Guidelines

Czech Republic – Consensus interdisciplinary guidelines for the prevention and treatment of peripartum haemorrhage

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Terminology

The term *peripartum haemorrhage* is used in international specialized literature including World Health Organization materials to describe bleeding conditions related to the delivery, and it comprises bleeding conditions before, during and after the delivery.
Postpartum haemorrhage (PPH), i.e. bleeding after the delivery is the most common form of peripartum haemorrhage (1). Based on the consensus of the document workgroup, the same abbreviation for *"postpartum haemorrhage" (PPH)* is used in the text.
Bleeding conditions that are life-threatening for the mother, which develop in connection with pregnancy and delivery, are described as *"life-threatening peripartum haemorrhage" (LTPPH).*

Epidemiology

Haemorrhage related to pregnancy and/or delivery still represents one of the major causes of maternal deaths not only developing, but also in developed countries. It occupies the leading position among the causes of direct (specific) maternal deaths in the Czech Republic, as well. Approximately 80 peripartum hysterectomies are performed annually, and up to 90% are estimated to be done for the indication of LTPPH based on primary uterine atony or uterine atony associated with myomatous uterus, or due to haemorrhage caused by a placentation disorder.

Definitions

Peripartum haemorrhage can be defined and classified according to the estimated blood loss:

- **"Moderate"** blood loss (up to 1000 ml)
- **"Severe"** blood loss (over 1000 ml)
- **"Life-threatening peripartum haemorrhage"** is defined as a rapidly increasing blood loss clinically estimated over 1500 ml or any blood loss associated with the development of clinical and/or laboratory signs of shock / tissue hypoperfusion.

Clinical note: Blood volume physiologically increases during pregnancy by up to 40% of the original volume until the end of the pregnancy. **Initial symptoms of haemorrhagic shock are therefore less apparent in pregnancy.** Tachycardia and tachypnoea, together with a slight decrease of blood pressure, occur with blood loss between 1000–1500 ml. Systolic blood pressure below 80 mmHg associated with tachycardia, tachypnoea and changes in consciousness occurs in blood loss over 1500 ml. In the first hours of bleeding the condition is usually not reflected by decreased haemoglobin levels. Especially in cases where obstetric haemorrhage is hidden (for example, in the retroperitoneum), the obstetrician should be alerted about the possibility of severe blood loss by a significant rise in leukocyte levels and by the above mentioned clinical symptoms.

Risk factors and causes

Although patients with PPH may not have any risk factors, a number of studies have defined risk factors present already in the prenatal period and risk factors that occur during

parturition. Life-threatening peripartum haemorrhage occurs when at least one of 4 processes known as 4T = tone – trauma – tissue – thrombin is disturbed. Risk factors taking account of 4T are shown in Table 1. Peripartum haemorrhage of various degrees occurs predominantly in connection with primarily other than surgical causes (uterine hypotony / atony in 80%), or it may be due to primarily surgical causes to a lower extent (placental detachment disorders, obstetric injuries.

Preventive measures

The purpose of prevention is to minimize the risks of PPH / LTPPH. Preventive procedures are implemented both in the antepartum and intrapartum periods and are aimed at preventing fertility loss or death in connection with LTPPH.

Guideline 1

Women with LTPPH risk factors are recommended to deliver their baby in healthcare institutions where appropriate personnel and materials are available for LTPPH management.

Guideline 2

In patients with a high risk of LTPPH (abnormal placentation) the management plan is recommended to be formulated with the participation of a multidisciplinary team sufficiently in advance.

Guideline 3

Antepartum treatment of anaemia is recommended.
Iron products should be administered to pregnant women if their haemoglobin levels decrease below 110 g/l in the first trimester or below 105 g/l in week 28 of pregnancy.

Guideline 4

Parenteral administration of iron is suggested in women with sideropenic anaemia not responding to oral supplementation of iron. However, the cause of anaemia should be assessed after the end of pregnancy at the latest.

Guideline 5

Uterine massage after the delivery of the child and before the delivery of the placenta to prevent LTPPH is not recommended.

Guideline 6

If the child adapts well, umbilical cord ligation before 1 minute has elapsed is not recommended.

Guideline 7

Prophylactic administration of uterotonics in the third stage of labour immediately after the delivery of the child, before umbilical cord ligation, is recommended in all vaginal births to decrease the risk of PPH and LTPPH. Oxytocin is the first-choice drug.

