Postpartum haemorrhage and haematological management

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Abstract

Postpartum haemorrhage (PPH) is one of the leading causes of maternal morbidity and mortality around the world. In the UK, the Centre for Maternal and Child Enquiries (CMACE) confirmed a reduction in maternal deaths due to postpartum haemorrhage during the last Triennium (2006–2008). However, substandard care continues to contribute to more than half of maternal deaths due to postpartum haemorrhage.

Primary PPH is defined by the Royal College of Obstetricians and Gynaecologists (RCOG) Green Top Guideline on Postpartum Haemorrhage as a blood loss of 500 ml or more within 24 hours of the birth. It is further classified into minor (500–1000 ml) or major (>1000 ml) with a further sub classification into moderate (1000–2000 ml) or severe (>2000 ml or >30%of blood volume). Secondary PPH is defined as excessive bleeding between 24 hours and 12 weeks postnatally. A timely, multidisciplinary and systematic approach to restore the volume and clotting system whilst arresting bleeding is essential to improve maternal morbidity and mortality.

Although in some cases, massive obstetric haemorrhage can be anticipated and prevented, such as morbidly adherent placenta, it often occurs unexpectedly in women considered at 'low risk'. Hence, all clinicians involved in the care of women during pregnancy and delivery should have the knowledge and skills to promptly recognize symptoms, signs and complications of PPH and immediately activate the appropriate protocol which could save lives.

Keywords cell saver; coagulopathy; HAEMOSTASIS; peripartum hysterectomy; Shock Index; Triple P Procedure; uterine atony

Introduction

Postpartum haemorrhage (PPH) is one of the leading causes of maternal morbidity and mortality around the world. According to the WHO, it accounts for about one third of all pregnancy-related deaths in Africa and Asia. In the UK, it remains the third leading cause of maternal death (6.6 deaths/million maternities). The progressively increase in cesarean section rates, increasing complexity of patients with increasing rates of obesity, co-morbidities and increasing maternal age are likely to contribute to an increase in the rate of PPH.

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The definition of primary PPH according to the Royal College of Obstetricians and Gynaecologists (RCOG) Green Top Guideline on PPH states a blood loss of 500 ml or more within 24 hours of the birth. It is further classified into minor (500–1000 ml) or major (>1000 ml) with a further sub classification into moderate (1000–2000 ml) or severe (>2000 ml). Secondary PPH is defined as excessive bleeding between 24 hours and 12 weeks postnatally.

However, clinicians should appreciate that even a smaller blood loss (i.e. <1000 ml) may result in haemodynamic instability in a patient who is anaemic prior to delivery. Similarly, a woman with a low body mass index (BMI) may not be able to withstand even a moderate blood loss (1000–2000 ml) in view of her smaller circulating blood volume. Hence, it is more clinically prudent to consider massive PPH as a loss of >30% of blood volume or any blood loss that results in haemodynamic instability.

It is well recognized that visual estimation of blood loss by clinicians is notoriously inaccurate. It is important to also assess the rate of bleeding and associated haemodynamic response of the woman, so as to institute appropriate management. It is also useful to determine other parameters such as the Shock Index, which is defined as the pulse rate divided by systolic blood pressure (Pulse rate/SBP).

According to the Scottish Confidential Audit into Severe Maternal Morbidity, the incidence of massive obstetric haemorrhage (2500 ml) or women who received more than 5 litres of blood is estimated at 3.7/1000 maternities. Emergency caesarean sections were associated with an approximately three fold increase in postpartum haemorrhage as compared to elective caesarean section or spontaneous vaginal births.

Various risk matrices have been proposed to predict the occurrence of massive PPH. However, up to 40% of cases of PPH occur in women are initially classified as 'low risk'. This highlights the need for clinicians to be vigilant and anticipate, recognize and promptly institute timely and appropriate management to reduce morbidity and to avoid mortality due to massive postpartum haemorrhage. The role of multi-disciplinary simulation training, labour ward fire drills and development of local protocols for systematic, multi-disciplinary management of massive obstetric haemorrhage (e.g. 'Code Blue') cannot be overemphasized.

Rule of 30 (Table 1) and Shock Index (SI) are useful tools that could be used by clinicians in an emergency to understand the amount of blood loss and the degree of haemodynamic compromise. Shock Index refers to pulse rate divided by systolic blood pressure (PR/SBP) and its normal value is 0.5–0.7. As a woman bleeds, the heart rate increases to compensate for the blood loss, much before any changes in systolic blood pressure are observed. Hence, the Shock Index (SI) increases. In severe haemorrhage, SI increases to 0.9–11.1 and it has been reported that a Shock Index of >0.9 was associated with a need for intensive therapy on admission. Recently, an 'Obstetric Shock Index' (OSI) in a pregnant population has been described and based on the Pilot Study, the authors concluded that if the Obstetric Shock Index is >1 (i.e. Pulse Rate > SBP), then there is a significant increase in the rate of blood transfusion. Therefore, OSI may serve as a useful adjunct to reduce errors due to visual estimation of blood loss.

