



# Effect of uterine arterial embolization on the ovarian function in puerpera with postpartum hemorrhage

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## ABSTRACT

**Objective:** To observe the hemostatic effect of uterine arterial embolization in the treatment of postpartum hemorrhage and the effect on menstruation, sex hormone level, ovarian function, and pelvic floor function. **Methods:** A total of 45 patients with postpartum hemorrhage who were admitted in the Department of Obstetrics of our hospital from January, 2014 to June, 2016 for uterine arterial embolization were included in the study and served as the treatment group. The postoperative menstruation recovery was recorded. The hormone levels, ovarian function, and pelvic floor function before and after treatment were recorded. A total of 42 normal puerpera were served as the control group. The menstrual status of the two groups after menstruation was compared. **Results:** Rapid and effective hemostasis could be obtained from patients in the treatment group after treatment with hemostasis success rate of 100%. The comparison of menstruation cycle and menstruation days after treatment between the two groups was not statistically significant. The levels of E<sub>2</sub>, P, FSH, LH and PRL, ovarian function index RI and PI, pelvic floor muscle fatigue and vaginal dynamic pressure before and after 3 and 6 months had no significant difference, and there was no significant difference between the 2 groups. **Conclusions:** Uterine arterial embolization in the treatment of postpartum hemorrhage is effective, and has no influence on the patient's menstrual conditions, sex hormone levels, ovarian and pelvic floor functions; therefore, it is worthy of clinical application.

## 1. Introduction

Postpartum hemorrhage refers to that the amount of bleeding after delivery within 24 h is greater than 500 mL, exceeding 1 000 mL by cesarean section, and is one of the most serious complications during the delivery period. According to the statistics[1,2], 2%-3% postpartum hemorrhage will occur, and is a leading cause for the maternal death. The conservative therapy is mostly adopted in the clinic. Hysterectomy is required if the efficacy is poor, but uterus removal will cause bad effects on the endocrine function and physical health; therefore, it is difficult to be accepted by

the patients. The clinical application of vascular intervention in the gynecology and obstetrics renders more selections for the postpartum hemorrhage. The vascular interventional treatment is characterized by small trauma, good hemostatic effect, and rapid recovery, and can effectively preserve the fertility function, with a predominant treatment advantage[3,4]. The study is aimed to observe the hemostatic effect of uterine arterial embolization in the treatment of postpartum hemorrhage and the effect on menstruation, sex hormone level, ovarian function, and pelvic floor function.

## 2. Materials and methods

### 2.1. General materials

A total of 45 patients with postpartum hemorrhage who were admitted in the Department of Obstetrics of our hospital from

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January, 2014 to June, 2016 for uterine arterial embolization were included in the study and served as the treatment group, aged from 24 to 36 years old; gestational week from 36 to 43 weeks with an average week of (38.55±1.81) weeks; 26 had vaginal delivery, and 19 had cesarean section; 25 were primipara, and 20 were multipara. Inclusion criteria: (1) those who were ineffective by non-operation treatment, with postpartum amount of bleeding exceeding 1 000 mL; (2) those whose first postpartum amount of bleeding was exceeding 500 mL; (3) those who were merged with other diseases but not affecting the femoral artery puncture. Exclusion criteria: (1) those who had unstable vital signs; (2) those who were allergic to X-ray contrast agents; (3) those who had serious heart, liver, and kidney diseases; (4) those who had severely abnormal coagulation function; (5) those who were merged with acute and chronic infectious disease; (6) those who had poor compliance. A total of 42 puerpera with normal delivery were served as the control group, aged from 25 to 36 years old; gestational week from 37 to 42 weeks with an average week of (38.14±1.75) weeks; 24 had vaginal delivery, and 18 had cesarean section; 23 were primipara, and 19 were multipara. The comparison of age, gestational week, and delivery ways between the two groups was comparable ( $P>0.05$ ).