Guideline 8

It is recommended to administer uterotonics to prevent LTPPH in women after caesarean delivery.

Guideline 9
Carbetocin administration is suggested in women with an increased risk of LTPPH.

Guideline 10
Carbetocin administration including single administration of tranexamic acid (TXA) is suggested in women with an increased risk of LTPPH undergoing caesarean section.

Organization of care management
- Moderate blood loss = an obstetrician should be called in all cases
- Severe blood loss = an anaesthesiologist should also be called in all cases
- Life-threatening peripartum haemorrhage = a multidisciplinary crisis team should be activated in all cases

Guideline 11
Every healthcare institution with a department of gynaecology and obstetrics is recommended to have an organizational standard for the crisis plan in the form of a controlled document of the given healthcare institution for LTPPH situations.

Guideline 12
It is recommended that the crisis plan clearly defines organizational and specialized roles of individual crisis team members if an LTPPH situation occurs (non-medical personnel, an obstetrician, anaesthesiologist, haematologist, etc.) and that it defines the minimum scope of equipment for sites where patients with LTPPH are managed.

Guideline 13
It is recommended to organize regular formalized training of LTPPH crisis situations with the participation of the entire crisis team, including subsequent formalized evaluation.

Guideline 14
It is recommended to define a quality indicator for LTPPH diagnosis and treatment, including formalized evaluation of the same.

5.3. Scope of activity of individual crisis team members in connection with LTPPH

The role of a midwife:
- Identify the development of haemorrhage and estimate the blood loss volume
- Inform the obstetrician
- Ensure vascular access using a peripheral venous catheter with the widest lumen possible
- Initiate infusion therapy using balanced crystalloid solutions
- Collect blood for laboratory assessments
- Ensure emptying of the urinary bladder by inserting an indwelling urinary catheter
- Initiate clinical and instrumental monitoring of physiological functions – consciousness, blood pressure, heart rate, respiratory rate, peripheral haemoglobin saturation with oxygen, diuresis, body temperature
- Record data defined by the crisis plan for LTPPH.

The role of an obstetrician:
- Identify the source of bleeding
- Assess vital physiological functions
- Prescribe monitoring of vital physiological functions
- Initiate oxygen therapy
- Check / ensure vascular access points
- Initiate fluid resuscitation
- Initiate administration of uterotonics
- Consider implementation of procedures to stop uterine bleeding (for example, uterine massage, bimanual uterine compression, external aortic compression).

The role of an anaesthesiologist:
- Assess vital physiological functions
- Check / ensure monitoring of vital physiological functions
- Initiate / continue oxygen therapy
- Check / ensure vascular access points
- Continue fluid resuscitation
- Initiate procedures to prevent hypothermia and acidemia
- Initiate / ensure procedures of pharmacological and/or instrumental support of organ functions
- Initiate coagulation support procedures and consult a haematologist as needed.

Diagnostic and therapeutic procedure in LTPPH

Early identification of developing LTPPH is the key factor for achieving the best possible clinical outcome. Estimated blood loss over 1000 ml and/or identification of signs of a shock must lead to activation of the multidisciplinary team.

Essential aims of the diagnostic and therapeutic procedure in LTPPH are as follows:
- Early identification of haemorrhage and its cause
- Urgent initiation of procedures to remove the cause(s) of haemorrhage
- Early identification of tissue hypoperfusion and its early correction
- Early identification of coagulopathy and its treatment
- Organ function support / replacement
- Prevention of an LTPPH recurrence and potential complications related to the therapy of a coagulation disorder.

Uterine hypotony or atony

Uterine hypotony or atony is the most common cause of LTPPH.

Guideline 15
When uterine hypotony or atony is found, it is recommended to use the structured stepwise procedure (Table 2).

Indications for hysterectomy

- Continued uterine bleeding when the undertaken steps have failed and all available options have been used (pharmacological and surgical)
- Invasive placenta
- Devastating uterine injury
- Uterus as the expected source of sepsis.

Role of interventional radiology methods in LTPPH

Guideline 16
In all LTPPH conditions caused by uterine hypotony or atony, and provided that standard surgical procedures usual at the site have failed (or cannot be used), it is recommended to use an interventional radiology method (selective embolization of pelvic arteries) if available.

5.4.3. Initial laboratory assessments and availability of transfusion products

Guideline 17
The following initial assessments are recommended for developing conditions of LTPPH – blood count, aPTT, PT, fibrinogen level, pretransfusion testing (blood group, screening of irregular anti-erythrocyte antibodies, compatibility testing).

