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MEDICAL CARE FOR POSTPARTUM BLEEDING: A LITERATURE REVIEW

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Abstract

Relevance: According to modern literature, over the past decade, there has been no tendency in the world to reduce maternal mortality from postpartum hemorrhage (PPH). In Kazakhstan, evidence-based medicine clinical recommendations on prevention and algorithm of action for obstetric bleeding have been developed and recommended for use since 2010. We conducted a literary search for existing innovative methods of PPH prevention and treatment based on the study of clinical recommendations of many developed countries, WHO, FIGO, and scientific publications. There exist separate algorithms for managing PPH during vaginal delivery or cesarean section.

The study aimed to explore the existing innovative methods of preventing and treating postpartum hemorrhage to determine the most effective medical care for postpartum hemorrhage.

Materials and Methods: The literature search included papers published on PubMed in English from January 1, 2018, to November 31, 2022. The search was done by keywords including "pregnancy," "PPH," "pregnancy complication," "pregnancy outcomes," and "tranexamic acid," "guideline."

Results: Today, there are separate algorithms for managing PPH during vaginal delivery or cesarean section. Fibrin preparations and fibrinogen concentrate are recommended for use. When PPH occurs, it is important to communicate with family members to further inform them about the patient's condition. The routine use of the Allgower shock index for accurate calculation of the volume of blood loss is proposed. It is proposed to use antifibrinolytic drugs not only for therapeutic purposes but also for prophylactic purposes. It is important to carry out adequate infusion-transfusion therapy to prevent iatrogenic coagulopathy.

Conclusion: Introducing the above modern technologies into practical healthcare does not require high economic costs and can be used in obstetric institutions at all levels of medical care for PPH.

Keywords: *postpartum hemorrhage (PPH), cesarean section (C-section), uterine atony, uterine rupture, uterine trauma, coagulopathy, placental pathology.*

Introduction: Maternal mortality is a key indicator of the health status of women of reproductive age and the performance of the national healthcare system, reflecting both the availability and quality of prenatal and obstetric care. High maternal mortality from obstetric bleeding reflects the poor quality of medical care organizations and shows the possible direction to reduce maternal losses. Obstetric bleeding remains a significant cause of maternal mortality worldwide. Early recognition and effective treatment of postpartum hemorrhage (PPH) contribute to the reduction of massive PPH and hemorrhagic shock, massive transfusion of blood and its components, hysterectomy, bladder injury, re-surgery, pulmonary edema, acute kidney injury, thromboembolic complications, multiple organ failure, maternal mortality, and morbidity.

The aim was to study existing innovative methods for the prevention and treatment of postpartum hemorrhage to determine the most effective medical care for postpartum hemorrhage.

Materials and methods: The literature search included papers published on PubMed in English from January 1, 2018, to November 31, 2022. The search was done by keywords including "pregnancy," "PPH," "pregnancy complication," "pregnancy outcomes," and "tranexamic acid," "guideline."

Results: Support and communication with family members in PPH are important for patient care. Contact with family members supports meeting their emotional needs during care for PPH. This stage helps to emotionally prepare relatives for possible outcomes. Family members are often more informed about the patient's health status and past illnesses and can provide valuable information that can help when providing emergency care for PPH [1]. Effective communication and interaction with patients and their families affect treatment outcomes, safety, and perceived quality of care [2]. Support and communication with family members are regulated by clinical guidelines in Japan, the USA, and the UK [2-5]. The California Maternal Quality Care Collaborative protocol on quality assurance in the field of maternity has developed a checklist for communication with the patient's relatives [2]:

1. Definition of a healthcare professional:

- Identify a staff member to keep the family updated and help with the support items listed below;

Where possible, this person should be identified at the admission of a patient at risk for PPH and immediately available to support the family in an emergency.

2. Immediately after PPH is diagnosed:

- Introduce yourself and explain your role to family members;

- Invite family members to move to another room away from where the bleeding occurred; explain the importance of accurately measuring blood loss;

- Explain to the family what happened and what they can expect in the next few hours, including the duration of the operation (if applicable) and how often to contact them (at least every hour); provide them with your contact details; act as a liaison between the family and other units to provide

timely information;

3. If the patient is in critical condition:

- Prepare family members for what they may see (for example, if the patient is intubated);
- Let the family know about what the patient already knows (e.g., does she know she had a hysterectomy);
- Provide the patient with updated information about her baby, photos, etc. If possible, bring the baby to the patient and identify ways in which she can participate in the care of the baby (e.g., first feeding);
- If the patient is intubated or unable to speak clearly, provide a whiteboard or similar method of communication. Ask the patient what her needs are and provide support (e.g., make sure the mother is lactating if she wishes to breastfeed);
- Assess the patient's understanding of her medical status/ care plan and provide support as needed (e.g., the patient may fear extubation and need physician reassurance);
- Offer emotional support through a social worker, psychologist, or imam/priest/rabbi before discharge;
- Acknowledge the trauma experienced by the patient and provide the patient and family with advance guidance regarding physical and emotional recovery;
- Provide postpartum specifics, "what to expect" after discharge (e.g., "Life after a hysterectomy");
- Encourage early follow-up with a physician after discharge;
- Invite the patient to arrange a time with their doctor to discuss further recovery tactics.

