

# Bleedin' obstetrics



**Dr Andrew Potter**  
FANZCA

**Obstetric haemorrhage presents a significant challenge to obstetricians, anaesthetists and midwives, not to mention the challenge to the parturient herself. From the Confidential Enquiry into Maternal Deaths (2007), haemorrhage is seen to be consistently in the top four most common causes of maternal deaths in the United Kingdom at around 0.7 deaths per 100,000 maternities.<sup>1</sup>**

In the 2005 Maternal Deaths Report from Australia, obstetric haemorrhage was the direct cause of death in four women accounting for 14 per cent of direct maternal deaths.<sup>2</sup> Non-obstetric haemorrhage is also seen as an indirect cause of maternal deaths, with five women dying from this in the 2003-2005 triennium in Australia.<sup>2</sup>

Bleeding may not be apparent as it may be retained within the uteroplacental unit. It must always be considered in the gravid women with abdominal pain and evidence of cardiovascular compromise.

## Uterine rupture

There are multiple risk factors for this uncommon cause of antepartum haemorrhage, but the most common is rupture through a pre-existing uterine scar. It may be a result of spontaneous onset of labour in a parturient with a previous caesarean section or during a trial of labour following caesarean.

## Physiology

### Cardiovascular

At term, the maternal cardiac output has increased by approximately 40 per cent from the pre-pregnant state. The maternal blood volume has increased by a similar amount, though the increase in plasma volume is greater than the increase in red cell mass, leading to a relative reduction in haematocrit by around ten per cent (the physiological anaemia of pregnancy). The increase in blood volume provides some protection from haemorrhagic complications of pregnancy. Maternal systemic vascular resistance falls leading to a low normal blood pressure in late pregnancy in an otherwise uncomplicated pregnancy. Uterine blood flow increases up to five-fold to around 500 ml/min at term with potential for catastrophic blood loss in very short periods of time.

### Haematological

In normal pregnancies, there is a gradual increase in circulating coagulation factors (fibrinogen, factors VII, VIII and X) which provides some innate protection from obstetric bleeding. Platelet counts are generally unchanged in the absence of other disease processes.

## Causes of obstetric haemorrhage

Obstetric haemorrhage is classified according to timing in relation to the delivery: antepartum or postpartum.

### Antepartum haemorrhage

#### Placenta praevia

This generally presents in late pregnancy with painless vaginal bleeding. Usually, the bleeding is not catastrophic and stops spontaneously, but can on occasion continue and be life-threatening. High-grade placenta praevia is associated with significant blood loss if normal vaginal delivery is attempted. There is a significant association between placenta praevia and other placental implantation abnormalities such as placenta accreta, increta and percreta.

#### Placental abruption

This is defined as the separation of a normally implanted placenta from the uterus after 20 weeks gestation and before the birth. The aetiology of placental abruption is poorly understood. Presentation is usually lower abdominal pain with or without vaginal bleeding.

### Case One

A G3P2 parturient presented at 37/40 in active labour. One hour after spontaneous onset of contractions she developed severe abdominal pain and approximately 250ml p.v. blood loss. She was reviewed by the obstetric team urgently as she became progressively haemodynamically unstable. Fetal heart rate was 80 to 100bpm with little variation. An immediate transfer to the operating theatre was arranged and an emergency lower segment caesarean section was performed under general anaesthesia. A uterine abruption was diagnosed. The fetus was delivered and transferred to the neonatal intensive care unit for ventilatory support. There was ongoing blood loss of 3500ml and despite best surgical efforts a hysterectomy was required. The patient needed eight units of packed cells, eight units of fresh frozen plasma and one pooled dose of platelets. Ongoing coagulopathy in the intensive care unit required a further four units of fresh frozen plasma. The patient required two days of ventilation and inotropic support before extubation and making a full recovery.

### Postpartum haemorrhage

This is defined as any bleeding that occurs in the six-week period following delivery. Primary postpartum haemorrhage is defined as greater than 500ml blood loss within the first 24 hours following vaginal delivery<sup>3</sup> and 1000ml following caesarean section. The majority of postpartum haemorrhages occur in the first few hours if not minutes after the delivery and, like antepartum haemorrhages, can have a number of causes as listed below.

#### Uterine atony

The old adage 'an empty, contracted uterus will not bleed' stresses the importance of good uterine tone following delivery. Uterine atony is often accompanied by retained placental products. Uterine atony is the commonest cause of significant postpartum haemorrhage. Risk factors for atony include prolonged obstructed labour; multiple births; macrosomia of the fetus or neonate; polyhydramnios; and general anaesthesia for caesarean section.

#### Retained placenta

Once again, 'an empty, contracted uterus will not bleed' has some merit, in the absence of coagulopathies. Retained placenta may complicate up to one per cent of normal vaginal births.

