

THE EFFECTIVENESS OF ENDOVASCULAR AND SURGICAL METHODS OF HEMOSTASIS IN PATIENTS WITH HIGH RISK OF POSTPARTUM HEMORRHAGE

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Obstetric postpartum hemorrhage is the leading cause of maternal mortality worldwide. Developing countries have a disproportionately high rate of fatal bleeding compared to industrialized countries. In most cases, early postpartum bleeding leads to death. In order to reduce mortality from postpartum bleeding, it is necessary to identify patients at high risk, accurately analyze blood loss and life indicators, correctly choose therapy and surgical methods of hemostasis. Temporary balloon occlusion of internal iliac arteries, embolization of uterine arteries, ligation of internal iliac arteries are modern organ-preserving methods of prevention and relief of postpartum bleeding. These techniques are also effective in cases of obstetric bleeding to create a complete hemostasis or reduction of blood flow at the time of the hysterectomy. Comparison of endovascular and surgical methods of hemostasis in two groups of patients with high risk for early postpartum hemorrhage, such as: cesarean section in anamnesis, placenta previa, anterior location of placenta, increment and rotation of the placenta, has shown high clinical efficacy of endovascular methods, such as temporary balloon occlusion of internal iliac arteries and uterine artery embolization.

Keywords: postpartum hemorrhage, a temporary balloon occlusion, uterine artery embolization, ligation of internal iliac arteries

Postpartum obstetric hemorrhage plays a key role in the structure of maternal mortality worldwide. The maternal mortality rate in 2015 is 303,000 women who died during and after pregnancy and childbirth, reflecting a 43.9% decline between 1990 and 2015 [4]. Almost all fatal cases of PPH were noted in countries with low income, and most of them are recognized as preventable. Developing countries have a disproportionately high rate of fatal haemorrhages, accounting 99% of the global structure, in comparison with industrialized countries, where rate is about 1% [5]. Improving the quality of health care for women in childbirth for the prevention and treatment of postpartum bleeding is a crucial step towards achieving the UN Millennium development goals [11].

In most cases, early postpartum bleeding leads to death. [10.3]. The risk factors for postpartum bleeding include: placenta previa, caesarean section, a history of postpartum bleeding, a history of multiple pregnancy, the elongation of the third stage of labour, retained placenta and its parts in the uterus, preeclampsia, mid-lateral episiotomy, weakness of patrimonial activity, a trauma of the birth canal, a large fetus, operative vaginal delivery, hypertension, chronic anemia, low socio-economic background, maternal age older than 35 years, uterine fibroids [3,6]. The causes of early postpartum bleeding are: violation of uterine contraction; delay of parts of the placenta or blood clots in the uterine cavity; trauma of the birth canal, uterus, vagina; pre-existing or acquired coagulopathy. The causes of late postpartum

bleeding include: postpartum infection, hereditary hemostatic defects, the presence of placental tissue residues, subinvolution of the uterus [8].

Strategy in reducing mortality from postpartum hemorrhage include: identification of high-risk patients, analysis of the state of childbed a precise assessment of blood loss and vital signs, the correct choice of drugs, methods of treatment, transfusion therapy and if necessary surgery in the early stages of postpartum bleeding [7]. Knowledge of vascular anatomy of the pregnant uterus helps to evaluate the effectiveness of various methods of hemostasis in advance and choose the best one for each specific clinical case, due to the variety of collaterals of the vascular bed. Preference is given to organ-preserving methods of surgical treatment aimed at reducing blood loss, and providing the possibility of minimally invasive operations with preservation of reproductive function, such as balloon occlusion of the internal iliac arteries (BOIIA), uterine artery embolization (EUA), as well as the use of autohemotransfusion [2].

Balloon catheters installed in both internal iliac arteries are relatively safe and in most cases effective method for the prevention and treatment of bleeding in the postpartum period [1]. Favorable outcomes are also described in the application of bilateral ligation of the internal iliac arteries. This technique is effective in cases of obstetric bleeding to create a complete hemostasis or reduction of blood flow at the time of hysterectomy [9].

The purpose of this study was to evaluate the clinical efficacy of endovascular treatment

techniques such as temporary balloon occlusion of internal iliac arteries and uterine artery embolization combined with temporary balloon occlusion of internal iliac arteries, and surgical methods of hemostasis such as temporary ligation of the internal iliac arteries (IIA), temporary ligation of the common iliac artery (CIA) permanent ligation of the common iliac arteries in patients with high risk of early postpartum hemorrhage.

Materials and methods of research

On the basis of the Perinatal center of State Pediatric Medical University, Saint-Petersburg from 2014 to 2017 was conducted a study of the clinical efficacy of surgical and endovascular hemostasis techniques among women with postpartum bleeding. The study was conducted in two groups. The first group consisted of women who, after the birth of a child through the natural birth canal or fetal extraction during cesarean section, for the purpose of temporary reduction of blood flow, a method of temporary balloon occlusion of internal iliac arteries was used in combination with subsequent embolization of uterine arteries (6 person) or exclusively a method of embolization of uterine arteries (8 person). The second group underwent temporary ligation of internal iliac arteries (1 person), permanent ligation of internal iliac arteries (3 people), temporary ligation of common iliac arteries (1 person). The choice of technique depended on the intensity of bleeding and effectiveness in achieving hemostatic effect.