Allgower shock index (SI), calculated by dividing heart rate by systolic blood pressure, is used to detect the blood loss volume, hemodynamic instability, and hypovolemia in PPH (Table 1). Foreign clinical guidelines report the proven effectiveness of SI, which is widely used as a routine method for assessing blood loss in PPH. SI values increase with blood loss after the birth of the placenta. SI values were significantly higher in patients who required a blood transfusion for massive bleeding than in patients who did not receive it [6-11].

Table 1 – Allgower shock index [6]

Index	Blood loss volume
0.8 or less	Normal level
0.9 - 1.2	20%
1.3 - 1.4	30%
1.5 and more	40%

Therefore, SI is more efficient in detecting PPH than other vital signs. Using SI in PPH management could contribute to the timely recognition of PPH and reduce blood loss. Suspected blood loss, vital signs, and symptoms of hypovolemic shock should be included in the clinical assessment to recognize and diagnose PPH.

Tranexamic acid (TXA) is an antifibrinolytic drug that blocks the binding sides of lysine on plasminogen molecules. In Kazakhstan, TXA preparations are recommended by the clinical protocol of the Ministry of Healthcare of the Republic of Kazakhstan on PPH [9] for massive bleeding or circumstances that activate the fibrinolytic system of the blood. However, exact requirements for dosage, timing, and routes of administration are not defined, and the possibilities of prophylactic use of this drug group are not considered. According to the clinical protocols on the use of TXA to treat and prevent PPH by the Royal College of Obstetricians and Gynaecologists [10], Queensland Clinic [11], WHO recommendations [12], New Zealand National Consensus Guidelines for Treatment of Postpartum Haemorrhage [13], and FIGO (The International Federation of Gynecology and Obstetrics) recommendations on the management of PPH [14], the timely use of TXA preparations reduces female mortality from bleeding from 1.9% to 1.5% (risk ratio (RR) 0.81, 95% confidence interval (CI) 0.65-1.00; P=0.045) [9, 10]. A meta-analysis of individual data found that a 15-minute delay in administering TXA during the first 3 hours of bleeding decreases this drug's efficacy by 10% [15].

An analysis of 10 RCTs (6 for C-section and 4 for vaginal delivery) evaluated the effectiveness of TXA as a prophylactic drug for cesarean section (C-section) in the PPH risk group along with uterotonics. There is no reliable data on using TXA to prevent PC during vaginal delivery. The results of RCTs allow us to recommend TXA preparations for preventing PPH in women undergoing a planned C-section, as there was a significant decrease in blood loss in patients with and without risk of thromboembolic complications [13-24].

Fibrinogen as An early predictor of PPH severity

Fibrinogen concentration is a reliable indicator that correlates with severe PPH development. The risk of severe PPH increased twice at a fibrinogen concentration of 2-3 g/L and 12 times at a concentration >2 g/L [24].

In ongoing PPH, fresh-frozen plasma (FFP) alone is often not sufficient to maintain adequate fibrinogen levels (>2 g/L) or to effectively raise an already low fibrinogen level [25]. So, fibrinogen concentrates are needed in this case. Massive FFP transfusions decreased fibrinogen concentration in ongoing PPH [24]. This was due to the short biological half-life of individual blood coagulation factors and a frequent increase in turnover of blood coagulation factors and inhibitors in coagulopathy because of consumption and/or loss or dilution. FFP introduction is also associated with numerous problems. E.g., it takes 30-45 minutes to defrost FFP; transport and heating devices are needed; a significant increase of fibrinogen

levels requires Large volumes of FFP (800 ml to replace 2 g of fibrinogen). This poses a risk of volume overload and pulmonary edema in high-risk patients (high volume intake, other risk factors such as multiple pregnancies, preeclampsia, and antenatal glucocorticoids). Other complications associated with blood transfusion include transfusion-associated acute lung injury, etc.

The European guidelines for managing trauma-related bleeding [24] and recent publications on managing PPH recommend administering 2-4 g of fibrinogen concentrate at levels >2 g/L for ongoing bleeding.

