

Diagnostics
and Bleeding Localization

Estimate of blood loss:

- Less severe: 500 - 1000 ml
- Severe: more than 1000 ml
- **Peripartum hemorrhage:** rapidly increasing blood loss, clinically estimated to be above 1500 ml or as any blood loss associated with the development of clinical and/or laboratory signs of shock/tissue hypoperfusion

Organization of Care According to Estimated Blood Loss:

- Less severe blood loss
= **An obstetrician is always called**
- Severe blood loss
= **An anesthesiologist is always called in**
- Peripartum hemorrhage
= **A multidisciplinary crisis team is always activated**

Identification of the Source of Bleeding:

1. Palpation / bimanual examination
2. Examination in mirrors
3. Ultrasound examination

Other Procedures:

1. Assessment and stabilization of basic vital signs
2. Start monitoring of basic vital signs
3. Initiation of oxygen therapy
4. Securing/controlling vascular access
5. Initiation of fluid replacement/fluid resuscitation
6. Catheterization of the bladder
7. Consider the following procedures:
 - Uterine massage
 - Bimanual compression of the uterus
 - External aortic compression

Recommended Initial Laboratory Tests:

1. Blood count
2. Coagulation tests (aPTT, PT, antithrombin III)
3. Fibrinogen level
4. Pre-transfusion testing (blood group, screening for irregular erythrocyte antibodies, compatibility test)
5. Consider viscoelastic examination

Initial Requirements for Transfusion Products:

1. Plasma (in the initial phase ensure availability of at least 4 T.U)
2. Erythrocytes (in the initial phase ensure the availability of at least 4 T.U)

Ensuring the Stability of the Indoor Environment:

1. Acid-base balance
2. Temperature
3. Level of ionized calcium (Ca²⁺⁺)



Tromboelastometry provides rapid information on acute hemostatic status, allows differentiation of the causes of bleeding and deployment of targeted treatment.

Management of Postpartum Hemorrhage (PPH)

Authors: Pařízek A., Černý V., Blatný J., Kvasnička T., Salaj P.



Obstetrics Forum.cz

Causal Management

Uterine Hypotony/Atony	Step 1 1. Uterotonic administration - Oxytocin or carbetocin - Methylergometrine (if hypertension is not present) 2. Insertion of a urinary catheter 3. Uterine massage 4. Manual or instrumental revision of the uterine cavity 5. Prostaglandin administration 6. Tranexamic acid administration <i>In case of failure - Step 2</i>	Step 2 1. Blood clot removal from the uterine cavity and the vagina 2. Uterotonic and prostaglandin administration 3. Pressure, vacuum, and hemostatic intrauterine device 4. Fibrinogen 5. rFVII administration depending on relevant scenario <i>In case of failure - Step 3</i>	Step 3 1. Selective catheterization embolization aa. uterinae (if interventional radiology is available) 2. Surgical intervention (gradual devascularization of the uterus) - Gradual ligation of aa. uterinae and aa. ovaricae - Uterine compression sutures - Ligament aa. iliacae internae <i>In case of failure - Step 4</i>	Hysterectomy in a woman of childbearing age is a major intervention that will significantly affect her future life. We approach hysterectomies very carefully and individually. Performing a Hysterectomy Indications for a Hysterectomy: • Continued uterine bleeding when previous measures have failed and all available options (pharmacological and surgical) have been exhausted • Placenta accreta spectrum when clinical findings do not allow conservative surgical management • Devastating uterine injury • When the uterus is suspected as a cause of sepsis Surgical interventions are performed with i.v. ATB administration.
Retention of the Placenta	Step 1 1. Oxytocin, preferably carbetocin 2. Bladder catheterization <i>In case of failure</i>	Step 2 1. Manual removal under prophylactic ATB coverage		
Retention of Part of Placenta	Step 1 1. Oxytocin, preferably carbetocin 2. Bladder catheterization 3. Perform a gentle revision of the uterine cavity <i>In case of failure</i>	Step 2 1. The same procedure as during uterine atony		
Uterine Rupture/Dehiscence	Step 1 1. Perform a laparotomy and the primary surgical treatment of the uterus <i>In case of failure</i>	Step 2 1. Perform hysterectomy if primary treatment fails		
Uterine Inversion	Step 1 1. Perform manual reversion of the uterus (Perform under general anesthesia or wait for the effects of uterotonics to wear off) <i>In case of failure</i>	Step 2 1. Perform laparotomy - uterine inversion		
DIC: PLT, aPTT, PT, fibrinogen, D-dimers, antithrombin III	Step 1 1. DIC diagnostics 2. Search for the cause 3. Substitution of coagulation factors and inhibitors (plasma, antithrombin III, fibrinogen)	Step 2 1. In case of stabilization, consider anticoagulation prophylaxis, in case of persistence of the condition, consult a hematologist		
Primary Hematological Disorder	Step 1 1. Consult a hematologist for further normalization of coagulation factor levels			

USED ABBREVIATIONS:

- PPH – peripartum bleeding
aPTT – activated partial thromboplastin time
PT – prothrombin time
ATB – antibiotics
T.U. – transfusion unit
TP – transfusion product
rFVIIa – recombinant activated factor VII

Medicines and Their Dosage

Oxytocin (Oxytocin®)

Initiation of treatment: 5 IU of oxytocin i.v. (administration time 1 minute) and 5-15 IU/hour in an infusion solution until bleeding stops.

