Management of post-partum haemorrhage

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Abstract

The most recent Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK (MBRRACE-UK) confidential enquiry into maternal deaths 2012–2014 states that for women in the United Kingdom, giving birth remains as safe as ever, with a maternal mortality rate of <9 per 100,000. The maternal mortality rate continues to fall. However, according to the Confidential Enquiry into Maternal and Child Heath (CEMACH) report 2011–13, obstetric haemorrhage was one of the leading causes of direct maternal death and was in fact, ranked second.

According to the Green Top Guidelines on Postpartum Haemorrhage on the 'prevention and management of postpartum haemorrhage' (2016), produced by the Royal College of Obstetricians and Gynaecologists (RCOG), primary postpartum haemorrhage (PPH) is the most common form of major obstetric haemorrhage and is defined as the loss of 500 ml or more blood from the genital tract within 24 hours of birth of a baby. PPH can be minor (500–1000 ml) or major (>1000 ml). Major can be further subdivided into moderate (1001–2000 ml) and severe (>2000 ml).

Secondary PPH is defined as any abnormal bleeding or excessive bleeding from the birth canal between 24 hours and 12 weeks after delivery. Although, in some cases, massive obstetric haemorrhage can be anticipated, enabling steps to be taken for prevention and timely and effective management, it most often occurs in women who are classified as 'low risk', with no identified antenatal or intrapartum risk factors. A timely, systematic and multidisciplinary approach to restore the blood volume and clotting system whilst arresting bleeding, *at the same time*, should be the key cornerstones in the management of PPH. Such an approach would help further reduce maternal morbidity and mortality. Hence, all clinicians involved in antepartum and intrapartum care should have the necessary knowledge and skills to identify risk factors, signs and symptoms of massive PPH and should have adequate training in not only activating potentially life-saving emergency protocols but also in taking immediate steps to arrest ongoing bleeding.

Keywords cell saver; coagulopathy; haemostasis; shock index; triple P procedure peripartum hysterectomy; uterine atony; uterotonics

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Introduction

Postpartum haemorrhage (PPH) is one of the leading causes of maternal mortality and morbidity around the world. The latest MBRRACE (2012–14) report, published in December 2016, confirmed the low maternal mortality rate in the UK. The incidence of maternal death secondary to haemorrhage is on the decline and, currently, PPH ranks seventh overall. However, obstetric haemorrhage ranks third, after thromboembolism and amniotic fluid embolism, as a *direct* cause of maternal death.

Primary PPH is the most common form of major obstetric haemorrhage. The latest RCOG Greentop Guideline on the Prevention and Management of PPH (2016) defined PPH as the loss of 500 ml or more blood from the genital tract within 24 hours of the birth of a baby. PPH can be minor (500–1000 ml) or major (>1000 ml). Major can be further subdivided into moderate (1001–2000 ml) and severe (>2000 ml, or >30 % of blood volume).

Secondary PPH is defined as abnormal bleeding or excessive bleeding from the birth canal between 24 hours and 12 weeks postnatally.

Risk factors for PPH may present antepartum or intrapartum, and care plans must be modified as, and when, risk factors for PPH are identified, including during labour (e.g. prolonged second stage of labour) or immediately after birth (e.g. difficult operative vaginal birth, shoulder dystocia etc. where genital tract trauma is anticipated). The risk factors for PPH are listed in Table 1.

Women with known risk factors should be delivered in a hospital with the potential for immediate recourse to blood transfusion.

Anaemia complicating pregnancy should be investigated and treated appropriately during the antenatal period as this may reduce the morbidity associated with PPH.

Clinicians must be aware that even a smaller blood loss (i.e. <1000 ml) may result in significant haemodynamic instability in a patient who is already anaemic prior to delivery. Similarly, a woman with a low body mass index (BMI) will be less able to withstand a moderate blood loss (1000–2000 ml) due to her smaller circulating blood volume. Therefore, the use of arbitrary thresholds of blood loss, such as 1.5 or 2 litre, may not only be misleading but also may be positively harmful in such cases. As visual estimation of blood loss is notoriously inaccurate, it is vital to consider massive PPH as a loss of >30 % of blood volume (i.e. booking weight in Kg × 100 = approximate blood volume during pregnancy) or as any loss that results in haemodynamic instability. Other guides, such as the Obstetric Shock Index (OSI) and the 'Rule of 30', can be used as adjuncts to assign the appropriate degree of concern in the situation of PPH and help to offset the challenges posed by visual estimation of blood loss.

