

The ABC of haemorrhagic shock in the pregnant woman

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ABSTRACT

Haemorrhagic shock is more common in the pregnant woman than generally acknowledged in the clinical setting. In most cases antepartum and postpartum haemorrhage can be managed effectively by concentrating on the management of the obstetrical cause of the bleeding. A midwife should have the appropriate knowledge and skills to recognise the signs and symptoms of haemorrhagic shock, to manage the condition systematically and effectively, and to prevent potential life-threatening complications.

A brief overview of haemorrhagic shock is discussed. The midwife is provided with a systematic guideline that should be used to assess and manage the obstetric woman presenting with haemorrhagic shock. The ABC (**A**irway, **B**reathing, and **C**irculation) include the key life-saving aspects that need to be considered when a pregnant woman presents with haemorrhagic shock. Clinical notes are added to enhance theory-practice correlation.

Introduction

Obstetric haemorrhage is a leading cause of death in the developing world and has a major impact worldwide. Antepartum and postpartum haemorrhage accounted for 13.4 % of all maternal deaths in South Africa during the period 2002–2004. This makes obstetric haemorrhage the third biggest cause of maternal deaths.¹

Haemorrhagic shock is a serious complication, which may occur in many obstetrical situations. Antepartum and postpartum haemorrhage can be managed effectively by concentrating on the management of the obstetrical cause of the bleeding. However, this is not always adequate and the pregnant woman needs further assessment and management to prevent complications. Pregnant women who died after severe haemorrhage would have presented with signs and symptoms of haemorrhagic shock. The question arises whether these women were misdiagnosed and/or mismanaged? If so, how can the midwife prevent such tragedies in future?

This article focuses on providing a systematic approach that can be used to assess and manage pregnant women presenting with

haemorrhagic shock. It does not, however, provide detail pertaining to the specific management of the obstetrical causes of the haemorrhage.

Haemorrhagic shock in a nutshell

Haemorrhagic shock in the pregnant woman is caused by a reduction in circulating blood volume due to an acute loss of red blood cells. The decreased circulating volume leads to a decrease in oxygen supply to cells, which will then cause organ disfunction.² Signs and symptoms of haemorrhagic shock will vary depending on the volume and rate of blood loss³ (see Table I).

The human body tries to compensate for the blood loss. This mechanism aims to protect the vital organs (brain and heart) in an attempt to sustain life. The blood loss leads to inadequate tissue perfusion, which in turn leads to a decrease in oxygen supply to the body cells^{2,3} (see Table II). If unrecognised or left untreated, cell death due to hypoxic injury will follow.² All efforts should be directed at restoring adequate oxygenation as soon as possible. The outcome is dependent on early recognition and on immediate and aggressive management, which relies on three

Table I: Classification of haemorrhagic shock³⁻⁶

	Compensated	Mild	Moderate	Severe
Blood loss (mL)	500–1,000	1,000–1,500	1,500–2,000	> 2,000
Heart rate (bpm)	< 100	> 100	> 120	> 140
Blood pressure	Normal	Slight fall (80–100 mmHg) Orthostatic pressure	Marked fall	Profound fall
Capillary refill	Normal	May be delayed	Usually delayed	Always delayed
Respiration	Normal	Mild increase	Moderate tachypnoea	Marked tachypnoea, air hunger, respiratory collapse
Urinary output (ml/h)	> 30	20–30	5–20	Anuria
Mental status	Normal or agitated	Agitated	Confused	Lethargic; obtunded

basic principles: (1) giving supplemental oxygen, (2) arresting the bleeding, and (3) replacing fluid losses.

A defined volume of blood loss is difficult to measure in most situations, and the loss evaluated visually is often underestimated by up to 50%.^{6,7} In the pregnant woman an additional challenge is brought about by the physiological increase in intravascular volume by approximately 50% (i.e. 4–6 L). Therefore, the pregnant woman can lose a significant amount of blood before showing signs of haemorrhagic shock, such as tachycardia, hypotension and a cold, clammy skin.^{4,8} This implies that the midwife must monitor blood loss diligently and keep in mind that although the mother's vital signs may appear to be within normal limits, she may be in the compensated phase of haemorrhagic shock. It also implies that although the mother's vital signs may appear stable, fetal distress could be present due to a decrease in placental perfusion, since the latter is a non-vital organ (see Table II).

There are two main challenges for the midwife during the assessment and management of the pregnant woman presenting with haemorrhagic shock. Firstly, the normal physiological changes that occur in most organ systems during pregnancy should be taken into consideration. Secondly, two patients are simultaneously vulnerable, namely the mother and the fetus.⁶ Effective resuscitation and management of the mother is the key to optimising fetal survival.

Assessment and management of haemorrhagic shock

Well-acknowledged principles should be utilised in the assessment and management of the pregnant woman presenting with haemorrhagic shock. This condition requires the active resuscitation of the woman. The first step in active resuscitation is to assess certain key aspects and to plan actions to address these aspects. Figure 1 depicts the key life-saving aspects, appropriate actions and clinical notes that serve to optimise theory-practice correlation.

