

# Clinical analysis of uterine artery embolization combined with double balloon catheter plus curettage for patients with placenta previa who underwent pregnancy termination and suffered antenatal massive hemorrhage in the 2nd trimester

## Three case reports

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### Abstract

**Rationale:** It is very difficult to treat patients with placenta previa who underwent pregnancy termination and suffered antenatal massive hemorrhage in the 2nd trimester.

**Patient concerns:** In this study, case 1 was with fetal malformation of 18-trisomy syndrome at gestation of 19 weeks + 2 days, case 2 was with fetal malformation of 18-trisomy syndrome at gestation of 22 weeks + 1 day, and case 3 was for intrauterine fetal death at gestation of 27 weeks. All the 3 cases were completely placenta previa.

**Diagnoses:** For the 3 patients, completely placenta previa was confirmed by ultrasound examination after hospitalization and underwent pregnancy termination for fetal death or fetal malformation in the 2nd trimester.

**Interventions:** The 3 patients with placenta previa underwent pregnancy termination by mifepristone combined with ethacridine lactate in the 2nd trimester for intrauterine fetal death or fetal malformation from June 2017 to May 2018, and suffered antenatal massive hemorrhage during termination. Uterine artery embolization (UAE) was immediately performed to achieve hemostasis, then double balloon catheter (DBC) was carried out to promote cervical ripen, at last curettage was implemented with the help of ultrasound. After all these procedures, the clinical outcomes were observed.

**Outcomes:** The antenatal bleeding volume of these 3 patients were about 500, 600, and 550 mL. After implementing the combined treatment, all patients completed the abortion. The UAE-DBC time interval and DBC-curettage time interval were 58.4 and 6.0 hours, respectively, for case 1, whereas almost 0 (i.e., immediately) for cases 2 and 3. Case 1 had a fever lasting for 3 days, and the maximum body temperature was up to 39°C after UAE. Moreover, the blood culture was positive for *Escherichia coli* after curettage in case 1, whereas it was negative in the other 2 cases.

**Lessons:** The UAE-DBC-curettage combined treatment is safe and effective for patients with placenta previa who undergo pregnancy termination and suffered massive antenatal hemorrhage in the 2nd trimester. Future studies are needed to advance our observation.

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Consent for publication: Not applicable.

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**Abbreviations:** DBC = double balloon catheter, UAE = uterine artery embolization.

**Keywords:** curettage, double balloon catheter, placenta previa, pregnancy termination, the 2nd trimester, uterine artery embolization

## 1. Introduction

Placenta previa refers to that the placenta partially or completely obstructs the internal orifice of the cervix by lying the lower uterine segment.<sup>[1]</sup> Placenta previa may result in maternal mortality or lead to increased number of maternal morbidities, including massive hemorrhage, infection, adjacent organ damages, and so on.<sup>[1-3]</sup> To avoid life-threatening bleeding, an emergency hysterectomy is necessary.<sup>[4]</sup> It is very difficult to deal with the pregnancy termination of intrauterine fetal death or fetal malformation with placenta previa in the 2nd-trimester termination. Uterine artery embolization (UAE) is often used for the management of primary postpartum hemorrhage.<sup>[5]</sup> Double balloon catheter (DBC) is an effective tool for cervical ripening, which is especially used in cases of uterine scar to increase the rate of vaginal birth after cesarean delivery.<sup>[6]</sup> It is an effective tool for cervical ripening, causing a lower incidence of uterine hyperstimulation than intravaginal prostaglandin E2.<sup>[7]</sup> Dilatation and curettage, which is similar vacuum aspiration, is a common method to induce abortion in early trimester.<sup>[8]</sup>

However, there are limited researches on pregnancy termination in the 2nd trimester with placenta previa following massive hemorrhage. First, UAE was adopted to deal with antenatal massive hemorrhage, then DBC was performed to ripe cervical, and finally curettage was conducted for patient to eliminate placenta and fetus. In our department, the combination method was used to deal with 3 patients with complete placenta previa who underwent pregnancy termination and suffered massive antenatal hemorrhage. It has seldom been reported at present.

