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TACTICS FOR THE TREATMENT OF OBSTETRIC BLEEDINGS TAKING INTO ACCOUNT THE BLOOD SUPPLY OF THE PELVIC ORGANS

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✓ ***Resume***

Obstetric hemorrhage remains one of the leading causes of maternal mortality worldwide, especially in cases of massive blood loss requiring emergency surgical intervention. This paper presents a study aimed at improving the treatment tactics for obstetric hemorrhage of traumatic genesis, taking into account the features of collateral blood supply to the pelvic organs. To improve the tactics of managing patients with birth trauma that occurs during childbirth, intraoperatively and in the postpartum period, depending on the characteristics of collateral blood supply. The study involved 255 pregnant women with bleeding during labor and after operative delivery. The study included 2 stages. Stage 1 consists of a retrospective analysis of n=77 maternal deaths over the past three years associated with obstetric bleeding. In the prospective stage - stage 2, the study conducted a cohort study in a group of women who had bleeding during cesarean section and childbirth n=178. The analysis showed that one of the causes of massive bleeding is the presence of anatomical variations in the vascular bed. The results of implementing the proposed algorithm demonstrated a significant decrease in the frequency of massive obstetric bleeding (from 15% to 6%), a 2-fold decrease in the number of hysterectomies, as well as a decrease in the volume of blood loss by an average of 400 ml

Key words: Obstetric bleeding, traumatic bleeding, collateral blood supply, surgical hemostasis

ТАКТИКА ЛЕЧЕНИЯ АКУШЕРСКИХ КРОВОТЕЧЕНИЙ С УЧЕТОМ КРОВОСНАБЖЕНИЯ ОРГАНОВ МАЛОГО ТАЗА

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✓ ***Резюме***

Акушерское кровотечение остается одной из ведущих причин материнской смертности во всем мире, особенно в случаях массивной кровопотери, требующей экстренного хирургического вмешательства. В данной работе представлено исследование, направленное на совершенствование тактики лечения акушерского кровотечения травматического генеза с учетом особенностей коллатерального кровоснабжения органов малого таза. В исследовании приняли участие 255 беременных с кровотечением в родах и после оперативного родоразрешения. Исследование включало 2 этапа. 1 этап - ретроспективный анализ n=77 случаев материнской смертности за последние три года, связанных с акушерским кровотечением. На проспективном этапе - 2 этапе исследования проведено когортное исследование в группе женщин, у которых возникло кровотечение во время кесарева сечения и родов n=178. Анализ показал, что одной из причин массивного кровотечения является наличие анатомических изменений сосудистого русла. Результаты внедрения предложенного алгоритма продемонстрировали достоверное снижение частоты массивного акушерского кровотечения (с 15% до 6%), уменьшение в 2 раза количества гистерэктомий, а также уменьшение объема кровопотери в среднем на 400 мл

Ключевые слова: Акушерское кровотечение, травматическое кровотечение, коллатеральное кровоснабжение, хирургический гемостаз

KICHIK CHANOQ A’ZOLARI QON BILAN TA’MINLANISHINI HISOBGA OLGAN HOLDA AKUSHERLIK QON KETISHLARINI DAVOLASH TAKTIKASI

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✓ ***Rezyume***

Akusherlik qon ketishi butun dunyo bo'ylab onalar o'limining asosiy sabablaridan biri bo'lib qolmoqda, ayniqsa shoshilinch jarrohlik aralashuvni talab qiladigan katta qon yo'qotish holatlarida. Ushbu maqolada chanoq a'zolarini kollateral qon bilan ta'minlash xususiyatlarini hisobga olgan holda travmatik genezning akusherlik qon ketishini davolash taktikasini takomillashtirishga qaratilgan tadqiqot taqdim etilgan. Tadqiqotda tug‘ruq vaqtida va operativ tug‘ruqdan keyin qon ketishi bilan og‘rigan 255 nafar homilador ayol ishtirok etdi. Tadqiqot 2 bosqichni o'z ichiga oldi. 1-bosqich - akusherlik qon ketishi bilan bog'liq so'nggi uch yil ichida n = 77 onalar o'limi holatlarining retrospektiv tahlili. Istiqbolli bosqichda - tadqiqotning 2-bosqichida sezaryen va tug'ish paytida qon ketishini boshdan kechirgan ayollar guruhida kohort tadqiqoti o'tkazildi n = 178. Tahlil shuni ko'rsatdiki, katta qon ketishining sabablaridan biri qon tomir to'shagida anatomik o'zgarishlar mavjudligidir. Taklif etilgan algoritmni amalga oshirish natijalari massiv akusherlik qon ketishining sezilarli darajada pasayishini (15% dan 6% gacha), histerektomiyalar sonining 2 baravar kamayishini, shuningdek, qon yo'qotish hajmining o'rtacha 400 ml ga kamayishini ko'rsatdi