Guideline 18
In conditions of developing LTPPH, it is recommended to ensure availability of at least 4 transfusion units of fresh frozen plasma, 4 transfusion units of erythrocytes and 5 g of fibrinogen (as a concentrate or cryoprecipitate).

5.4.4. Optimization of tissue perfusion and systemic homeostasis

Guideline 19
It is recommended to initiate immediate fluid resuscitation in all patients with LTPPH. It is recommended to use balanced crystalloid solutions for the initiation of fluid resuscitation.

Guideline 20
It is recommended to use synthetic colloids for fluid resuscitation of patients with LTPPH only in situations where crystalloid solutions are insufficient to achieve and/or maintain haemodynamic targets of fluid resuscitation.

Guideline 21
When synthetic colloids are used, it is recommended to prefer balanced gelatin solutions.

Guideline 22
It is recommended to seek to achieve / maintain the target systolic blood pressure between 80–90 mmHg in patients with LTPPH until the bleeding source is controlled.

Guideline 23
If the target systolic blood pressure values cannot be achieved, it is recommended to use ephedrine or noradrenaline or phenylephrine if available.

Diagnosis and therapy of coagulopathy in LTPPH

Guideline 24
Cooperation with a haematologist, if available, is recommended in the diagnosis and therapy of coagulopathy in LTPPH not responding to standard therapeutic procedures.

Guideline 25
It is recommended to monitor coagulation and initiate measures for coagulation adjustment as soon as possible after LTPPH identification.

Guideline 26
In addition to the above mentioned standard and repeated assessments (BC, aPTT, PT, fibrinogen), it is recommended to use also viscoelastometric methods (ROTEM, TEG), if available, to identify the type of coagulation disorder in LTPPH and to monitor the same.

Guideline 27
In order to achieve / recover the effects of endogenous haemostatic mechanisms and therapeutic procedures for coagulation support, it is recommended to strive for a maximum correction of hypothermia, acidosis and ionized calcium level.

Guideline 28
Early application of procedures to prevent hypothermia and to maintain normothermia is recommended.

Guideline 29
It is recommended to monitor and maintain the ionized calcium level in the normal range while transfusion products are administered (especially fresh frozen plasma).

Guideline 30
Fibrinogen replacement is recommended in patients with LTPPH if their fibrinogen levels decrease below 2 g/l and/or if fibrinogen deficiency is found based on viscoelastometric methods or if it is justified to clinically assume fibrinogen deficiency even without knowing its levels. The initial dose of fibrinogen 4 g, or an equivalent of this dose when transfusion products enriched with fibrinogen are used, is recommended as the minimum initial dose in LTPPH. Every obstetric site is recommended to be equipped with an adequate stock of immediately available fibrinogen.

Guideline 31
It is suggested to administer TXA as soon as possible after the onset of LTPPH in patients with LTPPH. If TXA is administered, we recommend to give the initial dose of 1 g during 10 minutes and subsequently to continue with the infusion of 1 g in 8 hours. Alternatively, the dosing of 20-25 mg/kg can be used.

Guideline 32
When the bleeding has been stopped, TXA administration is not recommended in patients with LTPPH.

Guideline 33
Administration of fresh frozen plasma is recommended in LTPPH situations where (a) laboratory signs of a coagulation disorder are also present, which can be corrected through administration of plasma; (b) the type and/or cause of the coagulation disorder cannot be identified; (c) administration of a coagulation factor concentrate is not indicated.

Guideline 34
Administration of the prothrombin complex concentration (PCC) is recommended in patients with LTPPH (a) treated with vitamin K antagonists or (b) where a deficiency of factors contained in the PCC is expected. Routine administration of PCC in patients with LTPPH is not recommended.

Guideline 35
The use of rFVIIa in patients with LTPPH is off-label. It is suggested to consider rFVIIa administration in patients with LTPPH where properly implemented standard procedures fail, as a rescue procedure before indication for hysterectomy, provided that the conditions for optimal efficacy of the administered rFVIIa are achieved (fibrinogen level >1 g/l, haemoglobin concentration >60 g/l, thrombocytes >50 x 10^9/l, pH >7.2).

Guideline 36
It is recommended to administer erythrocyte transfusion products in patients with LTPPH to achieve the target haemoglobin levels in the range of 70–80 g/l. The target haemoglobin level should be individualized with respect to circulatory stability, medical history, comorbidities and estimated organ reserve.