## 2. Methods

### 2.1. Pharmacological interventions for pregnancy termination

The 3 patients with complete placenta previa underwent pregnancy termination and suffered massive antenatal hemorrhage in the 2nd trimester at our hospital (Maternal and Child Care Hospital of Hubei Province, a big birth center in China, with annual deliveries of 25,000 in the last 3 years). The patients were managed in the inpatient department of obstetrics. Information was recorded including clinical and obstetric characteristics of the cases, treatment modality, maternal morbidity, clinical outcomes, subsequent recovery menstruation, fertility, and so on.

In our hospital, the common method for the 2nd-trimester pregnancy termination mainly includes oral mifepristone combined with extra-amniotic administration of ethacridine lactate (Rivanol), which is very popular method for medical abortion in China.<sup>[9-11]</sup> Totally, 150 mg of mifepristone were administered to patient in 3 days (each pill contains 25 mg of mifepristone, 2 pills a day), and an injection of 100 mg of ethacridine lactate was performed at approximately 9:00 AM on the 4th day. Then, patients mostly delivered in the following 24–48 hours.

### 2.2. Uterine artery embolization (UAE)

UAE,<sup>[8]</sup> super-selective embolization of both uterine arteries with gelatin sponge particles, was performed by an experienced interventional radiologist. A total of 160 mg of gentamycin was

infused bilaterally into the uterine arteries before the embolism procedure. Postembolization, angiography was conducted to confirm whether the occlusion of the vessels was complete.

### 2.3. Double balloon catheter (DBC)

DBC<sup>[6,12]</sup> is usually used as per the manufacturer's instructions (Cervical Ripening Balloon; Cook OB/GYN, Spencer, IN, USA). It involves 2 balloons. First, the uterine balloon was sent into the lower part of uterine cavity and 40 mL of normal saline solution was injected into the uterine balloon. Then, the vaginal balloon was placed outside the cervical orifice and 40 mL of normal saline solution was injected into vaginal balloon. After vaginal examination, we checked if DBC had been placed normally, then the fluid amount in the cervical balloon and vaginal balloon was alternatively increased by 20 mL each time until both balloons totally reached to 80 mL. DBC was left for maximum 12 hours according to the manufacturer's guidance. The device was removed immediately on the occurrence of any one of the following events, including spontaneous labor, expulsion, spontaneous rupture of membranes, or unexplained vaginal bleeding.

### 2.4. Curettage<sup>[13]</sup>

The doctor checked the uterine by bimanual examination, examined the uterine cavity, and observed the dilation of cervix by vaginal examination. After preoperative antibiotics and paracervical block were offered, the doctor used tooth oval pliers to pull the placenta tissue or part of the fetus gently under the guidance of ultrasound. When the placenta and fetal were basically cleaned, the doctor changed pliers into a large scraper, scratched the uterine wall carefully through the cavity of uterine. The operation was stopped when the wall was felt rough and no residual tissue was seen under ultrasound monitoring. Vacuum aspiration was not used throughout the process. All the procedures were performed by propofol doctor (Y.Z), who had performed at least 1000 normal surgical abortion. Routine gross examination of the uterine contents with placenta and fetus was performed immediately after surgical abortion of curettage.

### 2.5. Ethical review and patient consent

Ethical approval was not thought to be necessary because this is a retrospective study and all the data are dealt only with the patients' medical records and follow-up results by telephone. All included women signed written informed consent for therapeutic procedures and also for the publication of this case report.

