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Original article

Major obstetric hemorrhage

Hémorragie obstétricale majeure

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Abstract

Major obstetric hemorrhage is a challenge for anesthesiologists because it remains responsible for over 10% of maternal deaths in high-income countries. A standardized multidisciplinary management, described in locally validated protocols and based on international guidelines is mandatory to prevent these deaths. The first difficulty relies on the systematic underestimation of the bleeding. Collection bags must be used to facilitate the diagnosis and therefore rapid management. The etiologies in antenatal or postpartum must be well-known in order to be treated adequately. A rapid recourse to prostaglandins (sulprostone in France) may reverse uterine atony. Invasive approach with surgery or radiology should be promptly implemented (uterine artery or internal iliac artery ligations ± uterus plication) and hysterectomy should then be timely considered. Simultaneously, early and aggressive resuscitation with large-bore venous accesses should be implemented for rapid and massive transfusion (4:4:1 RBC:FFP:platelets ratio), along with an early use of fibrinogen concentrates and tranexamic acid. This transfusion strategy may be then guided by thromboelastography or thromboelastometry and bedside hemoglobin measurements. Activated factor VII remains indicated only before or after hysterectomy in case of uncontrolled bleeding. Management of placentation abnormalities (placenta previa, accreta, increta, percreta) must be well mastered as these etiologies may generate cataclysmic hemorrhages that can be and have to be anticipated.

Keywords: Transfusion; Fibrinogen; Hysterectomy; Placentation anomalies; Multidisciplinary approach

Résumé

L'hémorragie obstétricale majeure est un challenge pour les anesthésistes-réanimateurs car elle reste responsable de plus de 10 % des morts maternelles dans les pays industrialisés. Une prise en charge standardisée, multidisciplinaire, décrite au sein de protocoles validés localement et basés sur les recommandations internationales est impérative afin d'éviter ces décès. La première difficulté réside dans la sous-estimation systématique de l'hémorragie. Des sacs de recueil doivent être mis en place afin de faciliter le diagnostic et donc une prise en charge rapide. Les étiologies en anté- ou en post-partum doivent être connues afin d'être traitées adéquatement. La mise rapide sous sulprostone peut permettre de juguler une atonie utérine. Les mesures invasives de chirurgie ou de radiologie doivent être rapidement mises en œuvre (ligatures des vaisseaux utérins ou des artères hypogastriques ± capitonnage de l'utérus) puis l'hystérectomie d'hémostase envisagée à temps. Parallèlement, la réanimation de ces patientes doit être agressive d'emblée avec de grosses voies veineuses afin d'effectuer rapidement une transfusion massive (ratio culot globulaire:plasma frais congelé:culot plaquettaire de 4:4:1), un apport précoce de concentrés de fibrinogène et l'ajout d'acide tranéxamique. Cette stratégie transfusionnelle peut être secondairement guidée par la thromboélastographie ou thromboélastométrie et par des mesures au lit du malade du taux d'hémoglobine. Le facteur VII activé conserve une place restreinte avant l'hystérectomie ou après en cas de saignement incontrôlé. Les anomalies de la placentation (placenta praevia, accreta, increta, percreta) doivent être connues car génératrices d'hémorragies cataclysmiques qui peuvent et doivent être anticipées.

Mots clés : Transfusion ; Fibrinogène ; Hystérectomie ; Anomalies de placentation ; Approche multidisciplinaire

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1. Introduction

Major obstetric hemorrhage (MOH) is challenging for anesthesiologists and obstetricians, as it remains the leading cause of maternal mortality and morbidity worldwide [1]. Indeed, it is estimated that between one-quarter and a half of preventable maternal deaths are secondary to hemorrhage [2]. As failure to recognize MOH can delay its treatment, an agreed defined volume should trigger a MOH protocol based on national or international guidelines. The cornerstone of MOH management is a coordinated, multidisciplinary approach with written protocols implemented in every maternity, in order to act rapidly and avoid omissions and/or conflicting advises that are likely to occur in this stressful situation. This strategy has to be discussed and agreed upon in every maternity unit, should be based upon national and international recommendations and a good knowledge of pathophysiology, etiology and treatments available and finally written down as a local consensual procedure.

