Clinical effect of uterine artery embolization in the treatment of refractory postpartum hemorrhage

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Abstracts. This study is to investigate the clinical effect of uterine artery embolization in the treatment of refractory postpartum hemorrhage. Retrospective analysis of 50 patients with refractory postpartum hemorrhage admitted to PLA Group 83 Military Hospital from July 2014 to July 2018, using uterine artery embolization (observation group) and hysterectomy (control group), compared the effective rate of hemostasis, total bleeding volume, operation time and postoperative complications (fever, pain, infection) between the two groups. The effective rate of hemostasis was 96% in the observation group and 92% in the control group. There was no significant difference between the two groups (P > 0.05). The total blood loss was 2237.34 ±548.33 ml and 39.02 ±12.14 min in the observation group and 3427.55 ±667.42 ml and 74.21 ±16.16 min in the control group. There was significant difference between the two groups (P < 0.05). The postoperative complications of the observation group were lower than that of the control group (P <0.05). The two methods are effective in the treatment of refractory postpartum hemorrhage, but uterine artery embolism has the advantages of less bleeding, short operation time and rapid recovery after operation, which is worthy of clinical application.

1. Introduction
Postpartum hemorrhage is one of the most important causes of maternal death. In recent years, the development of medical technology has reduced the incidence of postpartum hemorrhage, but for patients with refractory postpartum hemorrhage, the clinical effect is poor. Hysterectomy is often performed to save the lives of parturients. Although this method is effective, it brings great mental and psychological trauma at the cost of the loss of maternal organs. With the development of interventional technology and its application in obstetrics and gynecology, it provides a new method for the treatment of refractory postpartum hemorrhage, and the curative effect has been gradually recognized by clinic. In this study, 50 patients with refractory postpartum hemorrhage undergoing hysterectomy and interventional therapy were analyzed retrospectively. the outcome of interventional therapy for refractory postpartum hemorrhage was discussed.

2. Data and methods

2.1. General information
From July 2014 to July 2018, 50 cases of refractory postpartum hemorrhage were treated in obstetrics and gynaecology of the 83rd Army of PLA. According to the method of random digital table, there
were 25 cases in the observation group and 25 cases in the control group. The age of the observation group was 21-36 (25.32±3.25) year. The age of the control group was 22 ≤ 36 (24.12 ±3.05) years. Observation group gestation week34^{12}-40^{13} (38.21±2.47) circumference. Control group gestational age35-40^{1} (38.73±2.10) circumference. The amount of blood loss before the operation of the observation group1400-3200 (1602.91±78.61) ml. Preoperative bleeding volume in the control group1400-3300 (1689.06±76.45) ml. In the observation group, 13 cases, 12 cases of cesarean section, 15 cases of the control group and 10 cases of cesarean section were observed. The cause of postpartum hemorrhage in the observation group: 19 cases of uterine contraction and 6 cases of placenta factor; the cause of postpartum hemorrhage in the control group: 17 cases of uterine contraction and 8 cases of placenta factor. The causes of age, gestational weeks, pre-operative blood loss, delivery and post-partum hemorrhage of the two groups were statistically treated (P <0.05) and were comparable.

2.2. Diagnostic criteria for refractory postpartum hemorrhage [1]

The blood loss in the 24 h after the birth of the fetus is more than 1000 ml with low blood volume, and the hemostatic effect is poor after using the conservative treatment methods such as the uterine contraction agent and the continuous uterus massage, and the surgical operation, the interventional treatment and even the hysterectomy are required.

2.3. Therapeutic method

The patients in the observation group were treated with uterine artery embolism. Routine disinfection, towel laying and local anesthesia were performed under ECG monitoring. Seidinger puncture technique was used to place catheter in the right thigh artery. Then 5F cobra1 catheter was introduced into the guide wire to insert the 1~3cm at the bifurcation level of the lower segment of the abdominal aortic. 12 mL of the developer was injected at the speed of 6mLs, and the digital subtraction angiography images were taken to determine the direction of the internal ilium artery and uterine artery, as well as the location of the bleeding. Then the catheter was inserted into the uterine artery of the bleeding side, and the gelatin sponge particles with diameter 1-3mm were selected and slowly injected into the uterine artery. The control group was treated with hysterectomy, including 21 cases with total hysterectomy and 4 cases with subtotal hysterectomy.

