

Prevention and management of blood loss at caesarean section

Excessive bleeding at caesarean section (CS) causes avoidable maternal deaths in South Africa.

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Background

Bleeding associated with caesarean section (CS) was the most common causal subcategory of maternal deaths from obstetric haemorrhage in South Africa in 2008 - 2010, accounting for 180 (26.2%) of the 688 maternal deaths due to haemorrhage. It has increased as a cause of death compared with previous triennia, and this is a cause of great concern. Related morbidities included obstructed labour, previous CS, abruptio placentae and placenta praevia. The majority of these deaths were clearly avoidable. The deaths occurred at all levels of public hospital and some at private hospitals, with the largest numbers at district hospitals, where the majority of CSs in SA occur.

The majority of these deaths were clearly avoidable.

Lack of surgical skill to achieve haemostasis at the initial CS, lack of skill to perform the additional surgical measures required to arrest excessive haemorrhage, and poor post-CS monitoring were all avoidable factors.^{1,2}

Prevention

The following steps should be taken to minimise haemorrhage associated with CS:

- Ensure that the partogram is completed fully and that the labour graph is interpreted properly, so that prolonged labour is diagnosed timeously, the appropriate interventions made, and late-first and second-stage CS is avoided.
- Ensure that the strict indications for CS are followed. If you know in advance that there is a major placenta praevia, the patient should be referred to a regional or tertiary hospital.
- Ensure that the haemoglobin level is known prior to the CS and if <8 g/dl make sure that blood is available.
- If the CS is being performed for obstructed labour, ensure that the most experienced medical officer performs the surgery.
- Ensure that a dedicated medical officer/physician/anaesthetist provides anaesthesia, i.e. at least 2 doctors should be available for the procedure – one to carry out the anaesthesia and one to do the surgery. In emergency situations an experienced midwife can assist at the surgery.
- Ensure that appropriate surgical technique is used and that the incision in the uterus is not too low in the lower uterine segment, particularly in CS for obstructed labour and in the second stage of labour.
- Blunt dissection rather than sharp dissection for abdominal entry and controlled cord traction rather than manual removal to deliver the placenta have both been shown to reduce blood loss at CS.³
- DO NOT RUSH THE SURGICAL PROCEDURE. A CS should take about 30 - 40 minutes.
- Do not close the abdomen before you check that haemostasis has been achieved and the uterus is contracted, and check with the anaesthetist that the patient is haemodynamically stable. If intra-operative bleeding persists call for help.
- Ensure that after delivery of the baby, 2.5 IU of oxytocin by slow IV injection is given and 10 units is inserted into a litre of fluid and continues to run during the operation, following the operation in the recovery room and in the ward for *at least 2 hours*. Do not stop the oxytocin drip at any stage during the transfer of the patient from the theatre to the ward. Avoid high-dose IV boluses of oxytocin because they can cause hypotension.
- Ensure that prior to the patient leaving the operating table and the recovery room the uterus is palpated to determine that it is not atonic. Also assess the amount of vaginal bleeding and empty the uterus of all blood clots.
- Transfer the patient from the operating theatre/recovery room only after ensuring that the pulse rate and blood pressure are stable and that the level of the spinal block is <T8 and receding.

Also check for uterine/vaginal bleeding ('pad checks').

- Ensure observations in the following manner:
 - half-hourly for 2 hours
 - hourly for a further 4 hours
 - 2-hourly for a further 6 hours and then 4-hourly until discharge.
- Observations to be recorded include:
 - pulse rate
 - blood pressure values
 - vaginal bleeding (pad checks)
 - urine output 4-hourly.
- The patient should be nursed in an area where there are healthcare professionals who can do the observations regularly. She should not be admitted to a ward where observations are difficult to perform.

Management of excessive bleeding at CS

Algorithms 1 and 2 have been developed for the prevention and management of bleeding at and after CS and can also be found in *A Monograph of the Management of Postpartum Haemorrhage*.⁴ Algorithm 1 (Fig. 1) deals with bleeding at CS.

Bleeding at CS

Excessive bleeding at CS is defined as estimated blood loss in excess of 1 000 ml. Bleeding at CS is usually underestimated by swab counts and the estimated volumes in suction bottles. Visual inspection and reporting by the anaesthetist on the haemodynamic status of the patient is an important part of the recognition of postpartum haemorrhage (PPH). The anaesthetist needs to take responsibility for the resuscitation and there needs to be regular communication between surgeon and anaesthetist.