2. Antepartum haemorrhage

Antepartum hemorrhage complicates 5 to 6% of pregnancies [1]. One-third is due to placenta abruptio, one-third to placenta praevia, and one-third to other causes including uterine rupture and amniotic fluid embolism (AFE) [2]. Placenta abruptio can cause coagulopathy, which occurs in 10% of cases. However, if fetal demise occurs the incidence is much higher (up to 50%). Sometimes concealed blood loss (up to 1–2 L, then usually associated with fetal death) occurs in placenta abruptio, resulting in dangerous underestimation of the true blood loss.

Cases with abnormal placentation (placenta previa, accreta/increta/percreta or placenta abruptio) can result in serious complications both for mother and child. AFE needs immediate delivery and a huge postpartum bleeding resulting from major coagulation disorders and uterine atony must be anticipated. Antepartum hemorrhage can result in postpartum hemorrhage.

3. Postpartum hemorrhage (PPH)

Primary PPH is defined as blood loss of > 500 mL within 24 hours of delivery and affects about 5% of deliveries. However, as assessment of blood loss is inaccurate, any abnormal bleeding (in rate and/or duration) after delivery must trigger at once the diagnosis of PPH. Except for placenta praevia/accreta, none of the known risk factor for PPH has a sensitivity or specificity sufficient to detect patients at risk of PPH [3–5]. That is to say, every parturient has to be considered at risk and thus every maternity unit needs to be prepared to deal with PPH. The 3 most common causes are uterine atony in the first place (50–60%), retained placenta and cervical/vaginal traumas. Taken all together, they represent roughly 95% of all causes of PPH. Coagulation disorders (congenital or acquired) can be a cause or a consequence of PPH. Three tricks must be well-known: the bleeding can be concealed in the vaginal wall or pelvis, episiotomy can also lead to significant bleeding if not quickly repaired and multiple causes can be involved simultaneously.

4. Planning for obstetric haemorrhage – organizational aspects

The effective management of obstetric hemorrhage relies on very simple but often overlooked principles that all concur to timely treatment:

- simultaneous, coordinated, multidisciplinary management (obstetricians, anesthesiologists, hematologists, laboratory and blood bank technicians, radiologists), according to a consensual, pre-planned, step management available as a written operational protocol;
- consensual and practical definition of hemorrhage: any abnormal bleeding (in rate and/or duration) should trigger at once the diagnosis of hemorrhage. This is particularly important after delivery where the border between physiologic bleeding and PPH must be clear-cut to avoid any treatment delay;
- MOH has no consensual definition. A blood loss volume of more than 1500 mL or any clinical evidence of cardiovascular compromise should trigger a "MOH protocol";
- as first step, the obstetric team needs to focus on the search and on the basic treatment of the 3 commonest causes of PPH; simultaneously, the anesthetic team provides basic resuscitation and adequate analgesia for these obstetric interventions;
- in the French PPH guidelines, the second step relies on prostaglandin administration with i.v. PGE2 sulprostone and should be implemented as soon as the first step has proven ineffective to stop the bleeding, and no later than 30 minutes after initial PPH diagnosis [4,6]. Alternatively, i.m. 15-Methyl PGF2-alpha carboprost is used in other high-income countries. Intra-uterine balloon tamponade (using for example the "Bakri" balloon) can also be very useful;
- more advanced resuscitation and monitoring is also usually needed and provided by the anesthetic team at this stage;
- the next step is based on invasive therapy, either surgical artery ligation ± uterine compression sutures, or radiologic embolization, depending on clinical situation, resources available and the experience of the physician involved. In most countries, it is called "second-line therapy" whereas in the French guidelines, it is named as third step of PPH management with the aim of being activated no later than 30 minutes after the second step has also failed to stop the bleeding [4];
- last step is hysterectomy and in-between the use of rFVIIa can be considered.

This systematic step-by-step approach of PPH treatment has to be adapted to the individual situation, rate of bleeding and/or specific etiologies, with some steps by-passed when relevant.

5. Invasive therapy

Several invasive options are available to control postpartum hemorrhage when medical treatment is unsuccessful to control bleeding: uterine balloon tamponade, arterial embolization, uterine compression sutures and uterine artery or internal iliac artery ligation. A systematic literature review performed by Doumouchstis et al. showed that uterine embolization and