Kalit so‘zlar: akusherlik qon ketishi, travmatik qon ketishi, kollateral qon ta'minoti, jarrohlik gemostaz

Relevance

Obstetric hemorrhage is one of the main causes of maternal mortality. According to the WHO study, 14 million cases of postpartum hemorrhage occur annually worldwide, of which 120,000-140,000 are fatal (50% of which result in death within the first 24 hours) and 200,000 result in maternal morbidity [12]. According to literature data obtained in the USA, hemorrhage accounts for 12% of maternal mortality cases, and 73% of them are preventable. In the UK, hemorrhage is the third most common cause of maternal mortality, 53% of which are preventable. In Africa, hemorrhage accounts for 35% to 60% of maternal mortality cases [1, 5, 6]. The occurrence of hemorrhage is caused by a violation of the main etiologic factors, designated as 4T, including uterine tone disorders, trauma, placental disorders and coagulation disorders [4, 7, 13].

Bleeding is one of the controllable causes of maternal mortality and depends on qualified medical care during childbirth and the postpartum period. The development of new methods for managing obstetric bleeding is of great importance, since the nature of this condition requires obstetricians to take decisive action to save women's lives, and the lack of an algorithm of actions can cause more harm than good [3, 8, 11].

One of the 4 causes of haemorrhage is trauma. The data and incidence of traumatic haemorrhage in obstetrics are poorly known. Traumatic haemorrhage is an important cause of maternal mortality and morbidity, and this requires high clinical alertness and a multidisciplinary approach in the management of each individual case. However, existing guidelines on shock and morbidity in pregnancy do not include data on the role of traumatic haemorrhage in increasing the incidence of postpartum and postoperative complications [2].

According to the literature, traumatic haemorrhage can occur during pregnancy, labour and postpartum and is the result of spontaneous trauma without a mechanical cause.

For successful control of bleeding, it is necessary to know the peculiarities of blood flow in the internal genital organs of a woman, the deformed anatomy of uterine arteries, their individual anatomical features and their relationship with neighbouring anatomical formations.

The corona mortis is a vascular anomaly occurring in approximately 15-30% of people. It represents a prominent collateral artery between the inferior iliac artery and the glomerular artery. This

anomaly is mentioned in older guidelines because accidental injury to the collateral arteries can cause massive bleeding that is difficult to treat. Accidental injury to this anomalous anastomosis can cause massive bleeding that is difficult to stop [9, 10].

Thus, the development and improvement of surgical tactics for the treatment of obstetric haemorrhage taking into account the peculiarities of blood supply of the pelvic organs are urgent tasks of modern medicine. Further research in this area contributes to improving the effectiveness and safety of surgical interventions aimed at preserving the life and health of mother and child.

The aim of the study: scientific approaches to improving the treatment tactics of obstetric hemorrhage of traumatic genesis, taking into account the features of collateral blood supply to the pelvic organs.

Materials and methods

The study population consisted of 255 pregnant women with haemorrhage in labour and after surgical delivery with various bleeding risks and 15 non-pregnant women of childbearing age who underwent angiography.

The demographic and clinical characteristics of the participants consisted of women of childbearing age aged 18-42 years living in Uzbekistan.

Assessment of inclusion criteria and clinical context: The inclusion criteria were a cohort of women who had haemorrhage in labour through natural delivery and by surgery, and patients with pathological bleeding in labour and postpartum. Postpartum haemorrhage included uterine atony, retention of placenta parts, and clotting disorders. Exclusion criteria: Bleeding of 500 ml or less in conservative labour not requiring surgical intervention. Bleeding associated with haematological and malignant diseases.

The study included 2 stages. Stage 1 consists of a retrospective analysis of maternal mortality over the past three years associated with obstetric hemorrhage. The number of patients in this group was 77. At this stage, the main problems arising during thanatogenesis were identified: The main causes of repeated laparotomies in maternal mortality and ways to prevent them. In the prospective stage - stage 2, a cohort study was conducted in a group of women who had bleeding during cesarean section and childbirth n = 178.