Carbetocin (Duratocin®)

An alternative to an oxytocin infusion
100 µg i.v.



(administration time 1 minute)

Methylergometrine

Initiation of treatment: 0.2 mg i.m. or slowly i.v., **Further:** After 15 minutes, repeat administration of 0.2 mg methylergometrine i.m. or 0.2 mg i.m. or slowly i.v. every 4 hours, not to exceed a dose of 1 mg (five doses of 0.2 mg).

Prostaglandiny F_{2α}

In case the bleeding continues after administration of oxytocin, carbetocin, or ergometrine, if needed.

Dinoprostum (Enzaprost F®)

5 mg in a 500 ml infusion solution, Rate: 5 ml/min (= 300 ml/h) do not exceed 20 mg.
If there is no response, administer carboprost (Prostin 15M®)

Carboprost (Prostin 15M®)

Initiation of treatment: 0.25 mg i.m. or intramyometrically. **Further:** As needed every 15 minutes (0.25 mg i.m.), not to exceed a dose of 2 mg (eight doses of 0.25 mg).

Misoprostol (Cytotec®)

400-600 µg sublingually, rectally, vaginally, or orally. Repeat: After 15 min as needed, maximum dose 800 µg.

Tranexamic Acid (Exacyl®)

Initial dose: For life-threatening bleeding, 1 g i.v. within 10 minutes is recommended, the next dose depends on the clinical condition of the patient.
Total dose should not exceed 2 g/day.

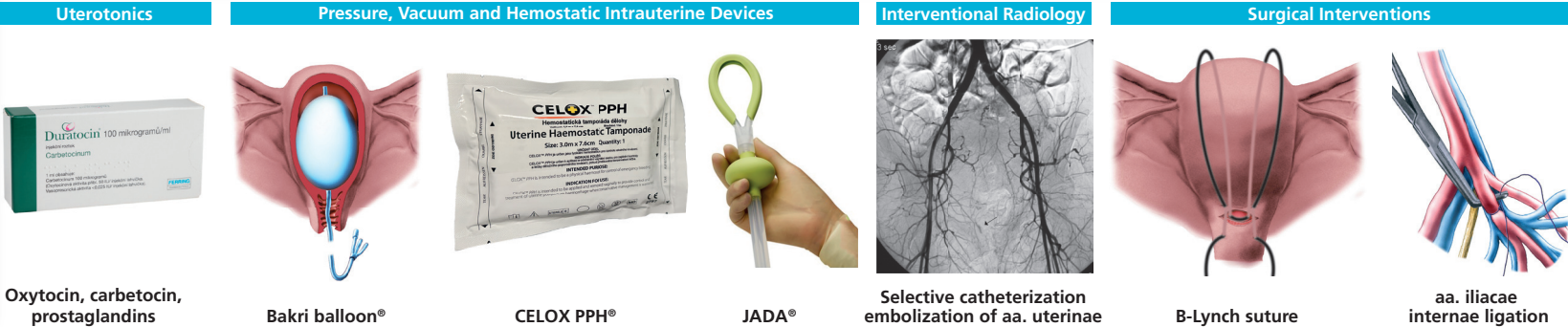
Fibrinogen

Administration of fibrinogen is recommended during life-threatening bleeding when its concentration drops below 2 g/l i.v.
Initial dose: At least 4 g i.v. is recommended for life-threatening bleeding.



Recombinant activated factor rFVIIa (NovoSeven®)

Administration of rFVIIa is indicated for the treatment of severe obstetric hemorrhage if the use of uterotonics is not sufficient to achieve hemostasis - according to the appropriate scenario.
Initial dose: 90 µg/kg



Management of Peripartum Hemorrhage (PPH)

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Uterotonic prophylaxis
Identification of PPH



Determining the cause (4T)

Tonus

Trauma

Tissue

Trombin

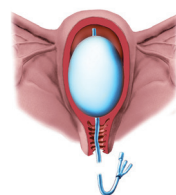
Uterine massage



Uterotonics
Tranexamic acid
Fibrinogen



Bakri balloon®,
Celox PPH®,
JADA®, NovoSeven®



Scenario 1
After vaginal delivery
For PPH after vaginal delivery, consider administration of rFVIIa after the use of first line non-invasive and invasive measures (uterotonics, TXA, intravenous fluids/blood/blood derivatives and fibrinogen, treatment of birth injuries, uterine cavity revision, uterine tamponade), if the patient is still bleeding **laparotomy or uterine artery embolization**.