## 3. Case reports

### 3.1. Case 1

A 41-year-old pregnant woman, in the 4th pregnancy (para 1, 2 early abortions, and 1 alive children by cesarean section), was referred to our hospital with fetal malformation of 18-trisomy syndrome at gestation of 19 weeks+2 days in June 2017. Ultrasound examination showed completely placenta previa. The bleeding time was day 4 after 3 days of oral mifepristone and

4 hours after the injection of 100 mg ethacridine lactate into amniotic cavity, with a hemorrhage volume of 500 mL. UAE was performed immediately to deal with antenatal massive hemorrhage and vaginal bleeding. Twelve hours after UAE, the cervical length was 3.0 cm and the Bishop scores were 3, then a pill of misoprostol was inserted into vagina every 12 hours (each pill contains 200  $\mu$ g of misoprostol), with totally 4 pills used. The patients had a fever lasting for 2 days and the maximum body temperature was up to 38.3°C. Then, DBC was inserted to ripen cervical for 12 hours. The duration time from UAE to DBC inserted was 58.4 hours. The cervix was dilated by 1.0 cm after removing the DBC. The temperature was up to 39°C. Six hours later curettage was implemented under ultrasound monitoring. The placenta and fetus were characterized by odor. The volume of hemorrhage during curettage was 110 mL. The operation time for curettage was 30 min without causing any damage to cervix. Finally, the patient was diagnosed as septicemia by blood culture with *Escherichia coli*, with a C-reactive protein level of 123.7 mg/L, WBC of  $19.5 \times 10^9$ /L and maximum body temperature of 39°C. Antibiotics of imipenem and cilastatin (2.0, Bid, iv) were used since the onset of fever and then kept for 14 days, and the body temperature dropped to normal immediately. The level of hemoglobin was declined from 132 g/L (Admission) to 117 g/L (Discharge). The duration of hospitalization was 26 days. Ultrasound examination showed no placenta residue or fetus residue on the discharge day. The vaginal bleeding after curettage was lasted for 10 days. The time interval between curettage and regular menstruation was 45 days. It took 14 days to restore the  $\beta$ -HCG level from curettage to normal.

### 3.2. Case 2

A 26-year-old pregnant woman, in the 2nd pregnancy (para 0, 1 early abortion), was referred to our hospital for fetal malformation of 18-trisomy syndrome at gestation of 22 weeks + 1 day in September 2017. Ultrasound examination showed completely placenta previa. The bleeding time was day 3 after oral mifepristone for the 5th pill (without ethacridine lactate) and the volume of hemorrhage was 600 mL. UAE was carried out immediately to stop the bleeding. After UAE, vaginal examination was conducted, showing that the cervical length was 4.0 cm and the Bishop scores were 2. Then, DBC was inserted 12.5 hours after UAE and kept for 12 hours. The cervix was dilated by 2 cm after removing the DBC. Curettage was implemented under ultrasound monitoring immediately after removing the DBC. The volume of hemorrhage during curettage was 140 mL. The operation time for curettage was 15 min without causing damage to cervix. Antibiotics of Penicillin (800 MIU, Qd, iv) was used for 3 days after curettage. The body temperature was normal during hospitalization. The C-reactive protein level was 1.7 mg/L (normal) and WBC was  $9.5 \times 10^9$ /L when curettage. The level of hemoglobin was decreased from 112 (admission) to 99 g/L (discharge). The duration of hospitalization was 9 days. Ultrasound examination showed no placenta residue or fetus residue on the discharge day. The vaginal bleeding after curettage was lasted for 5 days. The time interval between curettage and regular menstruation was 50 days. It took 21 days to restore the  $\beta$ -HCG level from curettage to normal. No blood culture or mifepristone was used for case 2. After 1-year, the patient had a spontaneous pregnancy according to follow-up examination via telephone.

### 3.3. Case 3

A 45-year-old pregnant woman, in the 6th pregnancy (para 1, 4 early abortion, and 1 alive children by cesarean section), was