Of the 178 women examined, n-100 had obstetric hemorrhage due to impaired uterine contractility. The remaining n-78 formed a group with bleeding due to birth trauma. In turn, this group was divided into the main group (n-58) using the developed algorithm for treating bleeding and a comparative group with standard management of bleeding cases (n-20).

All pregnant women underwent a full range of clinical, laboratory and instrumental research methods. In addition, after childbirth, women underwent ultrasound diagnostics of the postoperative uterus and pelvis using a Mindray sonograph with a Mindray-70 Hz linear sensor to diagnose various complications. Study of the vascular bed by Doppler with determination of blood flow parameters. Hemostatic parameters were studied to change the blood coagulation system. Angiography of the vessels of the pelvic organs was performed in the Department of Roentgen Endovascular Surgery using a Philips device. The contrast agent used was Unigexol 350 mg/ml and with a radiation dose from 800 mGy to 4500 mGy.

Results and discussions

In a retrospective analysis, n=77 birth histories leading to maternal mortality from obstetric haemorrhage in the Republic of Uzbekistan in 2020-2023 were studied.

A large number of surgical interventions were performed, uterine extrapation 64% (n=49), relaparotomy 16% (n=12) and rerelaparotomy 8% (n=6).

When studying the peculiarities of bleeding depending on the localisation of the bleeding focus, it was revealed that in 47 (61%) cases the focus was in the body of the uterus (premature detachment of the normally located placenta, uterine atony), in the lower segment of the uterus (uterine rupture, placenta accretion) there were 18 (23.3%) and in the vagina and external genital organs (birth trauma) there were 12 (16%).

The data of retrospective analysis of bleeding cases revealed the following problems:

- The structure of bleeding showed that the cause was tone in 47 (61%) cases, this included premature detachment of a normally located placenta with subsequent atony - 29 (37.7%), purely atonic bleeding - 18 (23.3%), trauma accounted for 18 (23.3%), which included 5 (6.5%) uterine rupture, 13 (16.9%) birth canal injuries. Placenta accreta accounted for 10 (13%), thrombin cause of bleeding 2 (2.7%).

- The main quota in the structure of obstetric bleeding was massive obstetric bleeding caused by a violation of the contractile capacity of the uterus, postpartum atonic bleeding in 61% and bleeding of traumatic genesis in 23.3%. - The volume and sequence of surgical intervention in obstetric hemorrhage was carried out without taking into account the localization of the injured area and the characteristics of the blood supply to various parts of the uterus.

- The analysis showed that despite the fact that the frequency of bleeding in the lower segment of the uterus was less, the volume of massive bleeding was greater and averaged 2600 ± 150 ml. Compared with bleeding from other parts of the uterus and external genitalia, where bleeding in the first hours averaged 1450 ± 100 ml. And this led to the use of blood products in 88% of cases, which is 20% more than in other localizations. With bleeding localized in the lower uterine segment, cervix and upper third of the vagina, the risk and volume of massive obstetric bleeding is 1.7 times greater compared to bleeding from the body of the uterus, lower third of the vagina and external genitalia.

A prospective cohort study was conducted in 178 pregnant women with increased blood loss during labor. The bleeding pattern was as follows: tone 100 (56%), which included premature detachment of a normally located placenta - 69 (39%), atonic bleeding - 31 (17%), trauma was 78 (44%), which included 13 (7%) uterine ruptures, 65 (37%) birth canal injuries.

Women with obstetric hemorrhage of traumatic genesis (n=78) deserve special attention. Of the total number of obstetric hemorrhages of traumatic genesis, in 24 (30.7%) injuries were localized in the body of the uterus, in 41 (52.6%) in the lower segment of the uterus, cervix and upper third of the vagina, in 13 (16.7%) cases injuries were localized in the lower third of the vagina and in the external genitalia (Table 1).

