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DEFINITIONS AND CLASSIFICATIONS

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INTRODUCTION

Conventionally, the term 'postpartum hemorrhage' is applied to pregnancies beyond 20 weeks gestation. Although bleeding at an earlier gestational age may have a similar etiology and management to postpartum hemorrhage, these are usually referred to as spontaneous miscarriages.

There has been no significant change in the definitions or classification over the past 50 years; this does not reflect the advances made in medical and surgical treatment over this period[1]. A widely used definition currently is that proposed by the World Health Organization (WHO) in 1990 as 'any blood loss from the genital tract during delivery above 500 ml'[2].

The average blood loss during a normal vaginal delivery has been estimated at 500 ml; however, around 5% of women would lose greater than 1000 ml during a vaginal birth[3–6]. Cesarean deliveries are associated with an average estimated blood loss of 1000 ml[7]. There is, therefore, a degree of overlap in the acceptable range of blood loss for vaginal and Cesarean deliveries.

PURPOSE OF CLASSIFICATION

Classification of postpartum hemorrhage is desirable for the following reasons. First, due to the rapidity of disease progression, there is an overriding clinical need to determine the most suitable line of management. The urgency of intervention depends on the rate of the patient's decline or deterioration.

The second reason for classification is to assess the prognosis. This may help to determine the immediate, medium and long-term clinical outcome. Therefore, a prognostic classification will guide the degree of aggressiveness of the intervention, especially as management may involve more than one clinical specialty. It will also help to decide on the optimal site for subsequent care, for example in a high-dependency unit or intensive care unit, if such exist in the hospital.

The third reason is to allow effective communication based on standardization of the estimate of the degree of hemorrhage, thus standardizing differing management options. The initial assessment is usually made by the staff available on site, and these are often relatively junior medical or midwifery personnel. They, in turn, have to assess the severity of bleeding and summon help or assistance as required. Thus, a standardized easily applicable working classification facilitates effective communication and obviates inter-observer variation.

CLASSIFICATIONS IN USE

Conventional temporal classification

Traditionally, the classification of postpartum hemorrhage has been based on the timing of the onset of bleeding in relation to the delivery. Hemorrhage within the first 24 h of vaginal delivery is termed either early or primary postpartum hemorrhage, whereas bleeding occurring afterwards, but within 12 weeks of delivery, is termed late or secondary postpartum hemorrhage[8].

Secondary postpartum hemorrhage is less common than primary postpartum hemorrhage, affecting 1–3% of all deliveries. In both cases, the true blood loss is often underestimated due to the difficulty with visual quantitation[9,10].

Classification based on quantification of blood loss

Amount of blood lost

Blood loss at delivery is estimated using various methods. These range from the less modern methods of counting blood-soaked pieces of cloth or 'kangas' used by traditional birth attendants in rural settings, to more modern techniques such as calculating the blood loss by subtraction after weighing all swabs using sensitive weighing scales[11].

The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) describes postpartum hemorrhage as a blood loss of 500 ml or more for a vaginal delivery and 750 ml or more in association with Cesarean delivery[12].

Change in hematocrit

The American College of Obstetricians and Gynecologists advocates the definitions of either a 10% change in hematocrit between the antenatal and postpartum periods, or a need for erythrocyte transfusion[13].

Rapidity of blood loss

In attempts to overcome these inconsistencies, the classification of postpartum hemorrhage has also been based on the rapidity of blood loss. Severe hemorrhage has been classified as blood loss > 150 ml/min (within 20 min, causing loss of more than 50% of blood volume) or a sudden blood loss > 1500–2000 ml (uterine atony; loss of 25–35% of blood volume)[14].

Volume deficit

A form of standardized classification described by Benedetti considers four classes of hemorrhage[15] (Table 1). The class of hemorrhage reflects the volume deficit, and this is not necessarily the same as the volume of blood loss.

Class 1 The average 60 kg pregnant woman has a blood volume of 6000 ml at 30 weeks gestation. A volume loss of less than 900 ml in such a woman will rarely lead to any symptoms and signs of volume deficit and will not require any acute treatment.

Table 1 Benedetti's classification of hemorrhage[15]

Hemorrhage class	*Acute blood loss* (ml)	*Percentage lost*
1	900	15
2	1200–1500	20–25
3	1800–2100	30–35
4	2400	40

Class 2 A blood loss of 1200–1500 ml will begin to manifest clinical signs, such as a rise in pulse and respiratory rate. There may also be recordable blood pressure changes, but not the classic cold clammy extremities.

Class 3 These are patients in whom the blood loss is sufficient to cause overt hypotension. The blood loss is usually around 1800–2100 ml. There are signs of tachycardia (120–160 bpm), cold clammy extremities and tachypnea.

Class 4 This is commonly described as massive obstetric hemorrhage. When the volume loss exceeds 40%, profound shock ensues and the blood pressure and pulse are not easily recordable. Immediate and urgent volume therapy is necessary, as this quantity of blood loss can be fatal secondary to circulatory collapse and cardiac arrest.

Classification based on causative factors

The causes of postpartum hemorrhage can also form a basis of classification (Table 2).

Causes of primary postpartum hemorrhage

Primary postpartum hemorrhage is traditionally considered as a disorder of one or more of the four processes: uterine atony, retained clots or placental debris, genital lesions or trauma, and disorders of coagulation. An aide memoire is the four Ts: tonus, tissue, trauma and thrombin. Uterine atony alone accounts for 75–90% of cases of postpartum hemorrhage.