The obstetric shock index

The Shock Index (SI) is defined as the pulse rate (PR) divided by the systolic blood pressure (SBP); PR/SBP. In the non-pregnant adult population, a value of 0.5–0.7 is said to be normal. During pregnancy, due to the increase in pulse rate and the reduction of systolic blood pressure, the suggested normal range for the obstetric shock index (OSI) is 0.7–0.9. An OSI >1 has been shown to predict the need for blood transfusion and is therefore a

Please cite this article in press as: Ghosh M, Chandraharan E, Management of post-partum haemorrhage, Obstetrics, Gynaecology and Reproductive Medicine (2017), http://dx.doi.org/10.1016/j.ogrm.2017.06.002

Risk factors for PPH

Risk factors for PPH

- Multiple pregnancy
- Previous PPH
- Fetal macrosomia
- Failure to progress in second stage
- Prolonged third stage of labour
- Retained placenta
- Abnormal invasion of the placenta
- Episiotomy
- Perineal laceration
- General anaesthesia

Table 1

useful adjunct in estimating blood loss in cases of massive PPH and in predicting the need for blood and blood products. It is a useful bedside test in an emergency because it is very easy to calculate (i.e. if the pulse rate rises above the systolic blood pressure the OSI will be >1). As the bleeding continues, the maternal heart rate increases to compensate for the blood loss before any changes in systolic blood pressure are observed. Therefore, the OSI will change prior to any observed changes in the systolic blood pressure.

The 'Golden First Hour' and the 'Rule of 30'

Severe PPH causes a reduction in tissue perfusion and cardiovascular compromise, potentially leading to maternal collapse and death. Aggressive resuscitative measures should be deployed *before* the estimated blood loss is more than one-third of the woman's circulating blood volume (blood volume [ml] = weight [kg] × 100), or a change in haemodynamic status has occurred (e.g. OSI > 1). The 'Golden First Hour' is the time at which effective resuscitation must occur to achieve maximum survival and prevent metabolic acidosis.

The Rule of 30 is used to measure the severity of shock (Table 2). It refers to a blood loss of ≥ 30%, a fall in systolic blood pressure (SBP) of 30 mmHg or more, an increase in heart rate (HR) by at least 30 beats/min, a respiratory rate >30 breaths/min, a fall in the haemoglobin or haematocrit of 30%, and/or a reduction in urinary output to <30 ml/hour. These are all guides suggesting that the woman is likely to have lost at least 30% of her blood volume.

Haematological management involves recognition of the amount and rapidity of blood loss (Table 3), replacing the circulating blood volume and oxygen carrying capacity and restoring the coagulability of the blood. In addition, if there is any evidence of metabolic acidosis, this should be immediately corrected, whilst at the same time, addressing the underlying cause of the PPH (Table 4). Metabolic acidosis compromises cardiac function and inherent clotting mechanisms. Massive PPH resulting in depletion of coagulation factors is very likely once 80% of the blood volume has been lost. This equates to an approximate blood loss of 4.5 litres in an 'average sized' woman. However, coagulopathy may develop earlier, especially if there is an existing predisposing factor such as pre–eclampsia, or in a woman with a low BMI.

Rule of 30

Systolic blood pressure	Falls by 30 mmHg
Pulse	Increases by 30 beats/minute
Haemoglobin	Falls by 30% (approx 3 g/dl)
Haematocrit	Falls by 30%
Estimated blood loss	30% of normal (100 ml/kg during pregnancy)

Table 2

Case study

A 29 year old primigravida was booked with a BMI of 18 kg/m^2 and a weight of 48 kg. She was referred to the consultant clinic due to her low BMI and followed-up in the antenatal clinic as her fetus was found to be small for the gestational age (SGA). Induction of labour occurred at 38 weeks for the same reason. She was not anaemic at booking and her Hb was 118 g/L at 36 weeks gestation. She went into labour after induction with a single controlled-release prostaglandin (10 mg) pessary. In view of the suspected SGA, she had continuous electronic intrapartum fetal monitoring, IV access and a valid "group and save" at the onset of labour.

She made good progress in labour and had artificial rupture of membranes (ARM) when the cervix was 4 cm dilated. She had a

Clinical findings in obstetric haemorrhage

Blood loss (volume)	Pulse rate	Systolic blood pressure	Signs	Shock
500–1000 ml (10–15%)	80–100 bpm	Normal	Palpitation tachycardia dizziness	Compensated
1000–1500 ml (15–30%)	100–120 bpm	Slight fall (80–100 mmHg)	Weakness tachycardia sweating	Mild
1500–2000 ml (30–40%)	>120 bpm	Moderate fall (70–80 mmHg)	Restlessness pallor oliguria	Moderate
2000–3000 ml (>40%)	>120 bpm (with the onset of myocardial failure, there may be a paradoxical reduction in pulse rate culminating in cardiac arrest)	Marked fall (50–70 mmHg)	Collapse, air hunger, anuria	Severe

Table 3

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