The Australian guidelines recommend using the fibrinogen concentrate depending on the blood loss volume and the limited use of colloids due to a possible iatrogenic coagulopathy. Large volumes of colloids dilute the coagulation factors, leading to clotting disorders and coagulopathy. Besides, rapid consumption of fibrinogen, coagulation factors, and platelets due to constant blood loss exacerbates coagulopathy. Colloidal fluids have a proven negative effect on coagulation and endothelial function [26].

Fibrinogen might be administered based on laboratory findings or without the analysis results. The decision to administer fibrinogen concentrate is based on clinical criteria (without laboratory tests) [27].

1. Inject 1 gram of TXA (if not already in)

2. Enter 3 grams of fibrinogen concentrate. Dilute 1 gram in 50 ml of warm water. Mix gently and do not shake (to avoid foaming). Administer every 1 gram for life-threatening: through a manipulator for 3 minutes.

The decision to administer fibrinogen concentrate is based on clinical criteria and laboratory data (fibrinogen concentration or thromboelastography). Administer 1 gram of TXA (if not already administered). Use the fibrinogen dosing guide (Table 2).

Table 2 – Fibrinogen Dosing Guidelines

Target thromboelastography ≥ 12 mm or fibrinogen concentration ≥ 2 g/L			
Thromboelastography	fibrinogen in the blood	cryoprecipitate	Concentrate fibrinogen
6-10mm	1-2g/L	15 units	3gr
<6mm	<1g/L	25 units	5gr

Discussion: The importance of preventing and managing PPH to reduce maternal mortality and morbidity. The authors reviewed literature from various developed countries, WHO, and FIGO and found that early recognition and effective treatment of PPH are crucial in preventing complications such as hemorrhagic shock, thromboembolic complications, and maternal mortality. The study also suggests using modern technologies, such as fibrin preparations and antifibrinolytic drugs, in healthcare practice to prevent and manage PPH. The article also highlights the importance of communication and support with family members, regulated by clinical guidelines in Japan, the USA, and the UK. The article provides a checklist for healthcare professionals to communicate effectively with the patient's family during PPH. Additionally, the Allgower SI is proposed for accurate blood loss volume calculation in PPH.

Conclusions:

- Communication with family members shall make an integral part of medical care due to its positive effect on the emotional preparedness of relatives for possible outcomes.

- The Allgower SI ensures an accurate blood volume calculation and is routinely used to determine the amount of blood loss and to provide emergency care for PPH.

- Given the high frequency of C-sections, experts in obstetrics should consider the need to develop separate algorithms for managing PPH during vaginal delivery or C-section.

- Fibrinogen concentrate is preferred for fibrinogen replacement in PPH because it replaces fibrinogen faster than FFP.

- TXA drugs are antifibrinolytics used to treat PPH and are included in all clinical protocols in many national, WHO, and FIGO clinical protocols. Clinical guidelines (UK, NZ, Germany, Austria, Sweden, WHO, FIGO) describe fixed doses (0.5 g to 2.0 g) and TXA drug use methods. WHO, FIGO and New Zealand National Consensus Guidelines recommend repeated doses of TXA for ongoing bleeding. THC preparations must be used within 3 hours after PPH is detected. TXA preparations are an affordable and effective way to combat PPH and prevent bleeding during C-sections [9-24].

Introducing the above modern technologies into practical healthcare does not require high economic costs and can be used in obstetric institutions at all levels of medical care for PPH.

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МЕДИЦИНСКАЯ ПОМОЩЬ ПРИ ПОСЛЕРОДОВОМ КРОВОТЕЧЕНИИ: ОБЗОР ЛИТЕРАТУРЫ

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Аннотация

Актуальность: По данным современной литературы за последнее десятилетие в мире не отмечается тенденция к снижению случаев материнской смертности от послеродовых кровотечений (ПРК). В Казахстане на основании принципов доказательной медицины с 2010 года разработаны и рекомендованы к применению клинические рекомендации по профилактике и алгоритму действия при акушерских кровотечениях. Нами проведен литературный поиск существующих инновационных методов профилактики и лечения ПРК на основании изучения клинических рекомендации многих развитых стран мира, ВОЗ, FIGO и научных публикаций. На сегодняшний день имеются отдельные алгоритмы ведения ПРК при родах через естественные родовые пути и при операции кесарева сечения.

Цель исследования – изучение существующих инновационных методов профилактики и лечения ПРК для выявления наиболее эффективной медицинской помощи при ПРК.