## 2.2. Methods

The blood, urine, and stool routine examinations, liver and renal functions, coagulation function, and electrolytes before operation in the treatment group were performed. Under the monitoring of DSA, the most obvious place of femoral arteriopalms 2 cm below the midpoint of right inguinal ligament was served as the puncturation point. Routine disinfection, towel spreading, and local anesthesia were performed. The right femoral artery was punctured by Seldinger's technology, and 4F arterial sheath was placed. 4F Cobra catheter was placed into the lower segment of abdominal aorta through the arterial sheath, and the contrast agent (16 mL) was injected with a speed of 8 mL/s in order to display the pelvic vessel distribution and definite the bleeding part. Then the catheters were inserted into the bilateral uterine arteries which were injected with 350-560  $\mu$ m gelatin sponge granules after radiography. The uterine artery bleeding was monitored by DSA. The slow blood or blood stopping could be regarded as the successful embolization. After operation, the pressure dressing in the puncturation site and immobilization processing for 9-12 h were performed. Meanwhile, the lower limb skin temperature was closely measured, and the dorsalis pedis pulse was observed and recorded.

**Table 1.**

Comparison of the serum sex hormone levels before and after treatment between the two groups.

Groups	n	Time	E <sub>2</sub>	P	FSH	LH	PRL
Treatment group	45	Before treatment	69.58±7.04	0.96±0.36	11.35±3.25	9.65±3.27	19.77±4.22
		3 months after treatment	68.47±6.95	1.02±0.34	11.28±3.18	9.71±3.21	20.15±4.31
		6 months after treatment	70.21±6.91	0.98±0.47	11.30±3.20	9.58±3.80	18.99±4.35
Control group	42	Before treatment	69.82±6.33	0.95±0.37	11.24±3.17	9.88±3.18	20.02±4.26
		3 months after treatment	68.64±7.01	0.94±0.39	10.98±3.21	9.84±3.40	20.11±4.27
		6 months after treatment	70.19±6.88	1.03±0.42	10.97±3.24	9.76±3.55	19.04±4.18

## 2.3. Observation indicators

The menstruation cycle and menstruation days after menstruation recovery in the two groups were recorded and compared. A volume of 5 mL morning fasting venous blood before treatment and 3 and 6 months after treatment in the two groups was collected, and centrifuged at 3 500 r/min for the serum. The specimen was preserved at -80 °C for detection. The chemiluminescence method was used to detect the serum E<sub>2</sub>, FSH, P, PRL, and LH levels, and the various indicators before and after treatment were compared. The color Doppler ultrasound was used to detect RI and PI of ovarian artery before treatment, 3 and 6 months after treatment, and the hemodynamic indicators were compared. PhenixU4 neuromuscular electric stimulation treatment apparatus was used to detect the pelvic floor muscle fatigue and vaginal dynamic pressure before treatment and 6 months after treatment in the two groups in order to evaluate the pelvic floor function.

## 2.4. Statistical analysis

SPSS 20.0 software was used for the statistical analysis. The measurement data were expressed as mean ± SD. The paired t test was used for the intra-group comparison before and after treatment, and the independent t test was used for the comparison between the two groups.  $P<0.05$  was regarded as statistically significant.

## 3. Results

### 3.1. Hemostasis and menstruation recovery

The patients in the treatment group had rapid and effective hemostasis after embolization treatment, with hemostasis success rate of 100%. The menstrual cycles after menstruation recovery in the treatment group and control group were (30.43±2.41) d and (32.56±2.84) d, respectively, and menstruation days of (6.05±0.61) d and (6.11±0.73) d, respectively. The comparison of menstrual cycle and menstruation days between the two groups was not statistically significant ( $P>0.05$ ).

### 3.2. Comparison of the serum sex hormone levels before and after treatment between the two groups

The comparison of E<sub>2</sub>, P, FSH, LH, and PRL before treatment, 3 and 6 months after treatment between the two groups was not statistically significant ( $P>0.05$ ) (Table 1).

### 3.3. Comparison of hemodynamic indicators of ovarian artery before and after treatment between the two groups

The comparison of RI and PI before treatment, 3 and 6 months after treatment between the two groups was not statistically significant ( $P>0.05$ ), and the intra-group comparison was also not statistically significant ( $P>0.05$ ) (Table 2).

**Table 2.**

Comparison of hemodynamic indicators of ovarian artery before and after treatment between the two groups.

