



Review

Anesthesiologic management of major obstetrical hemorrhage

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ABSTRACT

Postpartum hemorrhage (PPH) remains a considerable burden on maternal morbidity and mortality, accounting for 80% of severe maternal morbidity. Although a consensus on definitions on major obstetrical bleeding is lacking, postpartum blood losses greater than 500 ml after vaginal delivery and 1000 ml after cesarean section is considered as postpartum hemorrhage; a blood loss greater than 2500 ml is considered as severe postpartum hemorrhage.

The definition of major obstetrical hemorrhage (MOH) is a broader term characterizing antenatal or postpartal bleeding. Approximately only 10% of MOH is predictable, as etiologies and risk factors leading to MOH are still poorly understood. This lack of predictability may result in delays for initiation of proper anesthesiologic management of MOH. The quantity of blood loss, combined to the rapidity in which blood loss happens in case of MOH remains an important challenge anesthesiologic teams otherwise usually face only in major vascular or trauma surgery.

Preservation of maternal fertility is one of the major aims after maternal and neonatal resuscitation has been granted. Drugs used to increase uterine tone are reviewed in detail, as well as surgical measures available today.

Fortunately lessons learned from trauma management have been implemented in major MOH protocols. Not only is maternal and neonatal well being the primary aim to keep in sight, preservation of fertility whenever possible is the next aim anesthesiologists are facing.

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1. Introduction

PPH is generally defined as a blood loss equal to or greater than 500 ml within the first 24 h after vaginal delivery, whereas severe PPH is defined by blood loss that exceeds 1000 ml within 24 h. Reviews and textbook chapters tend to differentiate between bleeding that occurs before delivery (antepartum) and immediately postpartum regarded as primary PPH, whereas any abnormal or excessive bleeding from the birth canal occurring between 24 h and 12 weeks postpartum is regarded as secondary PPH.

There is no universal consensus on the definition of what constitutes a major obstetrical hemorrhage (MOH) in terms of blood loss. The term of MOH is somewhat broader than PPH as it is used for both ante- and postpartum hemorrhage. The World Health Organization (WHO) has defined PPH as a blood loss greater or equal to 500 ml within 24 h after birth, while severe PPH is a blood loss greater or equal to 1000 ml in the first 24 h postpartum [1].

Different definitions and stages of blood loss have been proposed by different authors and organizations; overall though, severe PPH or MOH usually consider that blood loss was greater than 2000–2500 ml (Table 1).

2. Epidemiology

Postpartum hemorrhage (PPH) remains a leading cause of maternal peripartum morbidity and mortality, occurring in approximately 3.7 per 1000 births (95% CI 3.4–4.0) [2] and accounting for 80% of all maternal morbidity [3]. The 2006–2008 UK *Saving Mother's Lives* survey reports a total direct and indirect maternal mortality related to pregnancy of 11.39 (95% CI 10.09–12.86) per 100,000 maternities. Nine direct deaths related to hemorrhage were reported in that period, ranking as the 6th cause of mortality in the UK, after sepsis, pre-eclampsia and eclampsia,

thrombosis and thrombo-embolism, amniotic fluid embolism and early pregnancy deaths [4]. The Scottish and UK decline in bleeding-related maternal deaths, compared to an increase in the number of cases of major obstetrical hemorrhage in the same time, points to better management of hemorrhage. Nevertheless, sub-standard care is still a concern in 66% of bleeding related causalities [4]. These figures are expected to be much higher in developing countries, where obstetric hemorrhage is the leading cause of maternal deaths [5].

3. Etiology and risk factors

The steady increase in PPH in the last decade is related to:

- Increasing maternal ages
- Increasing cesarean delivery rates
- Labor induction and augmentation
- Increasing serious comorbidities in parturients

Uterine atony accounts for 79% of PPH [6]. Overall, all PPH etiologies may be summarized into four 'T' categories [7]:

- **Tonus:** uterine atony, and any factor that increases uterine distention, an infection or an anatomical abnormality
 - Multiparity
 - Multiple gestation (twins, triplets)
 - Macrosomia
 - Polyhydramnios
 - Prolonged induction of labor, and prolonged 2nd stage of labor
 - Tocolysis
 - MgSO₄-Infusion
- **Trauma:** genital tract injury (laceration) or uterine injury (uterine rupture or inversion)

Table 1
Definitions of obstetrical blood loss.

Quantification of obstetrical blood loss					Reference
Blood loss (ml)	500–1000	1000–1500	1500–2000	>2000	
Compensated Stage 1 after vaginal birth	Mild Stage 1 after CS	Stage 2 if blood loss less than 1500 ml and continued bleeding or vital signs instable	Moderate Stage 3 if blood loss >1500 or unstable vitals after 2 PRBC or suspicion of DIC	Severe	[82] [79]
PPH after vaginal birth	PPH after CS		Severe PPH	MOH	[2] [1]
Minor PPH	Major PPH		Major moderate	Major severe >2500 ml blood loss or: transfusion of ≥5 PRBC, or treatment of coagulopathy	[83] [84]

MOH: Major Obstetrical Hemorrhage, PPH: Postpartal hemorrhage, CS: Cesarean Section, PRBC: Packed Red Blood Cells, DIC: Disseminated Intravascular Coagulation.

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