Case study example

A 27-year-old woman, who is 35 weeks pregnant, presents at the midwife obstetric unit with a history of severe vaginal bleeding and continuous abdominal pain. The blood contains dark clots. It is difficult to palpate the fetal parts. She seems anxious. Her initial blood pressure was initially 115/75 mmHg but later it was 115/85 mmHg, heart rate 96 bpm, axillary temperature 36.2°C and the fetal heart rate 125 bpm.

Table II: Clinical features of haemorrhagic shock⁵

System	Early (compensated) shock	Late (decompensated) shock
Central nervous system	Altered mental status	Obtunded
Cardiovascular	Tachycardia	Orthostatic hypotension
Cardiac failure	Arrhythmias	Hypotension
Renal	Oliguria	Anuria
Respiratory	Tachypnoea	Tachypnoea
Hepatic	No change	Liver failure
Gastrointestinal	No change	Mucosal bleeding
Haematologic	Anaemia	Coagulopathy
Metabolic	None	Acidosis Hypocalcaemia Hypomagnesaemia

1. What is the diagnosis?

The history is typical of *abruptio placentae* (dark vaginal bleeding with clots, continuous abdominal pain and fetal parts that are difficult to palpate).

2. What should the first steps in the management of this woman be?

Rapid recognition and diagnosis of haemorrhagic shock is essential to the successful management. Evidence to support the presence of haemorrhagic shock includes the antepartum haemorrhage, tachycardia, anxiousness, increased diastolic blood pressure and the narrowing pulse pressure due to vasoconstriction. Although these signs and symptoms can be due to other causes, such as pain and stress, and hypotension is not yet present, this woman must be managed for haemorrhagic shock using the ABCs as a guideline:

Help

Call for help. If at a clinic, a second person should organise appropriate transport via ambulance to a referral hospital as this is a high risk patient. Notify the receiving hospital of the woman's condition. In the meantime continue with the ABCs.

Airway

Give oxygen via a partial re-breathing mask, ensuring that the reservoir bag is inflated $\frac{2}{3}$ during inspiration. An alternative would be to use the highest possible percentage oxygen mask available in the unit.

Breathing

Determine respiratory rate and assess for depth and difficulty. Listen to the lungs for air entry and abnormal lung sounds.

Circulation

Abruptio placentae is diagnosed based on the signs and symptoms. The most appropriate way to stop haemorrhage in *abruptio placentae* is to deliver the baby as soon as possible. Whilst preparing for theatre, turn the woman on her left side. Insert at least one large bore intravenous cannula. Simultaneously draw blood for cross matching and then start with warm Ringer's lactate through a 10 dpm (blood set) intravenous set. Repeat vital signs (heart rate, blood pressure and peripheral perfusion) and compare with previous recordings. Insert an indwelling catheter to monitor urine output. Continue to monitor the woman's vital signs.

Disability and Drugs

Assess her AVPU scale (see Figure 1). The use of drugs is not applicable in this scenario.

Events and Environmental Control
Evaluate her antenatal records and obtain additional information from the woman. Keep the woman warm by covering her with a blanket.

Fetus

Once the woman is stabilised the focus can shift to the fetus. Perform continuous cardiotocographic monitoring, if available, or use a fetoscope/doptone.

Conclusion

Haemorrhagic shock is more common in pregnant women than generally acknowledged in the clinical setting. A pregnant woman may lose a considerable amount of blood before showing signs of shock. Do not wait

Figure 1: ABCs (Airway; Breathing; Circulation) of the assessment and management of the pregnant woman with haemorrhagic shock