Guideline 37
It is recommended to administer thrombocytes in patients with LTPPH to achieve the target value of at least 50 x 10^9/l or in the case of their function disorder.

Guideline 38
Routine measurement of antithrombin levels is not recommended in patients with LTPPH.

Guideline 39
Routine antithrombin replacement is not recommended in patients with LTPPH.

Guideline 40
It is recommended to initiate pharmacological prophylaxis of thromboembolic disease at least after 24 hours from achieving LTPPH control. It is recommended to initiate mechanical thromboprophylaxis (intermittent pneumatic compression and/or elastic stockings) immediately, as soon as allowed by the clinical condition.

Abbreviations

aPTT	Activated partial thromboplastin time
BC	Blood count
PCC	Prothrombin complex concentrate
PPH	Postpartum haemorrhage
PT	Prothrombin time
LTPPH	Life-threatening peripartum haemorrhage
ROTEM	Rotational thromboelastometry
TEG	Thromboelastography
TXA	Tranexamic acid

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Tab. 1.

Peripartum haemorrhage (PPH) – risk factors		
	Aetiology	**Risk factors**
Uterine hypotony / atony – myometrial retraction disorders (Tone)	**Excessively enlarged uterus**	• Polyhydramnios • Multiple pregnancy • Foetal macrosomia
	Myometrial "exhaustion"	• Precipitate delivery • Protracted delivery • Multiparity
	Intraamnial infection	• Fever • Long-term amniotic fluid outflow
	Functional or anatomical uterine alterations	• Uterus myomatosus • Placenta praevia • Uterine anomalies
Retained gestational sac residues (Tissue)	**Retained foetal membranes** **Placental abnormalities** **Retained cotyledon or accessory placenta**	• Doubts about integrity of the placenta / membranes • Previous uterine surgery • Multiparity • Placental abnormalities based on ultrasound examination
	Retained blood coagula	• Uterine hypotony / atony
Obstetric injury (Trauma)	**Laceration of the uterine cervix, vagina, perineum**	• Precipitate delivery • Surgical delivery
	Rupture / laceration following hysterotomy in caesarean section	• Foetal malpresentation • Foetus deeply engaged in the pelvis
	Uterine rupture	• Previous uterine surgery
	Uterine inversion	• Multiparity • Placenta adherens / accreta
Blood coagulation disorders (Thrombin)	**Congenital disorders:** • Haemophilia A • Von Willebrand disease	• History of congenital coagulation disorders • Liver disease
	Acquired disorders: • Idiopathic thrombocytopenic purpura (ITP) • Thrombocytopenia associated with preeclampsia **Disseminated intravascular coagulation (DIC):** • Preeclampsia • Dead foetus • Severe infection • Placental abruption • Amniotic fluid embolism	• Formation of haematoma, petechiae • Hypertension • Intrauterine foetal death • Fever, leukocytosis • Antepartum haemorrhage • Sudden collapse condition
	Therapeutic anticoagulation	• History of thromboembolic disease

Table 2. Uterine hypotony or atony management

Step I

a) Uterine massage
b) Uterotonics
- Oxytocin or carbetocin
- Methylergometrine (unless maternal hypertension is present)

c) Prostaglandin
d) Digital or instrumental revision of the uterine cavity

If failed – step II

Step II

a) Removal of coagula
b) Uterotonics
Alternatively
c) Bakri balloon catheter or vaginal tamponade as appropriate

If failed – step III

Step III

a) Selective catheter embolization of aa. uterinae (if interventional radiology is available)
b) Surgical intervention (gradual devascularization of the uterus)
- Gradual ligation of aa. uterinae and aa. ovaricae
- B-Lynch uterine suture
- Ligation of aa. iliacae internae

c) Administration of recombinant activated factor VII should be considered (if interventions (a) and (b) cannot be used, administration of this factor should be considered as the first procedure under step III; as follows from UniSeven national registry data (reference 32 in the list of references), timely administration of recombinant activated factor VII reduced the hysterectomy rate by 74%)

If failed – step IV

Step IV

Hysterectomy
Indications for hysterectomy
- Continued uterine bleeding when the undertaken steps have failed and all available options have been used (pharmacological and surgical)
- Invasive placenta
- Devastating uterine injury
- Uterus as the expected source of sepsis