Do not rush the surgical procedure. A CS should take about 30 - 40 minutes.

The surgeon must diagnose the cause of the bleeding: uterine atony, tears and lacerations, placental site bleeding and coagulopathy. The

first two causes may be due to prolonged labour. Uterine sepsis and abruptio placentae can also cause uterine atony and coagulopathy. Placenta praevia and morbidly adherent placenta can cause placental site bleeding. Inappropriately placed uterine incisions (too low or too lateral) can result in tears which cause haemorrhage.

As indicated in the algorithm, the following treatment modalities can be used for the different causes:

- Atonic uterus – stepwise use of oxytocics (oxytocin infusion, ergometrine, prostaglandins): B-Lynch compression suture (Fig. 2).
- Lateral tears into broad ligament – unilateral or bilateral uterine artery ligation.
- Tears down lower segment of uterus – haemostatic sutures. Ensure that you get the apex of the tear and check ureteric path if the tear goes lateral.
- Bleeding from the placental bed – individual haemostatic sutures and uterine artery ligation, balloon tamponade.
- If morbidly adherent placenta – as previous, consider use of Baum's curette.
- Aortic compression can be applied by an assistant as a temporising measure while help is called.
- Some practitioners have described the use of a Foley's catheter or feeding tube tied as a tourniquet around the lower part of the uterus, as is sometimes done during myomectomy. This compresses the uterine vessels and reduces blood loss while awaiting help or during transfer of the patient to a level of care with more expertise. This technique has not been properly evaluated. However, there are individual case reports in South Africa of women who have been transferred from a level 1 hospital after bleeding at CS with a uterine tourniquet *in situ* in whom the outcome has been successful. It is not known how long such a tourniquet can be placed *in situ* without causing permanent irreversible ischaemic changes to the uterus and ovaries.

Details of procedures such as B-Lynch uterine compression suture, balloon tamponade and uterine artery ligation can

be found in chapter 6 of *A Monograph of the Management of Postpartum Haemorrhage*.⁴ It sometimes requires more than one modality of treatment to arrest the haemorrhage.

Visual inspection and reporting by the anaesthetist on the haemodynamic status of the patient is an important part of the recognition of postpartum haemorrhage (PPH).

In cases of irreparable uterine rupture or placenta increta or percreta (placenta that has invaded into the myometrium and/or beyond) it is necessary to proceed immediately to subtotal hysterectomy without attempting conservative measures.

Occasionally with a placenta increta which fails to separate from the uterine wall after administration of oxytocin and in the absence of any bleeding, it is best not to attempt placental removal at all, but rather to leave it *in situ* and await spontaneous expulsion.

