



## REVIEW

# Massive obstetric hemorrhage: Current approach to management<sup>☆</sup>



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### KEYWORDS

Massive obstetric hemorrhage;  
Postpartum hemorrhage;  
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Fibrinogen;  
Bleeding

**Abstract** Massive obstetric hemorrhage is a major cause of maternal mortality and morbidity worldwide. It is defined (among others) as the loss of >2500 ml of blood, and is associated to a need for admission to critical care and/or hysterectomy. The relative hemodilution and high cardiac output found in normal pregnancy allows substantial bleeding before a drop in hemoglobin and/or hematocrit can be identified. Some comorbidities associated with pregnancy can contribute to the occurrence of catastrophic bleeding with consumption coagulopathy, which makes the situation even worse. Optimization, preparation, rational use of resources and protocolization of actions are often useful to improve outcomes in patients with postpartum hemorrhage. Using massive obstetric hemorrhage protocols is useful for facilitating rapid transfusion if needed, and can also be cost-effective. If hypofibrinogenemia during the bleeding episode is identified, early fibrinogen administration can be very useful. Other coagulation factors in addition to fibrinogen may be necessary during postpartum hemorrhage replacement measures in order to effectively correct coagulopathy. A hysterectomy is recommended if the medical and surgical measures prove ineffective.

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### PALABRAS CLAVE

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Viscoelástico;  
Fibrinógeno;  
Hemorragia

### Hemorragia masiva obstétrica: enfoque terapéutico actual

**Resumen** La hemorragia masiva obstétrica es una de las causas principales de morbimortalidad materna en el mundo. Entre otras definiciones, se conoce como la pérdida > 2.500 ml de sangre y se asocia a ingreso en unidades de pacientes críticos y a histerectomía. Los cambios fisiológicos del embarazo permiten una hemorragia cuantiosa antes de objetivar una caída de la hemoglobina y/o el hematocrito. Dentro de los cambios fisiológicos del embarazo, existe una hipercoagulabilidad asociada a la gestante. Algunas comorbilidades asociadas al embarazo

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pueden contribuir a la aparición de una hemorragia catastrófica con una coagulopatía de consumo, que hace la situación aún más grave. La optimización, la preparación, el uso racional de recursos y la protocolización de actuaciones son útiles para mejorar los resultados en estas pacientes. El uso de protocolos basados en *point of care* con test viscoelásticos está demostrando utilidad. Si se produce una hipofibrinogenemia durante la hemorragia, la administración precoz de fibrinógeno puede ser muy útil. Para corregir eficazmente la coagulopatía pueden ser necesarios otros factores de la coagulación, además de fibrinógeno, durante la reposición en la hemorragia posparto. Se recomienda la realización de una histerectomía si las medidas médicas y quirúrgicas se han mostrado ineficaces.

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## Introduction

Massive obstetric hemorrhage (MOH) is one of the leading causes of maternal morbidity–mortality in the world, particularly in developing countries—though in the industrialized world it is a growing cause for concern. Uterine atony is an increasingly frequent cause of MOH. This fact, and the growing number of cesarean sections, implicated in an increase in the number of cases of placenta accreta or abnormal placental attachment, have caused the incidence of MOH to increase. Furthermore, some cases of MOH are characterized by very severe coagulopathy and require adequate and intensive blood product replacement measures.<sup>1–3</sup>

Despite increasingly improved knowledge of MOH, research in this field has fundamentally centered on patients with massive hemorrhage associated to trauma – few studies having been focused on postpartum hemorrhage. However, obstetric patients differ markedly from trauma patients. In effect, the latter are often males; pregnancy is characterized by a series of physiological changes; and the mechanisms underlying hemorrhage in the two scenarios are completely different. These distinct features imply that the approach to management also may be different.

Recently, several clinical guides have been published on massive hemorrhage, with special emphasis on MOH.<sup>4–6</sup>

The present study deals with MOH in particular, beginning with its definition and reviewing the physiological and hemostatic changes in the pregnant patient, with a view to better understanding the physiopathology of MOH. With regard to treatment, we will describe the medical measures, the role of fibrinogen, and the transfusion indications involving protocols based on experience or guided by viscoelastic tests. Lastly, a series of recommendations will be made, with a series of key points, designed to help the reader to summarize and systematize the management of MOH.

## Definition of obstetric hemorrhage

Hemorrhage is physiological following delivery. However, when bleeding exceeds a certain magnitude, it is considered pathological. It is difficult to clearly define obstetric hemorrhage, and many definitions have been proposed (Table 1).<sup>7–10</sup>

The quantification of hemorrhage is particularly difficult during delivery and/or cesarean section, since blood becomes mixed with other fluids. Furthermore, in the event

**Table 1** Summary of the main definitions of obstetric hemorrhage.

Clinical guides	Definition
Australian, 2008 <sup>8</sup>	Blood loss > 500 ml after delivery and 750 ml after cesarean section
Austrian, 2008 <sup>4</sup>	Blood loss 500–1000 ml and signs of hypovolemic shock or bleeding > 1000 ml
German, 2008 <sup>4</sup>	Blood loss > 500 ml after delivery Severe: loss > 1000 ml in 24 h
RCOG, United Kingdom, 2009 <sup>10</sup>	Primary: estimated loss > 500–1000 ml without signs of shock Severe: estimated loss > 1000 ml or signs of shock
WHO <sup>9</sup>	Loss > 500 ml in 24 h after delivery Severe: loss > 1000 ml in 24 h

RCOG, Royal College of Obstetricians and Gynaecologists; WHO, World Health Organization.

of postpartum atony, a large amount of blood may be retained within the uterus, regardless of whether delivery has been normal (vaginal) or through cesarean section.<sup>1,2</sup>

The classical clinical signs (tachycardia and hypotension) are misleading in pregnancy, due to the notorious increase in plasmatic volume, and might not manifest until bleeding becomes very abundant.

The relative hemodilution and increased cardiac output inherent to normal pregnancy allow important blood loss to occur before a drop in hemoglobin concentration and/or hematocrit is identified.<sup>1,2</sup>

Hemorrhage is considered abnormal when over 500 ml after vaginal delivery and over 1000 ml after cesarean section. These volumes are exceeded in 1:20 deliveries or cesarean sections, respectively.<sup>11</sup>

Massive obstetric hemorrhage is defined as the loss of over 2500 ml of blood, and is associated to significant morbidity; the need for admission to intensive care; and the indication of obstetric hysterectomy. Other definitions include: a drop in hemoglobin concentration of  $\geq 4$  g/dl; the need for transfusion of  $\geq 5$  red cell concentrate units (RC);

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