Key principles	Actions	Clinical notes
Hazards	Early identification of the woman at risk.	All pregnant women who are bleeding (including women with hidden bleeding such as <i>abruptio placentae</i>) should be assessed for possible haemorrhagic shock. Take the baseline haemoglobin (Hb) into consideration. If the Hb was within normal limits before the incident, the woman should be able to compensate for a loss of up to 500 ml. ³ However, if the baseline Hb was low (e.g. 8 g/dl), actions should be taken sooner.
Help	When haemorrhagic shock is suspected, call a second midwife and/or doctor for assistance.	Do not leave the woman unattended. A team effort facilitates comprehensive care.
Airway	Ensure that the patient can open, maintain and protect her own airway. ³ Give supplemental oxygen. ⁹	A pregnant woman has an increased oxygen consumption due to an increased basal metabolic rate and decreased oxygen reserve. ^{9,10} Therefore, do not hesitate to give oxygen early. During haemorrhagic shock oxygen is given to the benefit of the mother. However, the value of oxygen administration for the prevention of fetal distress is not proven. ^{11,12} Use a partial re-breather mask to deliver 50–80 % oxygen concentration. ¹³ When initiating the oxygen therapy, ensure that the reservoir bag is fully inflated. Then, adjust the oxygen flow rate to ensure that the reservoir bag is kept $\frac{2}{3}$ inflated during inspiration (i.e. 10–15 L/min).
Breathing	Look: Observe the respiratory rate, depth and difficulty. ¹³ Listen: Briefly auscultate breath sound bilaterally. ¹³ Initiate pulse oximetry, if available. ¹³	The respiratory rate may show little change from the pre-pregnancy value, namely 14 to 15 breaths per minute. ¹¹ Beware of a rapid respiratory rate. Tachypnoea may indicate air hunger. ⁴ Nasal flaring indicates respiratory distress. ¹³ Pulse oximetry provides you with information regarding the woman's oxygen saturation. ⁴ The normal oxygen saturation should be > 95% on oxygen. ² If oxygen saturation is < 90%, the woman is in trouble.
Circulation	Identify and stop the source of the bleeding. ^{3,11} Turn the woman on her left side or elevate the right hip to prevent supine hypotension. ^{3,10,14} Insert two large-bore intravenous cannulae (14 or 16G) to enable fluids and drugs to be administered swiftly. Use a 10-drops-per-minute administration set. Administer 1-2 L of warm crystalloid solution (e.g. Ringer's lactate) as a volume expander initially. This is followed by a colloid solution (e.g. Voluven®). ^{3,4,11} Simultaneously draw blood for cross matching. ¹¹ Monitor the heart rate, blood pressure and peripheral perfusion every 15 minutes until the woman's condition stabilises. ³ An indwelling catheter should be inserted to monitor urine output, if not already done as part of the treatment of postpartum haemorrhage.	In the case of pre-eclampsia or a cardiac condition, the rate of the infusion should be carefully monitored to prevent fluid overload. ^{3,15} Twice as much fluid can be infused through a 14-gauge intravenous cannula compared with an 18-gauge cannula over the same time period. ¹⁶ Heart rates of pregnant women are typically increased by 10–15 beats per minute (bpm). This means that a heart rate of 75 may increase to 90 bpm during pregnancy. ^{8,11,14} During pregnancy the systolic blood pressure falls with an average of 10 mmHg whilst the diastolic blood pressure falls with an average of 10 to 15 mmHg. ^{10,11,16} These changes in the blood pressure are most evident during the second trimester. At the end of the third trimester the blood pressure returns to the pre-pregnancy status. ^{8,11} Hypotension is a LATE sign of haemorrhagic shock as the mother will have lost 30–35% of her blood volume before she presents with hypotension. ⁸ Increased heart rate and decreased peripheral perfusion are initial signs of shock. Due to vasoconstriction as a compensatory mechanism, the diastolic blood pressure will initially increase. Do not wait for the blood pressure to fall before initiating management! ³ Normal urine output = 0,5–1 ml/kg/hour. ⁴
Disability and Drugs	A brief neurological examination should be done by using the AVPU scale. ¹³	In the case of postpartum haemorrhage, start a rapid infusion of 20 units oxytocin in a litre of intravenous fluid. ¹⁷ If the uterus remains atonic give 0,5 mg ergometrine intravenously or intramuscularly, or 600 micrograms misoprostol per rectum. ¹⁷ AVPU scale: <ul style="list-style-type: none"> • Alert, • responds to Verbal stimuli, • responds to Painful stimuli, or • is Unresponsive The first signs of shock are restlessness and anxiety. ^{3,10} Do not ignore these signs. Oxytocin is the first-line drug used in postpartum haemorrhage (20-40 U/L as an infusion). ⁶ Ergometrine should not be administered to a cardiac or hypertensive patient. ¹⁷
Events and Environmental control	Obtain/evaluate the antenatal history. Keep the woman warm. ⁴	Note that overheating or warming the patient too quickly will result in peripheral vasodilatation which in turn will result in hypotension. ¹¹
Fetus	After the woman has been stabilised, assess the fetus with continuous cardiotocography in the case of a viable fetus. ^{3,18}	Normal fetal heart rate is 110–160 bpm. ^{18,19} Fetal survival is secondary to maternal survival.

Proper Pre-Planning Prevents Poor Performance!

Effective resuscitation and management of the mother is the key to optimising fetal survival. The midwife must be prepared to manage a pregnant woman presenting with haemorrhagic shock by ensuring that the following is in place:

1. Appropriate protocols displayed in the labour ward area, such as ABCs of haemorrhagic shock and management of postpartum haemorrhage
2. Partial re-breathing masks to provide optimal oxygen supply
3. Oxygen flow meters or mobile oxygen to reach all areas in the unit
4. Warm Ringer's Lactate and Voluven®
5. Large bore cannulae (14 and 16 G) and intravenous blood administration sets
6. Adequate drugs such as oxytocin, misoprostol and ergometrine
7. Regular in-service training on the specific causes of haemorrhage and recognition and management of hemorrhagic shock

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for signs of shock before acting. Firstly, be proactive and ensure that you are prepared for the management of a pregnant woman. This is achieved by having appropriate knowledge and skills and ensuring that the correct equipment and drugs are available. Secondly, identify high-risk patients, observe and document maternal vital signs and monitor the mother's general condition and vaginal blood loss continuously and diligently. If haemorrhagic shock is suspected, immediately start with the ABC's. These actions may save maternal lives and even those of their fetuses. PNT

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