**Genital tract trauma**

This occurs as a direct result of the labour, iatrogenic trauma from instrumented deliveries, or a combination. In an otherwise non-coagulopathic parturient, this is unlikely to lead to life-threatening haemorrhage.

**Management of massive obstetric haemorrhage**

Obstetric haemorrhage requires a coordinated and planned approach, as the speed at which the mother loses blood volume often leads to a life-threatening situation in a matter of minutes. With an antepartum haemorrhage, the situation is complicated by the need to manage two patients, with an emergency delivery of the fetus usually required.

**ORDER in obstetric haemorrhage**

- O – Organisation**
  - Contact experienced staff
  - Communication with blood bank, pathology and operating theatre
  - Define team roles
- R – Resuscitation**
  - Supplemental O<sub>2</sub> and lateral tilt
  - Large bore IV access and crystalloid infusion
  - Vasopressors
  - Early use of blood products
- D – Disorders of Coagulation**
  - Common in obstetric haemorrhage
  - Early use of platelets and fresh frozen plasma
  - Consider using rVIIa
- E – Evaluate Response**
  - Invasive monitoring
  - Urinary catheter
  - Hb, coagulation studies, arterial blood gas (ABGs)
- R – Remedy the Cause of the Bleeding**
  - Delivery of baby and removal of placenta
  - Uterotonic agents
  - Surgical intervention
  - Radiological intervention at selected sites

**ORDER for management of obstetric haemorrhage (modified from original by Professor John Bonnar)<sup>4</sup>**

- O – Organisation**
  - Call experienced staff early.
    - Consultant obstetrician, anaesthetist, midwife, paediatrician if delivery anticipated. In remote locations assistance may be required over the telephone while decisions on stability for transfer are made. A dedicated telephone line must be available for this purpose. Where facilities allow, the obstetrician and/or anaesthetist may be transported to the patient.

- Call the blood bank early to anticipate requirements of multiple blood products, including packed red blood cells, platelets and fresh frozen plasma.
- Inform the operating theatre and place on standby.
- Clarify team role identification. It is suggested on the delivery suite that the team leader is the consultant obstetrician and in the operating theatre the team leader for ongoing resuscitation should be the consultant anaesthetist, allowing the obstetrician to concentrate on surgical control of the bleeding. There should be a dedicated scribe and a member of staff dedicated to liaison with and collection from the blood bank of needed products. Clear communication between all of the team members cannot be overemphasised.

**R – Resuscitation and Restoration of Circulating Volume**

- Oxygen should be administered via a face mask and if antepartum, a hip wedge or bed/table tilt should be in place to reduce compression of the inferior vena cava by the gravid uterus.<sup>5</sup>
- Ensure two large bore cannulae are in place and working. Ideally 14g is best but a good 16g is better than a poor 14g. Pressure bags should be available for rapid infusions.<sup>5</sup>
- Collect and send a baseline haemoglobin, platelets, coagulation and electrolytes immediately. A cross-match for at least four units of packed cells should also be sent with anticipation of requirement for more blood products.
- Crystalloid fluid replacement should be commenced until packed cells become available. With ongoing and life-threatening bleeding, group O Rhesus negative blood can be transfused or type specific as soon as available. Cross-matched blood should be used as soon as it becomes available.<sup>5</sup>
- Warmed fluids should be used where possible via a fluid warming system and a forced air warmer should be used over the patient.
- Vasopressors should be used to maintain adequate blood pressure. Phenylephrine is a potent vasopressor that can be administered as a repeated bolus (50 to 100mcg) and as an infusion (starting at 3mg/h) titrating to response.

**D – Defective Coagulation**

- Platelet count and coagulation markers (INR and APTT) should be monitored.
- With ongoing bleeding and significant packed cell requirements, clotting factors may be required in the absence of laboratory confirmed coagulopathy or thrombocytopenia. There may be clinical evidence of coagulopathy with oozing from puncture sites and wound edges. A suggested sequence in the absence of laboratory confirmed coagulopathy is:
  - Four units of fresh frozen plasma following four units of packed cells and repeated in this manner.
  - Five units of platelets (or one pooled adult dose) following eight units of packed cells. Note: If there is already pre-existing low platelet counts this should be modified.

- Recombinant Factor VIIa (rVIIa) has been used successfully many times in the management of massive haemorrhage, including obstetric haemorrhage.<sup>6</sup> It is important to note that rVIIa is not licensed for this use. rVIIa works optimally in the presence of adequate platelets and in an environment with a pH of greater than 7.1.
- It is important to prevent the 'deadly triad' of hypothermia, acidosis and coagulopathy.