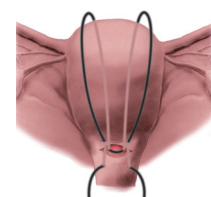
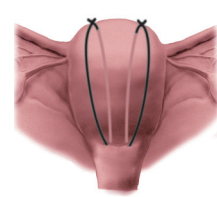
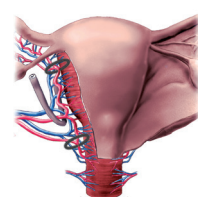
Scenario 2
During caesarean section
For PPH during caesarean section, **consider the use of rFVIIa** after failure of first line surgical measures (uterine compression sutures, uterine vascular ligation, uterine tamponade), **but before uterine artery embolization or hysterectomy**.

Scenario 3
After caesarean section
After caesarean section, when the patient is in the ICU or PACU and the laparotomy has been closed and severe bleeding is evident, **consider administration of rFVIIa** (possibly in combination with uterine artery embolization). **It is not advisable to postpone re-laparotomy in case of:** severe intra-abdominal hemorrhage with a significant drop in hemoglobin and/or cardiovascular instability.

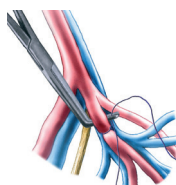
Scenario 4
Transport to a specialized workplace
In the event of transporting a PPH patient to a better equipped facility, **rFVIIa can be administered to stabilize** the patient and reduce the risk of worsening bleeding during transport. Administration of rFVIIa prior to transport should be considered based on the current clinical situation and the estimated time of transporting the patient to the center. **However, the administration of rFVIIa may not be a reason to delay the patient's transport to a higher care center or the administration of uterotonic treatment and/or uterine tamponade.**

Scenario 5
During Peripartal Hysterectomy
If excessive bleeding occurs during (peripartum) hysterectomy due to PPH and hemostasis is difficult to achieve, **consider administration of rFVIIa** along with other standard measures

RTG embolization
Vessel ligation
Haemyn suture
B-Lynch suture



aa. Iliacae internae ligation



Hysterectomy

Peripartum hemorrhage (PPH)

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Bleeding during childbirth

Vaginal delivery:

< 500 ml

Cesarean section:

< 1000 ml

Hemostasis mechanism = combination of two factors

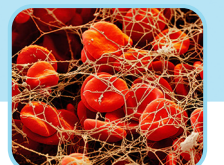
Mechanical hemostasis

Myometrial retraction – uterotonics, pressure and vacuum intrauterine devices



Coagulation

Tranexamic acid
Fibrinogen, rFVIIa



Peripartum bleeding - definition (Czech Republic)

Physiological blood loss < 500 ml
Less severe blood loss 500 - 1 000 ml
Severe blood loss > 1 000 ml
Peripartum hemorrhage (PPH) > 1 500 ml
(clinical and/or laboratory signs of tissue hypoperfusion)

4T

Tonus
80 %

Uterine hypotony
Uterine atony

Trauma
10 %

Ruptures
Lacerations

Tissue
5 %

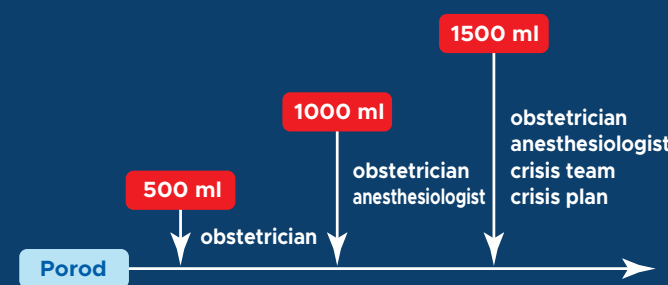
Placenta
accreta spectrum

Trombin
5 %

DIC
early/late

Organizational principles

- 1 Physiological blood loss → midwife
- 2 Less severe blood loss → obstetrician called
- 3 Severe blood loss → anesthesiologist called
- 4 Peripartum hemorrhage (PPH)
 - Crisis plan (standardized formalized procedure)
 - Crisis team (organizational & expert roles of individual members)



Obstetrics 2025 in the Czech Republic

Today, everything is available:

- Knowledge
- Advanced procedures
- Necessary medications
- Techniques – surgical, intensivist

Future

- Simulations & drill techniques