Bleeding after CS

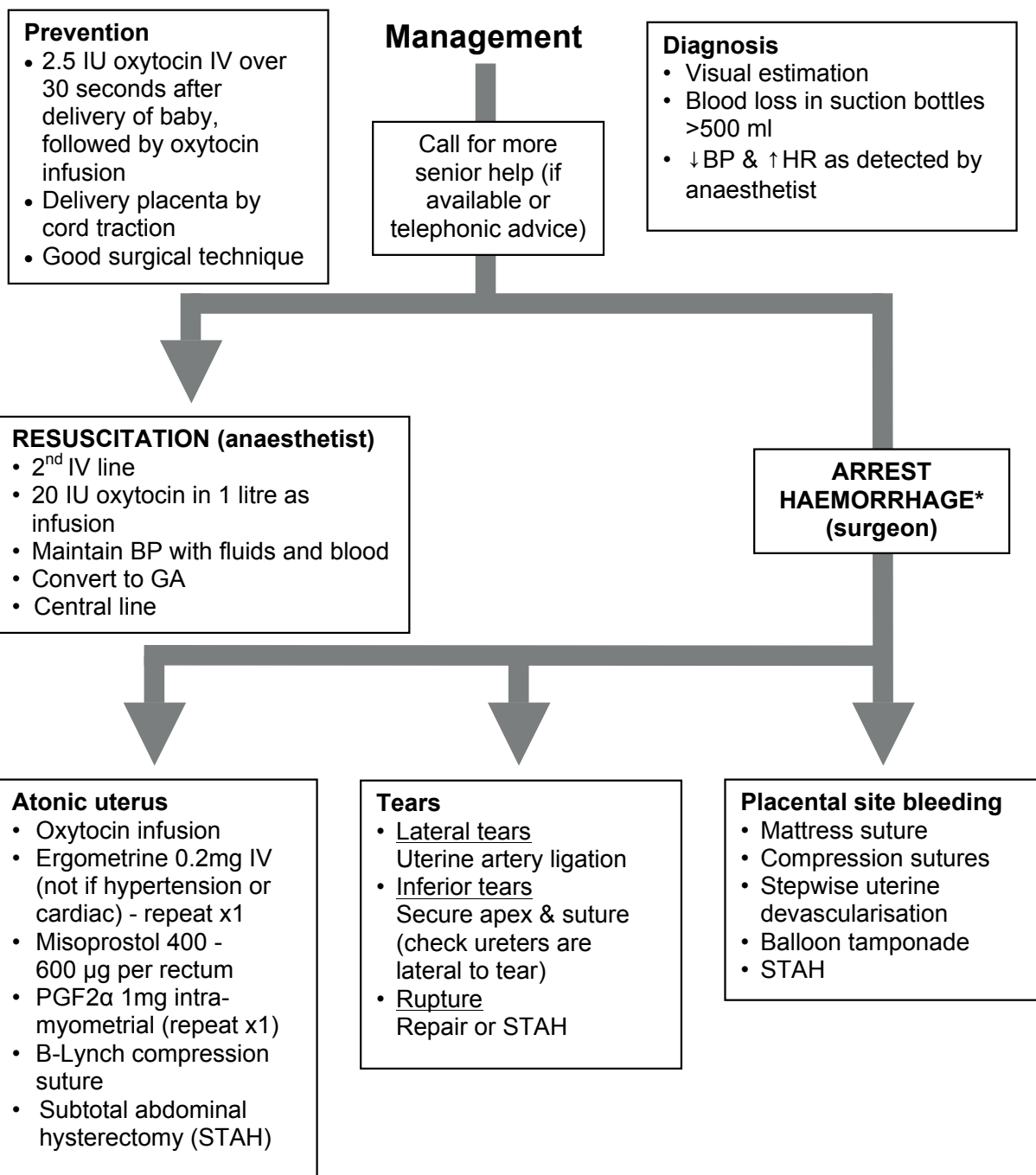
This problem should be minimised by ensuring haemostasis at the initial CS, treating uterine atony and carefully inspecting the uterus anteriorly and posteriorly for tears or haematomas.

In addition, bleeding can sometimes occur under the rectus muscle, under the rectus sheath and in the subcutaneous tissue, so these should all be inspected before closing the abdomen.

Vigilant postoperative monitoring can allow the PPH to be detected and treated timeously.

Excessive bleeding per vagina is more easily detected and is mostly caused by ongoing uterine atony, but can also be due to placental site bleeding, especially in placenta praevia. Occasionally bleeding vessels in the uterine

Bleeding at caesarean section



* Proceed immediately to STAH if:

- Uterine rupture is irreparable
- Placenta increta or percreta

Fig. 1. Bleeding at CS.