Groups	n	Time	RI	PI
Treatment group	45	Before treatment	0.62±0.29	1.07±0.55
		3 months after treatment	0.65±0.24	1.12±0.56
		6 months after treatment	0.60±0.31	1.09±0.53
Control group	42	Before treatment	0.63±0.31	1.09±0.48
		3 months after treatment	0.64±0.27	1.14±0.57
		6 months after treatment	0.66±0.28	1.11±0.54

### 3.4. Comparison of the pelvic floor function before and after treatment between the two groups

The comparison of pelvic floor muscle fiber fatigue and vaginal dynamic pressure before treatment, 3 and 6 months after treatment between the two groups was not statistically significant ( $P>0.05$ ), and the intra-group comparison was also not statistically significant ( $P>0.05$ ) (Table 3).

## 4. Discussion

Postpartum hemorrhage refers to that the amount of bleeding after delivery within 24 h is greater than 500 mL, exceeding 1 000 mL by cesarean section, is a kind of emergency and severe disease of obstetrics, and may endanger the patients' life with no timely and effective processing due to its urgent onset and rapid progression. Repeated hemorrhage is the common manifestation of postpartum hemorrhage, and only few patients have abrupt vaginal hemorrhage, with amount of bleeding exceeding 1000 mL, and even reaching 2 000-3 000 mL, which can cause hemorrhagic shock and even death[5,6].

Uterine arterial embolization is acknowledged as an effective measure in the treatment of postpartum hemorrhage, with small trauma and outstanding hemostatic effect, is safe and reliable. The

main treatment mechanism of uterine arterial embolization is that effective embolization to the bleeding artery can block the local blood supply or provide insufficient blood supply to produce a preferable hemostatic effect[7,8].

The menstruation in normal females is regulated by hypothalamus-hypophysis-ovary-uterus axis; moreover, the elevation of estrogen and progesterone secreted by the ovary can significantly inhibit the hypothalamus in order to reduce LH and FSH levels[9-11]. Some scholars argue that[12] due to the ovarian branch, embolization of uterine artery can cause insufficient ovarian blood supply, which can reduce the ovarian function and induce premature ovarian failure in a serious condition. Some researches demonstrate that[13] uterine arterial embolization was performed for 35 patients with postpartum hemorrhage, and the results showed that the menstruation in 62.8% patients was recovered normal 2-3 months after operation, the menstruation was returned in 22.9% patients 4-8 months after operation, the menstruation was recovered in 14.3% patients 12 months after operation, the menstruation amount was recovered normal 12 months after operation in all patients, with normal periodical rhythm; moreover, the hormone level after treatment can recover normal. The results in the study showed that the comparison of menstrual cycle and menstruation days after menstruation recovery between the two groups was not statistically significant ( $P>0.05$ ), and the comparison of the hormone levels between the two groups was also not statistically significant ( $P>0.05$ ), indicating that uterine arterial embolization in the treatment of postpartum hemorrhage has a preferable hemostatic effect, and will not produce obvious effect on the menstruation and sex hormone secretion, which is associated with that due to the selection of appropriate gelatin sponge granule as embolism agent, the ovarian blood supply is temporarily changed during operation, which can produce less damage on the ovarian function[14,15]. Moreover, the results in the study showed that the comparison of RI and PI before treatment, 3 and 6 months after treatment between the two groups was not statistically significant ( $P>0.05$ ), showing that uterine arterial embolization in the treatment of postpartum hemorrhage can reduce the ovarian blood perfusion amount, but will not affect the ovarian function, and meanwhile can effectively maintain the vaginal tightening degree[16,17].

In conclusion, uterine arterial embolization in the treatment of postpartum hemorrhage is effective, and has no influence on the patient's menstrual conditions, sex hormone levels, ovarian and pelvic floor functions; therefore, it is worthy of clinical application.

**Table 3.**

Comparison of the pelvic floor function before and after treatment between the two groups.

Groups	n	Time	I type muscle fiber fatigue	II type muscle fiber fatigue	Vaginal dynamic pressure
Treatment group	45	Before treatment	-0.47±1.71	-0.24±0.81	78.55±23.01
		3 months after treatment	-0.51±1.68	-0.19±0.80	79.16±23.15
		6 months after treatment	-0.46±1.59	-0.15±0.77	79.27±22.98
Control group	42	Before treatment	-0.43±1.72	-0.22±0.78	78.49±23.08
		3 months after treatment	-0.50±1.64	-0.19±0.86	79.43±23.22
		6 months after treatment	-0.58±1.70	-0.18±0.82	79.47±22.49

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