The criterion for inclusion of women in the study was the presence of risk factors for the development of early postpartum bleeding, such as: caesarean section in the history, placenta previa, placenta anterior arrangement, placental increment and rotation, and the use of surgical or endovascular methods for hemostasis.

The average age of patients was 32 years. The scope of the study included a comparative analysis of such clinical indicators as: hemoglobin level, red blood cells, platelets, hematocrit at the time of transfer to the intensive care unit, the volume of hemotransfusion, type of anesthetic benefit, the duration of the surgical stage of the operation, hysterectomy, the presence of complications in the postoperative period, x-ray doses, the volume of hemotransfusion and blood reinfusion using the Cell-Saver-5, the number of intensive care days.

Results of research and their discussion

Table presents the studied parameters in two groups of patients. The analysis allows to correlate clinical parameters in the application

of various methods of hemostasis in the early postpartum period.

Thus, average duration of hospitalization was 11.42 days in the first group of patients, while in the second group – 12.8 days. At the same time, length of stay in hospital after delivery in the first group was also less, compared with the comparison group, and amounted to 6.64 days, in the second group – 7.2 days.

The average volume of blood loss in two groups studied was also significantly different, in the main group it amounted to 1671.42 ml. in the comparison group 3100 ml, which is a significant indicator in the clinical effectiveness of the methods used in patients of the first group, as well as the volume of hemotransfusion and blood reinfusion using Cell-Saver-5. In the first study group, the average amount of blood transfusion amounted to 1097,4 ml. in the second – 1895,8 ml average volume of blood reinfusion in the first group was 399,7 ml in the comparison group 700,6 ml.

Comparison of the prevalence and frequency of postoperative complications confirmed low-trauma minimally invasive techniques. Postoperative complications were not revealed in 100% of examined cases in the group with the use of endovascular hemostasis methods, while in the group of patients with the use of surgical hemostasis methods the case of adhesive intestinal obstruction was recorded.

Also, an important role has the form of anesthetic benefits. Thus, in the first group of patients, in 57.15% of cases, epidural anesthesia was used, which is preferred due to the lack of risk of complications associated with tracheal intubation, in 42.8% of cases, combined endotracheal anesthesia was used. In the second group, endotracheal anesthesia was used in 100% of cases, due to the peculiarities of this type of surgical intervention and the volume of blood loss. At the same time, the total duration of the surgical stage was higher in the first group and amounted to 151.42 minutes, while in the second group – 138.8 minutes.

The duration of stay of patients in the intensive care unit also differed in two groups and amounted to 1.78 days in the first and 3.4 days in the second group.

One case of uterine extirpation was observed in both study groups, corresponding to 7.14% in the main group, and 20% in the comparison group. Also, the analysis revealed no significant differences in the degree of anemia in the postoperative period, due to the conduct of reinfusion and autohemotransfusion of blood in the early postpartum period. The average dose of x-ray radiation when performing interventional operations, made up 11.24 mSv.

Clinical indicators in groups of patients with early postpartum bleeding

№	Indicator	The main group (14 person)	The comparison group (5 person)
1	Average age (years)	32,85	32,2
2	The type of surgical treatment	endovascular treatment (EUA, EUA+BOIIA)	surgical treatment (temporary ligation IIA, permanent ligation IIA, temporary ligation CIA)
3	Average length of hospital stay (days)	11,42	12,8
4	Average number of bed days after surgery (days)	6,64	7,2
5	The average volume of blood loss (ml.)	1671,42	3100
6	The level of hemoglobin in the early postoperative period	anemia of I degree-71,4% anemia of II degree-21,4% anemia of III degree 7,4%	anemia of I degree – 60% anemia of II degree – 40%
7	The average volume of blood transfusion (ml.)	1097,4	1895,8
8	The average amount of reinfusion with cell-Saver-5 (ml.)	399,7	700,6
9	The kind of anesthesia	endotracheal anesthesia-42,85% epidural anesthesia- 57,15%	endotracheal anesthesia – 100%
10	The average number of intensive care days	1,78	3,4
11	The average duration of the surgical stage (min.)	151,42	138,8
12	A hysterectomy	1 case(extirpation of uterus without appendages)- 7,14%	1 case (extirpation of the uterus with the right appendages) – 20%
13	The presence of complications in the postoperative period	no-100%	1 case (adhesive intestinal obstruction) – 20%
14	The average x-ray exposure dose (mSv)	11,24	0

Conclusions

In a group of patients where endovascular hemostasis techniques were used, clinical efficacy was higher than in a group of patients who underwent surgical hemostasis techniques. Uterine artery embolization and temporary balloon occlusion of the internal iliac arteries are minimally invasive and effective organ-preserving operations that allow to preserve fertility and quality of life of women after postpartum bleeding.

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