## E – Evaluate Response

- Clinical evaluation.
  - Haemodynamic parameters; blood pressure is the most useful and for a significant obstetric haemorrhage invasive arterial blood pressure monitoring is indicated. Central venous pressure is less useful and insertion of a central venous pressure (CVP) line may delay other therapeutic manoeuvres.
  - Neurological assessment if the patient is not anaesthetised is very valuable, as altered mental state is often a subtle but early clue to imminent decompensation.
  - Urine output gives an idea as to end-organ perfusion and should be monitored.
- Laboratory.
  - Regular haemoglobin, platelets and coagulation assays are vital to assess response to blood product transfusion.
  - Arterial blood gas monitoring from an arterial line allows assessment of pH and haemoglobin status regularly.

## R – Remedy the Cause of the Bleeding

- Delivery of the baby and the placenta may stop an antepartum bleed, though postpartum bleeding may still occur.
- Uterotonic agents.
  - Syntocinon 5IU boluses given intravenously slowly with an ongoing infusion of 10 to 50IU per hour once control is achieved. Syntocinon causes peripheral vasodilatation, especially when given as large, rapid iv boluses which can cause profound hypotension.
  - Ergometrine 100 to 250mcg given intravenously. Ergometrine is highly emetogenic and consideration should be given to prophylactic antiemetic therapy. Ergometrine causes peripheral vasoconstriction, so should be used with special care in patients with pregnancy-induced hypertension.
  - Misoprostil up to 800mcg per rectal or sublingually.
  - Prostaglandin F<sub>2α</sub> 100 to 250mcg injected directly into the myometrium. This should not be administered intravenously, as it can cause profound bronchospasm but may be given intramuscularly.
- The genital tract and uterus need to be inspected for trauma and the uterus inspected for retained products. Uterine rubbing may stimulate uterine contraction. Uterine packing has been practised, but there is increasing use of the Bakri balloon for tamponading uterine bleeding.<sup>7</sup>

- Surgical options include a B-Lynch suture, ligation for uterine vessels or even internal iliac arteries and as a temporary measure, the abdominal aorta may be clamped above its bifurcation to increase time for resuscitation.
- In a select few locations, there may be the facility for arterial embolisation by an experienced radiologist.
- If bleeding continues a hysterectomy may be performed as a life-saving measure. If continued child-bearing is not an issue, then a hysterectomy could be performed at an earlier stage.

## Post-obstetric haemorrhage management

Following a significant obstetric haemorrhage, the patient will have deranged physiology and complex requirements. These are best managed in a high dependency or intensive care unit setting where close observation for further haemorrhage may be undertaken, while continuing to correct an ongoing coagulopathy or acidosis.

### Case Two

A G1P0 19-year-old delivered a 4.5kg baby following a 36-hour labour. The baby was delivered vaginally using forceps with epidural analgesia. Thirty minutes after delivery an estimated 1250ml blood loss was recorded and the uterus had failed to contract adequately, despite manual stimulation and syntocinon 10IU intramuscularly given at delivery. The woman received 1000ml normal saline stat and the operating theatre was contacted. The laboratory was contacted for a baseline haemoglobin and clotting factors and a request was made for a four-unit cross-match. The laboratory was informed that a postpartum haemorrhage was going to theatre and to prepare for blood product requirement. The patient remained haemodynamically stable. Under epidural anaesthesia, a manual evacuation of retained products was performed and a third degree tear was sutured. There was ongoing blood loss. Further syntocinon, ergometrine and misoprostil were administered with little effect. A Pfannenstiel incision revealed a flaccid uterus. Four units of packed cells were given and a B-Lynch suture was performed. Ongoing ooze suggested a coagulopathy treated with four units of fresh frozen plasma. rVIIa (90mcg/kg) was administered and haemostasis achieved. Further fertility was preserved.

## Summary

The majority of obstetric haemorrhage cases occur in previously well, young, fit women. The speed at which these otherwise healthy women can suddenly deteriorate into a life-threatening condition can be terrifying for those involved in their management. The management steps are complex, but once obstetric units have a developed obstetric haemorrhage plan, the complexity is reduced. Especially in units where there are not large numbers of deliveries and therefore less incidence of haemorrhage, it is recommended that obstetric haemorrhage drills are run. A coordinated team approach to the management of these patients will give them the best chance of survival with the minimum morbidity.

## References

1. Lewis GE. The Confidential Enquiry into Maternal and Child Health (CEMACH). Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer - 2003-2005. *The Seventh Report on Confidential Enquiries into Maternal Deaths in the United Kingdom*. 2007.
2. Sullivan EA, Hall B, King JF. Maternal deaths in Australia 2003-2005. *Maternal deaths series no 3*. 2007; Cat. no. PER42. Sydney: AIHW National Perinatal Statistics Unit.