'Rule of 30' for massive obstetric haemorrhage

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 (70 ml/kg in adults) (100 ml/kg during pregnancy)

Table 1

Haematological management involves recognition of the amount and rapidity of blood loss and replacing the circulating blood volume and restoring 'coagulability' of blood. Massive postpartum haemorrhage resulting in a 'washout phenomenon' and depletion of coagulation factors is likely once 80% of the blood volume has been lost. This equates to approximately a blood loss of 4.5 litres in an 'average size' woman. However, coagulopathy may set in earlier, especially if there is rapid bleeding or if there was an existing predisposing factor such as pre-eclampsia or in a woman with a low body mass index.

Case report

Background and delivery

A 36 year old multigravida was admitted in spontaneous onset of labour at 39 weeks and 3 days of gestation. She did not have any obstetric or medical risk factors. On admission she was found to be 4 cm dilated. Three hours later she had spontaneous rupture of membranes (SROM) and had an epidural sited for pain relief at this stage. She made good progress and 5 hours after admission she was fully dilated. However, she had a prolonged second stage of labour and was actively pushing for 90 minutes. On abdominal examination, head was not palpable and the fetal size was average and on vaginal examination, cervix was fully dilated and the vertex was at +1 station and was in a left occipito-anterior position (LOA). There was no significant caput or moulding. Decision for instrumental delivery (ventouse) was made for failure to progress during second stage of labour. An uncomplicated ventouse delivery was carried out and the patient delivered a 3.9 kg baby, with normal Apgar Scores and umbilical cord blood gases.

Immediate postpartum period and initial management

In view of the profuse bleeding after delivery of the placenta, uterine massage and uterotonic agents (5 units of syntocinon and syntometrine) were administered. Due to continued bleeding, uterine massage and 40 IU Syntocinon infusion (125 ml/hour) were commenced. Resuscitation with intravenous fluids was commenced after insertion of two large bore (14 G) intravenous cannulae and blood was sent for urgent full blood count (FBC), serum electrolytes and clotting screen. Subsequently, a first dose of 250 mcg of Haemabate (Prostaglandin) was administered intramuscularly.

Despite these measures, the patient lost 2.2 litre within approximately 4 minutes and there was continued bleeding despite initial uterotonic agents. At this point, our Major Obstetric Haemorrhage Protocol 'Code Blue' was activated.

Careful examination to exclude the "4T's" (Tone, Tissue, Thrombin and Trauma) was initiated: genital tract was systematically examined and no evidence of genital tract trauma was noted. Following vaginal examination, an ultrasound scan was performed to exclude retained products of conception. In view of continued bleeding and a component of uterine atony identified, decision was made to place a uterine tamponade balloon (Bakri Balloon) with 450 ml of sterile water under ultrasound guidance until vaginal bleeding stopped.

Subsequent management

Total estimated blood volume (EBL) was 2.9 litre and her Obstetric Shock Index (OSI) was 1.2. Haemoglobin level dropped from 11.2 g/dl prior to delivery to 6.9 g/dl and therefore, the patient received a total of 3 units of blood and 2 units of platelets and blood products.

She was monitored in the obstetric high dependency unit (HDU) for 24 hours and the uterine tamponade balloon was deflated and removed in 12 hours. She made a very good recovery and her haemoglobin on day 2 was 8.7 g/dl. However, she was asymptomatic and therefore, did not require any further blood transfusion.

Case discussion

This case illustrates the importance of a rapid response to massive obstetric haemorrhage and appropriate management of PPH, instituting a multi-disciplinary care plan to ensure optimum outcome. Even in 'low risk' pregnancies and deliveries, doctors and midwives need to be alert to ensure an appropriate response in an obstetric emergency.

The use of algorithms aids systematic management of postpartum haemorrhage in a logical and sequential manner. One such algorithm is HAEMOSTASIS (Table 2). It has been reported that the use of this algorithm 'HAEMOSTASIS' is associated with excellent outcomes and a low Peripartum Hysterectomy rate.

A multi-disciplinary approach with the input of senior staff (consultant obstetricians, consultant anaesthetists, haematologist and senior midwives) is essential to achieve optimum outcome.

Communication

Effective and clear communication between the members of the team is of most importance. This includes timely activating 'Code

Management algorithm of PPH 'HAEMOSTASIS'

H	Ask for **H**elp and hands on uterus (uterine massage)
A	**A**ssess and resuscitate
E	**E**stablish aetiology, **e**nsure availability of blood and **e**cbolics
M	**M**assage uterus
O	**O**xytocin infusion/prostaglandins — IV/IM/per rectal
S	**S**hift to theatre-aortic pressure or anti — shock garment/ bimanual compression as appropriate
T	**T**amponade balloon/uterine packing — after exclusion of tissue and trauma
A	**A**pply compression sutures — B —Lynch/modified
S	**S**ystematic pelvic devascularisation-uterine/ovarian/quadruple/ internal iliac
I	**I**nterventional radiology and, if appropriate uterine artery embolization
S	**S**ubtotal/total abdominal hysterectomy

Table 2