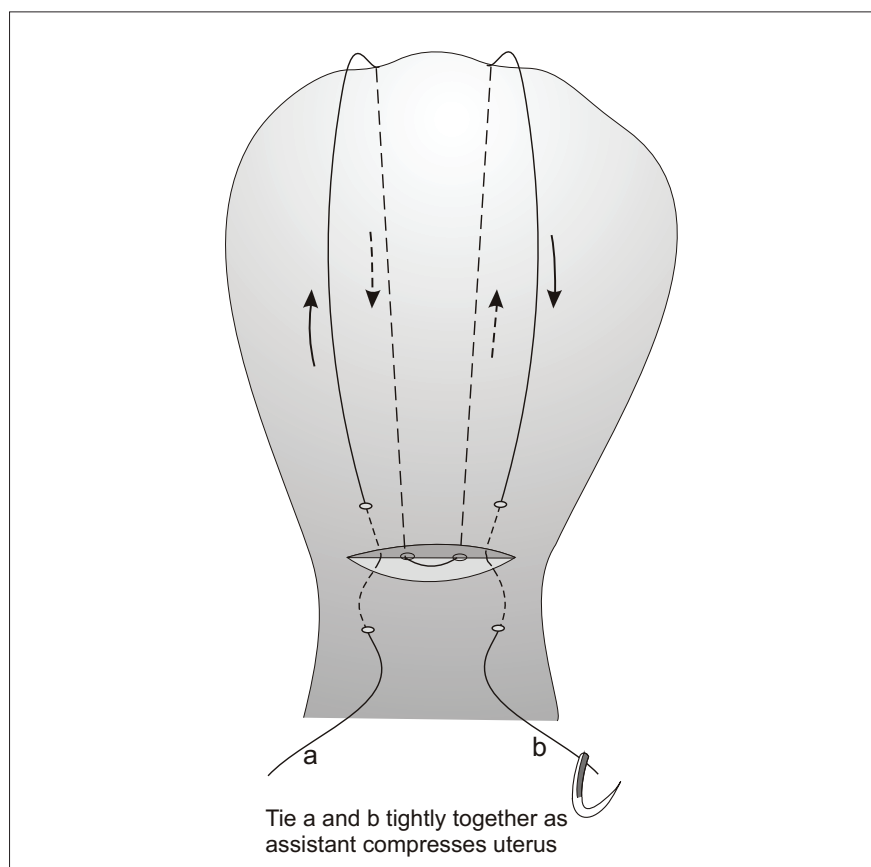


Fig. 2. B Lynch compression suture. Reproduced with permission from NCCEMD.⁴

angle which were not adequately ligated point inwards to the uterine cavity and cause postoperative vaginal bleeding.

In cases of irreparable uterine rupture or placenta increta or percreta (placenta that has invaded into the myometrium and/or beyond) it is necessary to proceed immediately to subtotal hysterectomy without attempting conservative measures.

Intra-abdominal bleeding is more difficult to detect because the bleeding is concealed. Deteriorating vital signs, e.g. tachycardia above 110 bpm and systolic BP <100 bpm

with pallor, are clues. Do not diagnose hypotension as a side-effect of a spinal anaesthetic unless haemorrhage has been excluded. Intra-abdominal bleeding is usually due to bleeding from the angle of the uterine incision which may cause free blood in the peritoneal cavity or a broad ligament haematoma.

Management is shown in algorithm 2 (Fig. 3). It involves volume resuscitation and blood transfusion as appropriate. It is very important to diagnose the cause of the bleeding. Uterine atony can initially be treated medically. Placental site bleeding, if anticipated because it follows a placenta praevia or placenta accreta, could be treated with balloon tamponade. However, if there is poor response to these measures and/or the bleeding is massive, a re-laparotomy must be performed without delay. A Hayman uterine compression suture (Fig. 4) is indicated for uterine atony which is not responsive to medical therapy. Haemostatic sutures can be inserted for bleeding at the uterine angle together with a unilateral

uterine artery ligation, especially if the bleeding is thought to be from vessels in the broad ligament. However, if there is vaginal bleeding in association with a well-contracted uterus and there was no risk for placental site bleeding, then it is advisable to reopen the uterine incision and look for arterial bleeders at the angles which can be ligated.

If all these measures fail proceed to hysterectomy.

Uterine compression sutures, balloon tamponade and uterine artery ligations are procedures that need to be learnt by any doctor trained to perform CS and can be done in a district hospital with emergency blood available.

Level of care

Uterine compression sutures, balloon tamponade and uterine artery ligations are procedures that need to be learnt by any doctor trained to perform CS and can be done in a district hospital with emergency blood available. The skill to perform subtotal abdominal hysterectomy (STAH) may not be available at this level, but should be available at regional and tertiary hospitals which, in the ideal situation, are the more appropriate level of care to manage patients with massive haemorrhage.

Other measures

Internal iliac ligation could be considered if fertility needs to be preserved and a hysterectomy is indicated. However, an experienced person is required and a success rate of 50% needs to be kept in mind. Some tertiary institutions may have the radiological equipment and doctors with the skills to perform uterine artery embolisation. This will be the procedure