Table 1

Characteristics of obstetric bleeding depending on the nature and location of the injury

Localization of the bleeding site	Average volume of blood loss	Massive bleeding	Hysterectomy	Ligation of the internal iliac artery
Uterine body 30.7% (n=24)	1054±111,8 ml	16,7% (n=4)	4,2% (n=1)	16,7% (n=4)
Lower segment of the uterus, cervix, upper third of the vagina 52.6% (n=41)	1540±96,8 ml	43,9% (n=18)	22% (n=9)	31,7% (n=13)
Lower third of the vagina, external genitalia 16.7% (n=13)	1014,73±106,8 ml	7,7% (n=1)	-	-

A three-type clinical and anatomical gradation of bleeding was developed:

1st type of bleeding - bleeding from the area of the body of the uterus. Blood supply from the pool of the internal iliac artery;

2nd type of bleeding - the source of bleeding is the lower segment of the uterus, the cervix, the upper third of the vagina. Blood supply from the pool of the internal and partially external iliac artery;

3rd type of bleeding - localization of the source of bleeding - the lower third of the vagina, external genitalia. Blood supply from the area of the external iliac artery. Studies have shown that bleeding from the lower uterus, cervix and upper third of the vagina, where the main blood vessels of the uterus are damaged, along with the formation of a retroperitoneal hematoma (type 2), increases the risk of developing massive bleeding by 1.4 times compared to uterine bleeding (type 1) and by 1.5 times compared to bleeding from the lower third of the vagina and external genitalia (type 3).

The results of the study indicate that the average volume of blood loss, the frequency of massive obstetric hemorrhages are greater when bleeding is localized in the lower uterine segment, cervix and upper third of the vagina. According to the literature, this may be due to the presence of collaterals between the internal and external iliac arteries.

In order to study these data, we performed angiography of the vessels of the pelvic organs in non-pregnant women of fertile age, without gynecological and somatic pathologies. To confirm the null hypothesis of the study, 15 women underwent a comprehensive examination of the state of the vessels of the mother's pelvis using an innovative diagnostic technique: angiography - a study of the pelvic vessels using X-ray selective angiography, this method made it possible to check the presence of a clinically significant collateral between the internal and external iliac arteries in the patient.

Collateral vessels of the pelvis are visualized, and it also made it possible to visualize the so-called crown of death "corona mortis" - a collateral between the obturator artery (internal iliac artery) and the inferior epigastric artery (branch of the external iliac), which was presumably detected in 4 (26%) cases. This study made it possible to diagnose additional collateral vessels and features of blood circulation in the pelvic organs. Thus, these studies confirm the primary hypothesis about the presence of a collateral between the obturator artery (internal iliac artery) and the inferior epigastric artery (branch of the external iliac) in 26% of cases, which contributes to increased blood loss in the presence of a bleeding focus in this area. That is, in the area of the lower uterine segment, cervix and upper third of the vagina, which is identified as type 2 bleeding.

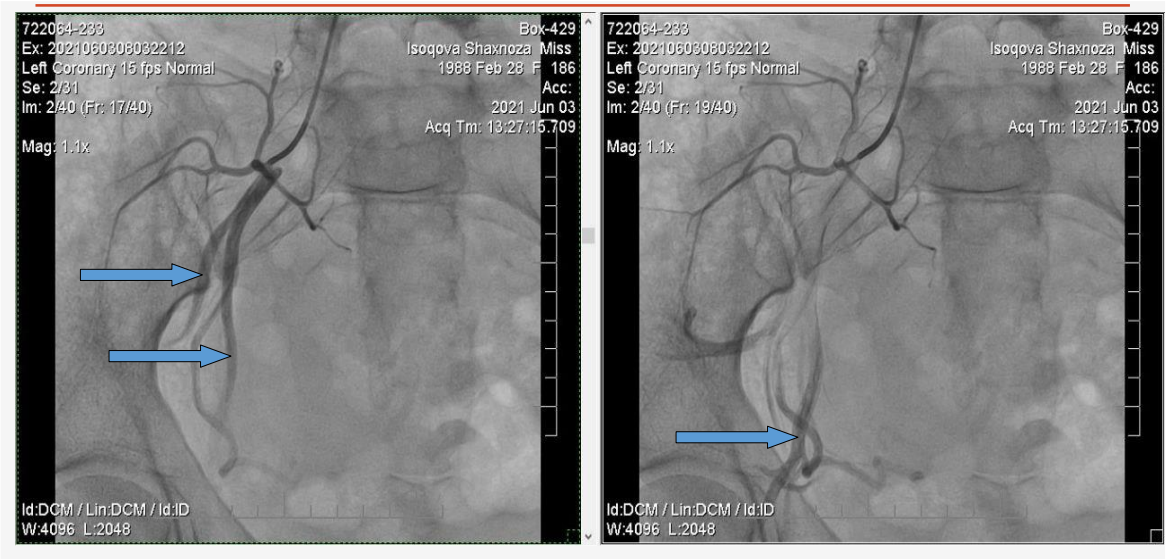

Figure 1. Angiography of the pelvic vessels. Corona mortis (Death's crown) - occurs in 15-30% of women

Taking into account the peculiarities of the blood supply to various parts of the birth canal, we have developed a sequence for performing surgical hemostasis in obstetric bleeding of traumatic genesis, taking into account the peculiarities of the blood supply and localization of the injured area.

