Obstetric haemorrhage

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Abstract

Obstetric haemorrhage remains a significant cause of maternal morbidity and mortality. It is the leading obstetric cause for admission to intensive care units. Knowledge of risk factors and early recognition of haemorrhage enables rapid activation of a coordinated multidisciplinary team response. Clear unit protocols for the management of massive haemorrhage that are reinforced by team drills help to increase awareness in the multidisciplinary team, improve performance and thus can improve patient outcome. Pharmacological agents and surgical manoeuvres are reviewed in the article, as are blood conservation techniques.

Keywords Cell salvage; interventional radiology; obstetric haemorrhage; resuscitation; uterotonic drugs

Royal College of Anaesthetists CPD Matrix: 1A02, 2A04, 2A05, 2A06, 2B05, 2B06

Learning objectives

After reading this article, you should be able to:

- define postpartum haemorrhage
- classify the aetiology of postpartum haemorrhage
- list two ways to reduce risk of AFE when using intraoperative cell salvage

Background

Obstetric haemorrhage is a significant cause of maternal morbidity and mortality. The Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK (MBRRACE-UK) report published in December 2014, placed obstetric haemorrhage as the third leading cause of direct maternal deaths for the period 2009–2012.[1] The mortality rate was 0.49 per 100,000 maternities, which was not significantly different to the previous triennial period (2006–2008) covered by the Centre for Maternal and Child Enquiries (CMACE) report.[2]

Over half of the mortalities were attributed to postpartum haemorrhage. Paucity of observations following delivery and lack of recognition of haemorrhage were implicated in many of the cases. Communication was identified as a persistent problem area, with lack of leadership and failure to escalate appropriately featuring in many deaths.[1]

Obstetric haemorrhage causes significant morbidity and is the most common cause of obstetric-related intensive care admissions.[3]

Definitions

Antepartum haemorrhage (APH) occurs prior to delivery in the period of 24 weeks' gestation to full term of pregnancy. It is much less common than postpartum haemorrhage. The common causes include placenta praevia, placental abruption, trauma and uterine rupture.

Postpartum haemorrhage is defined as primary if blood loss from the genital tract occurs within 24 hours of delivery or secondary if blood loss occurs over 24 hours following delivery up to 6 weeks post-delivery. Primary postpartum haemorrhage (PPH) is the most common form of major obstetric haemorrhage.

The Royal College of Obstetricians and Gynaecologists define PPH as minor (with 500–1000 ml blood loss) or major (with over 1000 ml blood loss). Major PPH can be further divided into moderate (with between 1000 ml and 2000 ml blood loss) or severe (with over 2000 ml blood loss).

Other definitions include the need for a transfusion of greater than four units of packed red cells or a haemoglobin fall of greater than 4 g/dl. Definitions based upon physiological changes can be unreliable due to the physiological changes associated with pregnancy.

Postpartum haemorrhage

The aetiology of PPH can be classified as per the 'Four Ts':

- tone
- thrombin
- trauma
- tissue.

Risk factors are summarized in Table 1.[4] The occurrence of secondary postpartum haemorrhage is associated with retained products of conception or puerperal sepsis.

Management

Team preparation

In recent years there has been increasing focus on system-level and unit processes pertaining to the management of postpartum haemorrhage. There is some evidence that intensive educational programmes, comprehensive obstetric haemorrhage treatment protocols and post-event team review may individually or in combination lead to reductions in the incidence of severe PPH and thus morbidity.[5] Unit processes that enable a rapid and coordinated response with haematological services facilitate timely receipt and administration of blood and blood products.

A combination of prediction and prevention, early recognition and rapid coordinated action in treating PPH will aid in pre-empting worst-case scenarios. Excellent communication amongst the multidisciplinary obstetric team is paramount.