Bleeding after caesarean section

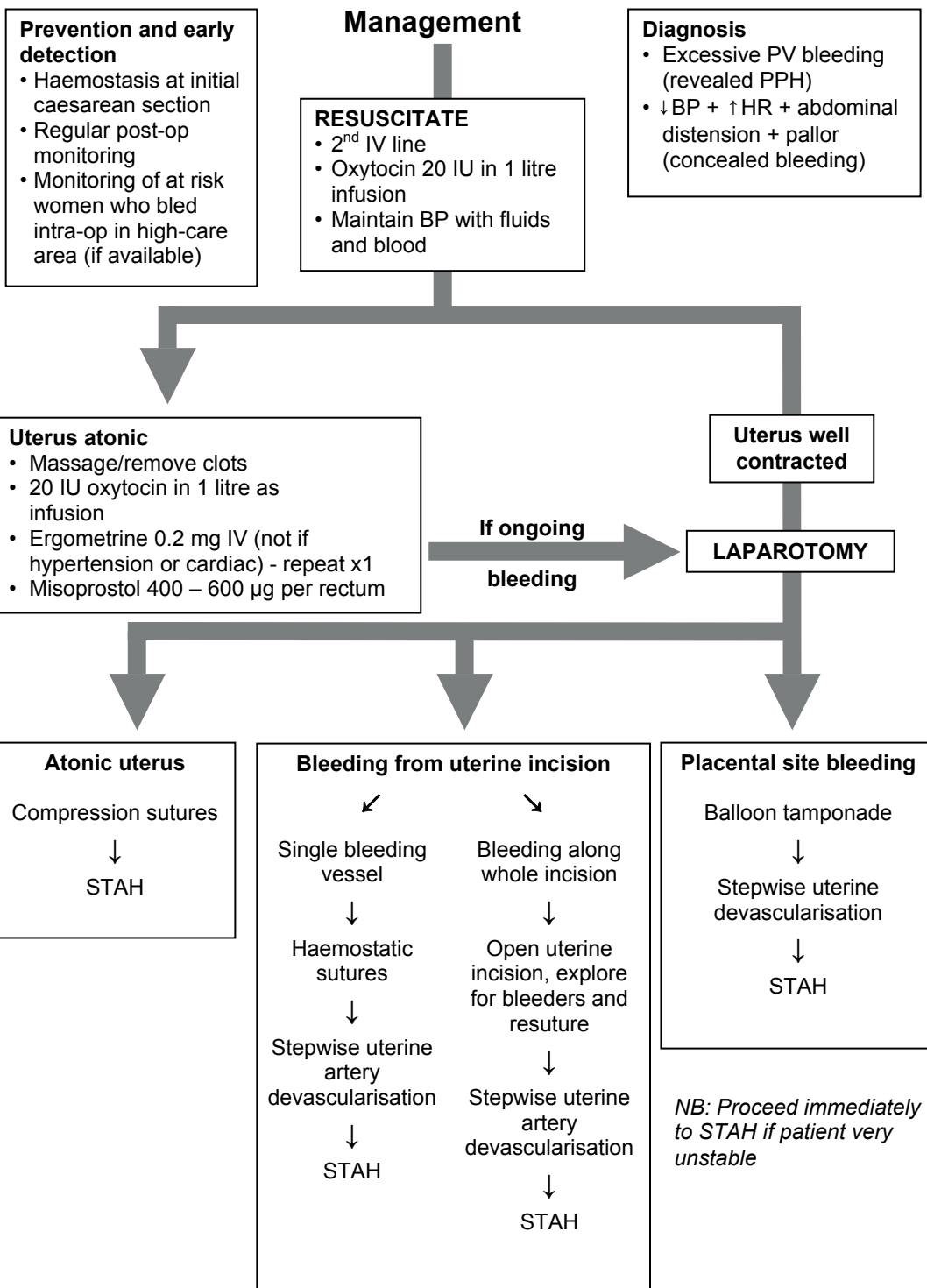


Fig. 3. Bleeding after CS.