When the injury was localized in the area of the uterine body (type I), the stages of surgical hemostasis were as follows:

1. Pressing the vessels along or in the wound, pressing the abdominal aorta.
2. Suturing the rupture site, ligating the main uterine vessels
3. Ligation of the internal iliac artery or pressing with the application of vascular clamps along the length if there is no technical possibility of ligation.
4. Hysterectomy in case of extensive damage to the uterus, lower segment, and cervix, or if there is no effect from treatment.

When the injured area was localized in the lower uterine segment, cervix, or upper third of the vagina (type 2), the following algorithm was used:

1. Ligation of the internal iliac artery or application of vascular clamps and (or) if ligation is not technically possible, pressing it along the length.
2. Suturing the rupture site, if technically possible, tight tamponade of the bleeding site with sterile material soaked in a local hemostatic agent (aminocaproic acid, local constrictors, adrenaline, etc.).
3. Hysterectomy for extensive damage to the uterus, lower segment, and cervix.

In cases of localization of the injured area in the area of the external genitalia, lower third of the vagina with the formation of hematomas (type 3), we used the following algorithm:

Surgical hemostasis by suturing the injured area of the vessels along the length, if there is no effect, tight tamponade of the bleeding site.

It should be noted that the use of the recommended technology allowed to reduce the number of hysterectomies against the background of extremely low hemoglobin levels and hemorrhagic shock from 32% to 16%, i.e. 2 times, which lead to multiple organ failure, this is the main cause of death after survival from massive bleeding (Table 2). Analysis of blood loss showed that with the second type of bleeding from the internal iliac artery, opening the pelvic vein allowed to reduce blood loss from 1650 ml to 1250 ml, on average by 400 ml.

Table 2

Comparative indicators of surgical intervention

Indicators	Main group %, (n-58)	Comparison group %, (n-20)
Hysterectomy	13,8% (8)	25% (5)*
Ligation of the internal iliac artery	29,3% (17)	-
Compression sutures on the uterus	24,1% (14)	-
Volume of blood loss during the intervention	1297,8±101,5	1645,9± 68,8
Operation duration, in minutes	68,08 ± 11,08	71,2±6,3
Hb before surgery, g/l	87,02 ±2,06	91,5± 1,03
Hb after surgery, g/l	72,2 ±2,38	70,8 ± 1,6
Transfusion of blood products	55,2% (32)	90% (18)*
Relaparotomy	-	5,0% (1)*

Note: * - differences relative to the comparative group data are significant (* - $p<0.05$)

The results of the conducted studies indicate that the use of the treatment algorithm in patients with traumatic bleeding significantly reduces complications.

The use of the proposed algorithm for treating traumatic bleeding, taking into account the characteristics of the blood supply and localization of the injured area, contributed to:

- avoiding massive blood loss from 15% to 6% and the development of multiple organ failure;
- in conditions of extremely low hemoglobin levels and shock, which cause multiple organ failure and are the main causes of death after recovery from massive blood loss, the use of this technology made it possible to reduce the frequency of hysterectomies by 2 times;
- devascularization of the pelvic organs in type 2 bleeding from the medial iliac side contributes to a reliable reduction in blood loss by 400 ml.

Conclusion

The probability of development and progression of obstetric hemorrhage of traumatic genesis depends on the features of blood supply to various parts of the birth canal and localization of the injured area. When the injury is localized in the lower uterine segment and upper third of the vagina, massive bleeding is observed 1.6 times more often, which is due to the presence of a developed network of anastomoses between the internal and external iliac arteries. The results of angiography of the pelvic organs confirmed the presence of a collateral between the obturator artery (internal iliac artery) and the inferior epigastric artery (branch of the external iliac) in 26% of cases, which contributes to increased blood loss when the bleeding focus is localized in the lower uterine segment, cervix and upper third of the vagina. The use of the proposed surgical tactics in obstetric bleeding of

traumatic genesis, taking into account the characteristics of the blood supply to various parts of the birth canal and the localization of the injured area, made it possible to reduce the frequency of massive bleeding from 15% to 6%, thereby avoiding relaparotomies and hysterectomies by 2 times.

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