Recognizing the haemorrhage

As placental blood flow at term can exceed 750 ml/minute, obstetric haemorrhage can be rapid and catastrophic. Failure to

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Risk factors for postpartum haemorrhage (PPH)

Risk factor	Four Ts	Approximate odds ratio for PPH (99% CI)
(a) Presenting antenatally and associated with a substantial increase in the incidence of PPH; women with these factors should be advised to deliver in a consultant-led maternity unit		
• Suspected or proven placental abruption	Thrombin	13 (7.61–12.9)
• Known placenta praevia	Tone	12 (7,17–23)
• Multiple pregnancy	Tone	5 (3.0–6.6)
• Pre-eclampsia/gestational hypertension	Thrombin	4
(b) Presenting antenatally and associated with a significant (through smaller) increase in the incidence of PPH; these factors should be taken into account when discussing setting for delivery		
• Previous PPH	Tone	3
• Asian ethnicity	Tone	2 (1.48–2.12)
• Obesity (body mass index >35)	Tone	2 (1.24–2.17)
• Anaemia (<9 g/dl)	–	2 (1.63–3.15)
(c) Becoming apparent during labour and delivery; these factors should prompt extra vigilance among clinical staff		
• Delivery by emergency caesarean section	Trauma	4 (3.28–3.95)
• Delivery by elective caesarean section	Trauma	2 (2.18–2.80)
• Induction of labour	–	2 (1.67–2.96)
• Retained placenta	Tissue	5 (3.36–7.87)
• Mediolateral episiotomy	Trauma	5
• Operative vaginal delivery	Trauma	2 (1.56–2.07)
• Prolonged labour (>12 hours)	Tone	2
• Big baby (>4 kg)	Tone/trauma	2 (1.38–2.60)
• Pyrexia in labour	Thrombin	2
• Age (>40 years, not multiparous)	Tone	1–4 (1.16–1.74)

Table 1

recognize the severity of the situation was identified in 61% of the deaths in the MBRRACE-UK report.[1]

The initial recognition of obstetric haemorrhage is often challenging. The haemorrhage may be concealed or in the case of an overt haemorrhage, estimation of total loss is notoriously in accurate. Amniotic fluid, loss of blood into sheets and pads, blood loss occurring out of hospital and operator under-estimation of blood loss are all causes of inaccuracies.

The ability of the pregnant patient to compensate for haemorrhage with an increase in heart rate, stroke volume and vascular tone mean that haemorrhage may go unrecognized until physiological extremes have been reached. In some cases, more than 40% total blood loss can occur before the physiological signs of haemorrhage become recognizable.

The use of standardized observation systems such as modified early obstetric warning scores (MEOWS) can be vital in recognizing evolving physiological trends over time. These observation systems allow signs such as tachypnoea, poor urine output, temperature, change in pallor, pathological cardiotocography due to placental hypoperfusion to be monitored and detected, along with the basic observations of tachycardia and hypotension.

Initial management and resuscitation (Figure 1)

Pathways such as massive haemorrhage protocols allow the obstetric MDT to obtain blood products quickly to enable rapid empirical treatment of major blood loss when necessary. Resuscitation should be informed by laboratory results where possible, and there is an increased awareness of the importance of the correction of hypofibrinogenaemia in obstetric haemorrhage.[6]

More appropriate administration of red cells, blood components and coagulation factors may be guided by point-of-care testing of haemoglobin values and thromboelastography (TEG) or thromboelastometry (ROTEM). Evidence has stated that the use of such tests have an increased sensitivity in identifying deficits in the coagulation cascade when compared to laboratory-based tests and an increase in accurate assessment of the deficit phase of coagulation cascade.[7]

Attention to detail including avoidance of hypothermia is also important owing to the increased oxygen demand of shivering and exacerbation of coagulation disorders. Calcium must also be replaced to support the coagulation system.

Pharmacological management

Alongside the initial resuscitation of the patient, the first-line treatment for obstetric haemorrhage is pharmacological intervention to encourage uterine contraction (Table 2).

Haemostatic agents

Additional agents can be used to promote haemostasis when treating life-threatening haemorrhage.

Tranexamic acid is a synthetic derivative of the amino acid lysine. It is an anti-fibrinolytic agent that competitively inhibits