2.4. Observation index

The observation indexes are based on hemostatic efficiency, total blood loss, operation time, postoperative complications (fever, pain, infection).

2.5. Statistical method

The software of SPSS19.0 is used for statistical analysis, and the measurement data is t-test. Results mean ±standard deviation. The results showed that there was significant difference between the two groups (P < 0.05), and there was significant difference between the two groups (P < 0.05).

3. Results

Comparison of hemostatic effective rate between observation group and control group (see table 1).

| Group            | n effective rate of hemostasis |
|------------------|-------------------------------|
| Observation group| 25                            | 24 (96) ▲               |
| Control group    | 25                            | 23 (92)                |

Note: compared with the control group, ▲ P>0.05
Comparison of total blood loss and operation time between observation group and control group (see table 2); and the postoperative complications of the observation group and the control group were compared (see table 3).

Table 2. Total bleeding volume and operation time in the two groups ($\overline{X} \pm S$)

| Group            | n  | Total bleeding volume (ml) | Operation time (min) |
|------------------|----|----------------------------|----------------------|
| Observation group| 25 | 2237.34±548.33            | 39.02±12.14          |
| Control group    | 25 | 3427.55±667.42            | 74.21±16.16          |

Note: compared with the control group, ● P<0.05, ◆ P<0.05

Table 3. Postoperative complications in both groups

| Group           | n | Fever | Pain | Infect |
|-----------------|---|-------|------|--------|
| Observation group| 25 | 12 (48) | 14 (56) | 1 (4) |
| Control group   | 25 | 20 (80) | 22 (88) | 3 (12) |

Note: compared with the control group, ▲ P<0.05, ● P<0.05, ◆ P<0.05

4. Discussion

Postpartum hemorrhage is a common complications in obstetrics and the leading cause of maternal death in China. The main causes were uterine atony, placental factors, soft birth canal injury and coagulation dysfunction. Massive hemorrhage can often secondary hemorrhagic shock, and even complicated with disseminated intravascular coagulation (DIC), multiple organ dysfunction, endangering the life of parturients. Most of the patients can achieve good results after non-surgical treatment, such as promoting uterine contraction drugs, hemostatic drugs, clearing uterus, uterine gauze filling, correcting coagulation function and so on, but there are still a few patients who need surgical intervention, that is, refractory postpartum hemorrhage, which is a serious complications after delivery [2].