referred to our hospital for intrauterine fetal death at gestation of 27 weeks in May 2018. Ultrasound showed completely placenta previa. The bleeding time was day 2 after oral mifepristone for the 4th pill (without ethacridine lactate) and the volume of hemorrhage was 550 mL. UAE was carried out immediately to deal with the bleeding. After UAE, the cervical length was 3.5 cm and the Bishop scores were 2, then DBC was inserted 5.0 hours after UAE and kept for 12 hours. The cervix was dilated by 2.5 cm after removing the DBC. Curettage was implemented under ultrasound monitoring immediately after removing the DBC. The volume of hemorrhage during curettage was 200 mL. The operation time for curettage was 10 min without causing any damage to cervix. Antibiotics of Penicillin (800 MIU, Qd, iv) was used for 3 days after curettage. The body temperature was normal during hospitalization. The level of C-reactive protein was 2.5 mg/L (normal) and WBC was  $9.8 \times 10^9$ /L when curettage. The level of hemoglobin was decreased from 110 (admission) to 94 g/L (discharge). The duration of hospitalization was 6 days. Ultrasound examination showed no placenta residue or fetus residue on the discharge day. The vaginal bleeding after curettage was lasted for 6 days. The time interval between curettage and regular menstruation was 52 days. It took 21 days to restore the  $\beta$ -HCG level from curettage to normal. No blood culture or mifepristone was used for case 3 either.

## 4. Discussion

Mifepristone combined with ethacridine lactate is a very common therapy used for pregnancy termination in the 2nd trimester in China.<sup>[14–15]</sup> This therapy method is also used in patients with low placentation or/and prior cesarean.<sup>[9]</sup> It is very important and also very difficult to deal with antenatal massive hemorrhage of patients with placenta previa who undergo pregnancy termination in the 2nd trimester. In some cases, hysterectomy is needed to stop the life-threatening bleeding. Based on prenatal diagnosis by magnetic resonance imaging and ultrasound, appropriate multidisciplinary clinical decisions can minimize potential maternal morbidity and mortality.<sup>[16–17]</sup>

Cui et al<sup>[18]</sup> reported that with the application of UAE, medication of mifepristone, misoprostol, and ethacridine lactate, and curettage under ultrasound guidance, uterus preservation was achieved in all 26 patients with placenta accreta spectrum disorders who underwent pregnancy termination in the 2nd trimester. Li et al<sup>[8]</sup> found that the UAE followed by dilation and curettage was effective in decreasing the overall complication rate of massive hemorrhage, uterine perforation, artificial abortion syndrome, incomplete abortion, uterine adhesion, and so on. Embolization provides temporary occlusion of the vessels for 2–6 weeks, which makes it possible to perform surgical-induced abortion after UAE.<sup>[19–21]</sup> The ripening of cervical is difficult in some cases by oral mifepristone or oral mifepristone combined with extra-amniotic administration of ethacridine lactate. Some studies<sup>[6,22–23]</sup> have specifically reported on the use of DBC for cervical ripening among women with previous cesarean and an unfavorable cervix. The results show that DBC is useful and safe, which results an increase in the Bishop score of patients' cervix but no increased risk of perinatal adverse events, such as cesarean delivery rate, neonatal outcome, and so on.

In our study, the Bishop scores of the case 1 was low after mifepristone plus ethacridine lactate and UAE, and the surgical induced abortion by curettage could not be performed smoothly without DBC at first. But after UAE, the uterus was hypoxic, the placenta and fetus remained in the uterus, which led to

intrauterine infection, fever, and even septicemia. Therefore, DBC was performed to ripen cervix 58.4 hours after UAE for the first time. Through 12 hours of mechanical dilation of the cervix by DBC, the dilation of cervix was 1 cm by vaginal examination. After waiting for 6 hours the dilation of cervix was still 1 cm, then doctor could do curettage smoothly to remove the odorous placenta tissue and fetus completely by ultrasound monitoring. Based on the experience of case 1, DBC and curettage were carried out step by step immediately on cases 2 and 3, so no intrauterine infection, fever, and sepsis was observed.

UAE combined with DBC plus curettage is a safe and effective therapy for patients with placenta previa who underwent pregnancy termination and suffered antenatal massive hemorrhage in the 2nd trimester. This combined therapy is a substitution for hysterotomy or hysterectomy in treating life-threatening bleeding or infection.

Limitations: This report includes a small sample size; hence, the results and conclusion should be interpreted with caution. Regarding life-threatening condition, a randomized trial is needed to compare the uses and side effects of the combined therapy of USA, DBC, and curettage. At the same time, such dangerous condition is very rare and the collection of patient's data is difficult, so large multicenter study may be necessary in the future.

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## Author contributions

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