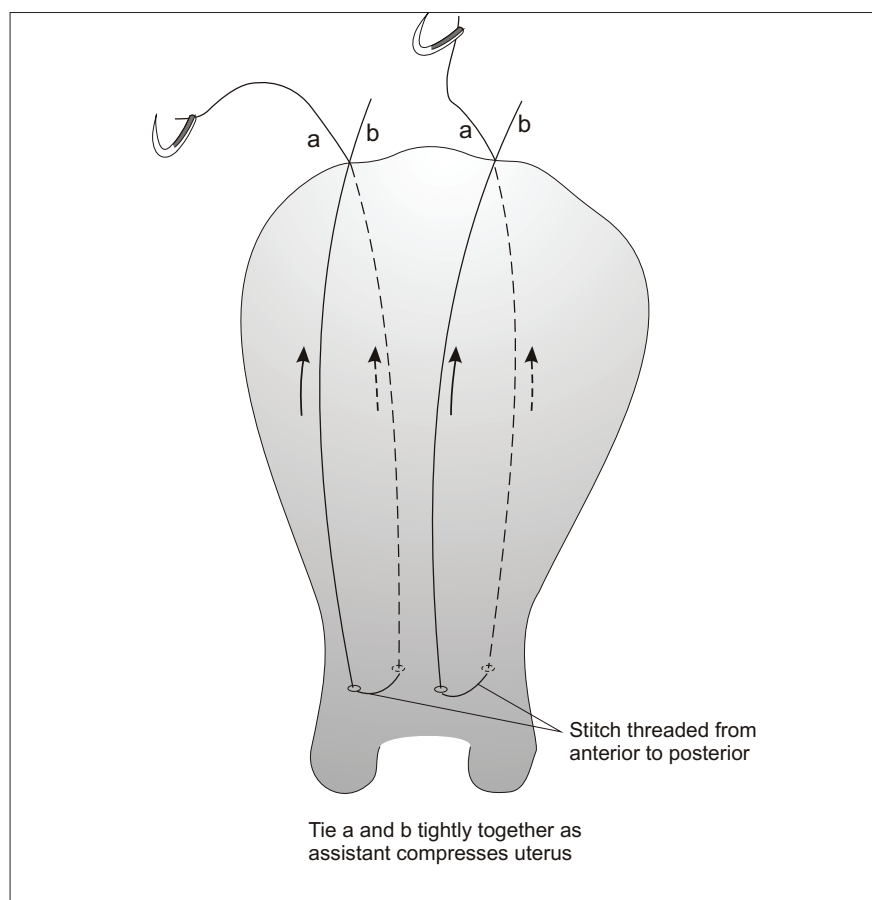


Fig. 4. Hayman uterine compression suture. Reproduced with permission from NCCEMD.⁴

of choice if available, but requires a well-resuscitated patient. Keep in mind that internal iliac ligation rules out the possibility of embolisation.

Internal iliac ligation could be considered if fertility needs to be preserved and a hysterectomy is indicated.

Abdominal hysterectomy

NB: Proceed straight to hysterectomy in the case of placenta praecreta, ruptured

uterus which is irreparable, or when the conservative measures mentioned above are unsuccessful.

A STAH is usually sufficient to control the bleeding. However, if there are tears going down into the cervix, a uterine rupture extending into the cervix or lower segment bleeding following a major placenta praevia, the cervix will also need to be removed, i.e. total abdominal hysterectomy (TAH).

What can be done to reduce deaths from CS bleeding?

Algorithms, posters and booklets are useful and should be distributed to the relevant health workers, but on their own they are insufficient. It is very important to

emphasise the need for 'hands-on' surgical training for all doctors performing CS, as well as an approach to and demonstration of additional surgical skills to arrest bleeding should it be excessive. The availability of experienced specialist assistance for difficult cases, preferably on-site or easily available telephonic advice in the case of a remote rural hospital, is also important. Clinical outreach can help maintain skills and include surgical training.

The clinical managers of maternity services should monitor CS-associated bleeding as an indicator, ensure that guidelines are in place, that surgical training occurs and that senior assistance is available. In addition, constant availability of emergency blood, adequate staffing and functional theatres are essential.

References available at www.cmej.org.za

IN A NUTSHELL

- Excessive bleeding at caesarean section (CS) causes maternal deaths in South Africa.
- Preventive measures such as timeous CS for prolonged labour, oxytocin and careful surgical technique can reduce bleeding at CS.
- Vigilant postoperative monitoring can allow earlier detection and treatment of postpartum haemorrhage.
- Algorithms are available to guide management of the various causes of bleeding at CS.
- Management of postpartum haemorrhage requires team work between surgeon, anaesthetist and midwives.
- Doctors who perform CS need to know the medical treatment of uterine atony and be able to perform additional surgical procedures for arresting haemorrhage and preferably subtotal hysterectomy.
- Post-CS bleeding may be concealed (intra-abdominal) as well as revealed (*per vaginam*).
- Post-CS bleeding not responding to medical or conservative measures requires urgent re-laparotomy.