In the case of refractory postpartum hemorrhage, the double-sided intra-arterial ligation and the bilateral uterine artery ligation are the most common operation methods, but the technique of ligation of the bilateral intra-arterial artery is difficult, the risk of the internal and peripheral nerves is damaged, and the distal lumen of the intra-aortic artery is not locked. The blood flow can be passed through the non-locked lumen of the internal carotid artery to the uterine artery through the rest of the traffic, so that the rebleeding can occur, and the success rate of the operation is only 42% [3]. Uterine artery ligation is generally only suitable for uterine contractile bleeding. For placenta previa, the lower uterine segment is not suitable for hemostasis [4]. Hysterectomy is an effective method for the treatment of refractory postpartum hemorrhage, but hysterectomy not only loses the fertility of parturients, but also affects the endocrine regulation between uterus and ovaries, and then affects the function of ovaries. Its physical and psychological stress on parturients is inestimable, seriously affecting the quality of life of parturients [5]. And when the patient has abdominal hematomas, pelvic adhesions and other anatomical abnormalities, the difficulty of the operation will be increased, and the effect of the operation will be greatly reduced. Interventional therapy is a method for the diagnosis and treatment of the organs and tissues in which the lesion is located by using modern medical image-oriented techniques such as ultrasound, (CT), nuclear magnetic resonance (MRI), X-ray and so on. In 1988, Deng Jianlin has made great progress in the treatment of postpartum hemorrhage with the improvement of interventional technique and the advantages of post-partum hemorrhage. In particular to that treatment of refractory postpartum hemorrhage shock Interventional therapy is introduced into the catheter by puncture. After angiography shows the bleeding site, the embolic agent embolizes the end of the artery to the trunk and atresia the whole arterial lumen to effectively control the bleeding. Embolic agent can obliterate the artery of bleeding, reduce the arterial pressure, and then slow down
the blood flow, which is beneficial to thrombosis. At the same time, due to the decrease of uterine blood supply, uterine smooth muscle fiber ischemia and hypoxia lead to the enhancement of contraction and control of bleeding [6]. In order to avoid the ischemic necrosis of normal tissue caused by embolism and hemostasis, gelatin sponge particles with diameter 1~3mm are often selected. Gelatin sponge is a kind of non-toxic, antigenicity, transient embolism material. When the anterior trunk of internal ilium artery or uterine artery is embolized, gelatin sponge particles can only be emboziled to the peripheral artery, and the anterior capillary artery and capillary bed can not be embolized. Some blood supplies can be obtained through other pelvic organs such as communicating branch, uterus, ovary, bladder and so on, and can be absorbed again after 2 to 3 weeks. Embolization of internal ilium artery (internal iliac artery embolization, IAE)Uterine artery embolism(uterial artery embolization, UAE)There are two kinds of methods. Because the internal ilium artery supplies blood from pelvic organs such as uterus, bladder, rectum and so on, its branches are widely distributed in ilium, waist, buttocks, anus, perineum and other parts, so the complications after embolism are serious and wide, mainly hip pain, nerve injury and ectopic embolism. However, uterine artery embolism has high accuracy and relatively mild complications, such as uterine pain and postoperative low fever. Therefore, the author believes that for patients with postpartum hemorrhage, such as patients with stable vital signs and skilled embolism technology, in order to reduce the occurrence of complications, UAE. should be selected as far as possible. When the amount of bleeding is large, the bleeding site is diffused or the operation is not skillful, it is better to do IIAE so as not to delay the rescue time. For parturients with refractory postpartum hemorrhage, uterine artery embolism can be performed in time to reduce postpartum hemorrhage if conservative treatment fails. It has the following advantages: (1) small trauma. The operation can be completed by percutaneous catheterization from the thigh artery, which avoids the great tissue trauma caused by laparotomy. Most of the postoperative complications were mild fever, different degrees of buttocks, perineum and thigh distension and pain, which laid the foundation for postoperative rehabilitation. (2) Accurate hemostasis. The interventional technique can clearly display the bleeding site, the blood vessel direction, the range and the like, so as to select the corresponding blood vessel plug, the success rate of the vascular embolization is high, and the hemostasis is accurate. (3) The operation time is short. The treatment has the advantages of directly embolizing the bleeding blood vessels, avoiding the blindness of the treatment, and obtaining the time for rescuing the patients. (4) Improving the quality of life of the patient. The treatment retains the uterus and preserves the reproductive function of the patient. The embolization agent used in the treatment was gelatin sponge, which was degraded for 2-3 weeks and the function of the uterus was completely restored. And the effect of the radiation dose on the ovary in interventional therapy is mild, transient and reversible in patients with normal endocrine function [7]. Liu Ping et al. [8] considered that the radiation dose accepted in the pelvis was 16.64cGY in bilateral uterine artery embolism, which was much lower than that in ovarian injury dose 2000 ≤ 3000cGY. It was found that there was no difference in postoperative lochia and menstruation between the interventional treatment group and the normal delivery group (P > 0.05). (5) it is beneficial to the patients with coagulation dysfunction. The patients with coagulation dysfunction are the absolute contraindications of laparotomy. The treatment only needs to puncture the femoral artery, the wound is small, the bleeding is less, and the thigh artery is superficial, so it is easy to press and stop bleeding. For DIC patients, to ensure effective correction of DIC, active and decisive thrombus treatment can block the development of the disease as soon as possible and improve the effect of interventional therapy. In this clinical trial, the effective rate of hemostasis in uterine artery embolism group was not significantly different from that in total hysterectomy group (P > 0.05), but it was superior to total hysterectomy group in total blood loss, operation time and postoperative complications (P < 0.05).

To sum up, uterine artery embolism is effective in the treatment of refractory postpartum hemorrhage. In clinic, interventional therapy should be selected decisively and accurately for this kind of parturients, while saving the lives of patients to the greatest extent, the fertility function of patients should be preserved, the quality of life should be improved, and it is worth popularizing and applying in hospitals with equipment conditions and technical strength.
5. References

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