Table 2 Classification of postpartum hemorrhage (PPH) according to causative factors

Causes of primary PPH
Tonus (uterine atony)
Uterine overdistention: multiparity, polyhydramnios, macrosomia
Uterine relaxants: nifedipine, magnesium, beta-mimetics, indomethacin, nitric oxide donors
Rapid or prolonged labor
Oxytoxics to induce labor
Chorioamnionitis
Halogenated anesthetics
Fibroid uterus
Tissue
Impediment to uterine contraction/retraction: multiple fibroids, retained placenta
Placental abnormality: placenta accreta, succenturiate lobe
Prior uterine surgery: myomectomy, classical or lower segment Cesarean section
Obstructed labor
Prolonged third stage of labor
Excessive traction on the cord
Trauma
Vulvovaginal injury
Episiotomy/tears
Macrosomia
Precipitous delivery
Thrombin (coagulopathy)
Acquired during pregnancy: thrombocytopenia of HELLP syndrome, DIC (eclampsia, intrauterine fetal death, septicemia, placenta abruptio, amniotic fluid embolism), pregnancy-induced hypertension, sepsis
Hereditary: Von Willebrand's disease
Anticoagulant therapy: valve replacement, patients on absolute bedrest
Causes of secondary PPH
Uterine infection
Retained placental fragments
Abnormal involution of placental site

Adapted from Wac *et al. Female Patient* 2005;30:19

Classification based on clinical signs and symptoms

Any bleeding that results in or could result in hemodynamic instability, if untreated, is considered as postpartum hemorrhage (Table 3).

PITFALLS OF CURRENT CLASSIFICATIONS

The drawbacks of a classification based solely on blood loss or hematocrit include the fact that this is a retrospective assessment and may not represent the current clinical situation. To a certain extent, any classification is of limited use to a clinician faced with active and continuous bleeding.

The change in hematocrit depends on the timing of the test and the amount of fluid resuscitation previously administered[16]. It could also be affected by extraneous factors such as prepartum hemoconcentration, which may exist in conditions such as pre-eclampsia.

Where the diagnosis is made by a clinical estimate of blood loss, there is often significant underestimation. The WHO definition of 500 ml is increasingly becoming irrelevant, as

Table 3 Symptoms related to blood loss with postpartum hemorrhage

Blood loss		*Blood pressure*	
%	ml	(mmHg)	*Signs and symptoms*
10–15	500–1000	normal	palpitations, dizziness, tachycardia
15–25	1000–1500	slightly low	weakness, sweating, tachycardia
25–35	1500–2000	70–80	restlessness, pallor, oliguria
35–45	2000–3000	50–70	collapse, air hunger, anuria

Adapted from Bonnar J. *Baillieres Best Pract Res Clin Obstet Gynaecol* 2000;14:1

most healthy mothers in the developed world can cope with a blood loss of less than 500 ml without any hemodynamic compromise.

Classifications based on the need for blood transfusion alone are also of limited value as the practice of blood transfusion varies widely according to local circumstances and attitudes to transfusion of both patients and physicians[17].

The clinical application of such a classification may, in addition, be limited because of inherent individual differences in response to blood loss. Hemodynamic compensation depends on the initial hemoglobin levels prior to onset of bleeding, and these vary among healthy individuals. For these reasons, reliance on a classification solely based on the amount of blood loss and without consideration of clinical signs and symptoms may lead to inconsistency with management.

NEED FOR A CLINICAL AND PROGNOSTIC CLASSIFICATION

Universally, guidelines on the management of postpartum hemorrhage have reiterated the importance of accurate estimation of blood loss, and the clinical condition of the hemorrhaging patient. This was further emphasized in the 1988–1990 Confidential Enquiries into Maternal Deaths in the United Kingdom (CEMD)[18] and reiterated in the 1991–1993 report as a list of six bullet points, the first being 'accurate estimation of blood loss'[19].

The ideal classification of postpartum hemorrhage should take into consideration both the volume loss and the clinical consequences of such loss. The recorded parameters should be easily measurable and reproducible. This will help in providing an accurate and consistent assessment of loss, which can readily be communicated and incorporated into most labor ward protocols.

PROPOSED CLASSIFICATION

The 500 ml limit as defined by WHO[2] should be considered as an alert line; the action line is then reached when the vital functions of the woman are endangered. In healthy women, this usually occurs after the blood loss has exceeded 1000 ml.

We propose a classification (Table 4) wherein the volume loss is assessed in conjunction with clinical signs and symptoms. We propose this classification as being mainly useful in fully equipped hospitals and obstetric units. It is not being proposed for full implementation in areas which are resource-poor.

Our adaptation of a previously described classification[15] will fulfil most of these criteria. This guideline adopts a practical approach whereby a perceived loss of 500–1000 ml (in the absence of clinical signs of cardiovascular instability) prompts basic measures of monitoring and readiness for resuscitation (alert line), whereas a perceived loss of > 1000 ml or a smaller loss associated with clinical signs of shock (hypotension, tachycardia, tachypnea, oliguria or delayed peripheral capillary filling) prompts a full protocol of measures to resuscitate, monitor and arrest bleeding.

Table 4 Proposed classification. Adapted from Benedetti[15]

Hemorrhage class	*Estimated blood loss* (ml)	*Blood volume loss* (%)	*Clinical signs and symptoms*
0 (normal loss)	< 500	< 10	none
	ALERT LINE		
1	500–1000	15	minimal
	ACTION LINE		
2	1200–1500	20–25	↓ urine output ↑ pulse rate ↑ respiratory rate postural hypotension narrow pulse pressure
3	1800–2100	30–35	hypotension tachycardia cold clammy tachypnea
4	> 2400	> 40	profound shock

Need observation ± replacement therapy
Replacement therapy and oxytocics
Urgent active management
Critical active management (50% mortality if not managed actively)

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