Материалы и методы: Проведен поиск статей в базе данных PubMed, опубликованных с использованием поисковых терминов «беременность», «послеродовое кровотечение», «осложнение беременности», «исходы беременности» и «транексамовая кислота», «guideline». В обзор были включены статьи на английском языке, опубликованные в период с 1 января 2018 г. по 31 ноябрь 2022 г.

Результаты: На сегодняшний день существуют отдельные алгоритмы ведения ПРК при родах через естественные родовые пути и при кесаревом сечении. Рекомендованы к применению препараты фибрина и концентрат фибриногена. При возникновении ПРК важно связаться с членами семьи, чтобы дополнительно информировать их о состоянии пациента. Предложено рутинное использование шокового индекса Аллгауэра для точного расчета объема кровопотери. Предлагается использовать антифибринолитические препараты не только в лечебных, но и в профилактических целях. Важно проводить адекватную инфузионно-трансфузионную терапию для предупреждения ятрогенной коагулопатии.

Заключение: Внедрение вышеперечисленных современных технологий в практическое здравоохранение не требует больших экономических затрат и может быть использовано в родовспомогательных учреждениях на всех уровнях оказания медицинской помощи при ПРК.

Ключевые слова: *послеродовое кровотечение, кесарево сечение, атония матки, разрыв матки, травмы матки, коагулопатия, патология плаценты.*

БОСАНҒАННАН КЕЙІНГІ ҚАН КЕТУГЕ АРНАЛҒАН МЕДИЦИНАЛЫҚ КӨМЕК: ӘДЕБИЕТКЕ ШОЛУ

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Андатпа

Өзектілігі: Қазіргі әдебиеттерге сәйкес, соңғы онжылдықта әлемде босанғаннан кейінгі қан кетуден болатын ана өлімінің төмендеу үрдісі байқалмайды. Қазақстанда дәлелді медицина қағидаттарының негізінде 2010 жылдан бастап акушерлік қан кетулердің алдын алу және әсер ету алгоритмі бойынша клиникалық ұсынымдар әзірленіп, қолдануға ұсынылды. Біз әлемнің көптеген дамыған елдерінің, ДДҰ, FIGO және ғылыми басылымдардың клиникалық ұсынымдарын зерттеу негізінде босанғаннан кейінгі қан кетудің алдын алу мен емдеудің қолданыстағы инновациялық әдістерін әдеби іздестірдік. Бүгінгі күні босанғаннан кейінгі қан кетуді табиғи босану каналы арқылы және кесарь тілігі арқылы басқарудың жеке алгоритмдері бар.

Зерттеудің мақсаты – босанғаннан кейінгі қан кетудің алдын алу мен емдеудің қолданыстағы инновациялық әдістерін негізінде босанғаннан кейінгі қан кету кезіндегі ең тиімді медициналық көмекті анықтау үшін зерттеу.

Материалдар мен әдістері: PubMed дерекқорында «жүктілік», «босанғаннан кейінгі қан кету», «жүктілік асқынуы», «жүктілік нәтижелері» және «транексам қышқылы», «нұсқаулық» іздеу терминдері арқылы жарияланған мақалалар іздестірілді. Шолу 2018 жылдың 1 қаңтары мен 2022 жылдың 31 қарашасы аралығында жарияланған ағылшын тіліндегі мақалаларды қамтыды.

Нәтижелері: Бүгінгі күні табиғи туу каналы арқылы босану кезінде және кесар тілігі кезінде босанғаннан кейінгі қан кетуді басқарудың жеке алгоритмдері бар. Қолдану үшін фибрин препараттары мен фибриноген концентраты ұсынылады. Егер босанғаннан кейінгі қан кету орын алса, науқастың жағдайы туралы қосымша хабарлау үшін отбасы мүшелерімен байланысу маңызды. Қан жоғалту көлемін дәл есептеу үшін Алгауэр шок индексін күнделікті қолдану ұсынылады. Антифибринолитикалық препараттарды тек емдік мақсатта ғана емес, профилактикалық мақсатта да қолдану ұсынылады. Ятрогендік коагулопатияның алдын алу үшін адекватты инфузиялық-трансфузиялық терапияны жүргізу маңызды.

Қорытынды: Жоғарыда аталған заманауи технологияларды практикалық денсаулық сақтау саласына енгізу үлкен экономикалық шығындарды қажет етпейді және босанғаннан кейінгі қан кету кезінде медициналық көмектің барлық деңгейіндегі акушерлік мекемелерде қолданылуы мүмкін.

Түйінді сөздер: *босанғаннан кейінгі қан кету, кесарь тілігі, жатыр атониясы, жатырдың жарылуы, жатырдың жарақаттары, коагулопатия, плацента патологиясы.*

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