal, so IVF-ET was conducted for assisted fertility treatment. After long-protocol down regulation, 225 IU gonadotrophin (Merck Serono) was injected as initiation for 11 d. The endometrial line was thin and unfocused during the entire ovarian stimulation process. A total of 31 oocytes were retrieved and 19 two pronuclei embryos were obtained by normal IVF. After 3 d transferred 2 day-3 embryos, the embryos transfer was successful, whereas 2 other day-3 embryos and 4 day-6 blastocytes were frozen. Eleven other shoddy embryos discarded. On day 12 post-implantation, the blood hCG was 491.5 IU/L. On day 31 post-implantation, ultrasound showed an intra-uterine single pregnancy sac which was not implanted at the scar. Caesarean section were performed successfully on the patient at 38 gestational weeks and a health 3.3 kg weight boy was born. In the operation, it was found that the placenta was attached to the anterior uterine wall and was close to the incision scar. And the placenta and fetal membranes were intact. During the operation manual removal of placenta and adhesion understands art were performed and the amount of bleeding was 300 ml.

Discussion

Serious complications, including vesicovaginal fistula and endometrial atrophy or menopause, occur rarely after UAE\(^4\). In this case report, our patient developed uterine cavity adhesions and a thin endometrium after UAE with MTX plus complete curettage of the uterine cavity. These findings were likely at least partly attributable to reduced elasticity of the uterine vessels caused by ischemia and hypoxia after embolism and thrombosis, which reduced the vessels’ pulse index and resistant index\(^5\).

Although collateral circulation to the uterus arising from communicating branches will develop over time, the uterine blood supply will not return to pre-UAE levels. Hong et al.\(^5\) demonstrated that the quantity of blood flow to the endometrium after UAE was greatly decreased. Despite the development of collateral circulation, the pre-UAE levels of endometrial blood supply were not regained, thereby resulting in thinning of the endometrium. The uterine cavity adhesions observed in this patient might have been due to endometrial infection secondary to the UAE.

Currently, the degree of endometrial thickness essential for a high pregnancy rate has not been established. Some studies have reported that pregnancy is impossible if the endometrial thickness is less than 7 mm\(^6\), whereas other studies have indicated that embryos may be successfully implanted, even on 6 mm thick endometrium\(^7,8\). A total of 155 pregnancies have even been reported with a 4 mm endometrium\(^9\). Zhao et al.\(^10\) showed that the minimal endometrial thickness for a successful pregnancy was 4.8 mm. In our
patient, who underwent hysteroscopy for the treatment of uterine cavity adhesions, no endometrial line was observed on ultrasound examination during the entire process of ovarian stimulation; therefore, the likelihood of pregnancy was thought to be relatively low. However, considering the patient’s normal ovarian function, we conducted IVF-ET treatment, and she successfully became pregnant with good quality embryos. Therefore, for patients with a thin endometrium, the thickness of the endometrium should be increased as much as possible to increase the likelihood of pregnancy. However, if this is not achievable, implantation should not be postponed or cancelled just because of a sub-optimal endometrial thickness, if the patient otherwise has a good ovarian function.

Because of her previous cesarean section and CSP, the patient in this report has a substantial risk for another CSP in the future. Therefore, it is imperative that she be closely followed during any subsequent pregnancy to allow for the early detection and management of potentially severe complications.

In conclusion, we presented a case of successful pregnancy by IVF after bilateral uterine arterial embolization for CSP, which means even the patient with thin endometrium can get pregnant by IVF.

References


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Conference Information

43rd Global Congress on Minimally Invasive Gynecology
November 17th to 21st British Columbia / Vancouver Obstetrics / Gynecology
Contact: American Association of Gynecologic Laparoscopists
Phone: 714-503-6200
Website: http://www.aagl.org/event/16/

2014 Royal College of Obstetricians & Gynaecologists (RCOG) Annual Professional Development Conference
November 18th to 20th United Kingdom / London Obstetrics / Gynecology
Contact: Barbara Mettle-Olympio, Royal College of Obstetricians and Gynaecologists
Phone: 011-44-20-7772-6279
E-mail: bmettle-olympio@rcog.org.uk
Website: http://www.rcog.org.uk/events/annual-professional-development-conference

21st Annual Fall Conference on Challenges in Taking Care of the High Risk Pregnancy
November 19th to 22nd Florida / Marco Island Obstetrics / Gynecology
Contact: Symposia Medicus
Phone: 800-327-3161 or 925-969-1789
Fax: 925-969-1795
Website: http://symposiamedicus.org/Conferences.aspx

6th Asia Pacific Congress on Controversies in Gynecology, Infertility & Ultrasound (COGI)
November 20th to 22nd Vietnam / Ho Chi Minh City Obstetrics / Gynecology
Contact: COGI Secretary, ComtecMed
Phone: 011-972-3-566-6166
E-mail: cogi@comtecmed.com
Website: http://www.cogi.org/vietnam/

Advanced Lower Genital Tract Disorders
November 21st to 23rd Georgia / Atlanta Dermatology, Family Medicine, Obstetrics / Gynecology, Oncology, Pathology
Contact: American Society for Colposcopy & Cervical Pathology
Phone: 301-733-3640
Fax: 240-575-9880
Website: http://www.asccp.org/Education/Future-Meetings-and-Courses-At-a-Glance