INTRAOPERATIVE CELL SALVAGE IN OBSTETRICS

AREA of APPLICATION

Intraoperative Cell Salvage (ICS) is being increasingly used in the UK in obstetrics for women at risk from postpartum haemorrhage during caesarean section. In the year 2005-2006, 38% of UK maternity units used ICS, and 28% included the use of ICS in their Massive Obstetric Haemorrhage (MOH) protocol. Early theoretical concerns over amniotic fluid embolism have not been borne out in clinical practice and 80% of maternity units identified the barrier to more use as lack of training rather than safety concerns[1].

STAFF

All staff involved in the ICS process.

PROCEDURE:

The use of ICS in obstetrics has been endorsed by:

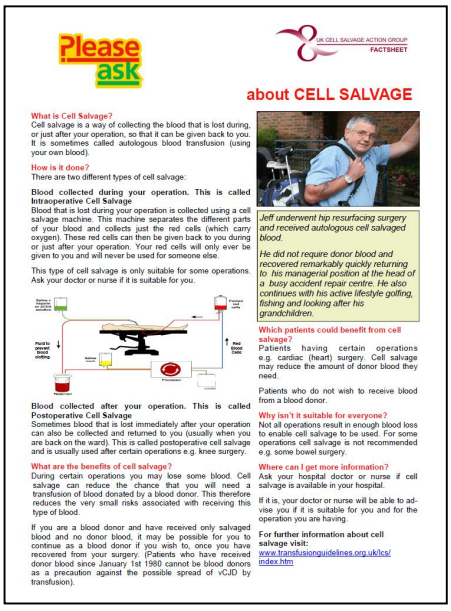
- Centre for Maternal and Child Enquiries (CMACE) (formerly CEMACH)[2,3,4]
- Joint AAGBI/OAA Guidelines[5]
- National Institute for Health and Care Excellence (NICE)[6]

It is strongly recommended that any health care professional involved with obstetric ICS be familiar with all relevant guidelines.

1. Patient Selection and Preparation

Wherever possible, the advantages and risks of ICS and allogeneic blood transfusion should be discussed with the woman prior to undergoing an obstetric surgical procedure. In a pre-planned case this can be done during pregnancy. It is recommended that women receive the NHS Blood and Transplant information leaflet entitled "Will I need a blood transfusion?"* and the UK Cell Salvage Action Group patient information leaflet entitled "Please ask about CELL SALVAGE".

*England and North Wales only - Please contact the Welsh Blood Service, the Scottish National Blood Transfusion Service or the Northern Ireland Blood Transfusion Service to obtain the appropriate leaflet for South and Mid Wales, Scotland and Northern Ireland.



Please ask

UK CELL SALVAGE ACTION GROUP FACTSHEET

about CELL SALVAGE

What is Cell Salvage?
Cell salvage is a way of collecting the blood that is lost during, or just after your operation, so that it can be given back to you. It is sometimes called autologous blood transfusion (using your own blood).

How is it done?
There are two different types of cell salvage:

Blood collected during your operation. This is called Intraoperative Cell Salvage
Blood that is lost during your operation is collected using a cell salvage machine. This machine separates the different parts of your blood and collects just the red cells (which carry oxygen). These red cells can then be given back to you during or just after your operation. Your red cells will only ever be given to you and will never be used for someone else.

This type of cell salvage is only suitable for some operations. Ask your doctor or nurse if it is suitable for you.

Blood collected after your operation. This is called Postoperative Cell Salvage
Sometimes blood that is lost immediately after your operation can also be collected and returned to you (usually when you are back on the ward). This is called postoperative cell salvage and is usually used after certain operations e.g. knee surgery.

What are the benefits of cell salvage?
During certain operations you may lose some blood. Cell salvage can reduce the chance that you will need a transfusion of blood donated by a blood donor. This therefore reduces the very small risks associated with receiving this type of blood.

If you are a blood donor and have received only salvaged blood and no donor blood, it may be possible for you to continue as a blood donor if you wish to, once you have recovered from your surgery. (Patients who have received donor blood since January 1st 1980 cannot be blood donors as a precaution against the possible spread of vCJD by transfusion).

Jeff underwent hip resurfacing surgery and received autologous cell salvaged blood.

He did not require donor blood and recovered remarkably quickly returning to his managerial position at the head of a busy accident repair centre. He also continues with his active lifestyle golfing, fishing and looking after his grandchildren.

Which patients could benefit from cell salvage?
Patients having certain operations e.g. cardiac (heart) surgery. Cell salvage may reduce the amount of donor blood they need.

Patients who do not wish to receive blood from a blood donor.

Why isn't it suitable for everyone?
Not all operations result in enough blood loss to enable cell salvage to be used. For some operations cell salvage is not recommended e.g. some bowel surgery.

Where can I get more information?
Ask your hospital doctor or nurse if cell salvage is available in your hospital.

If it is, your doctor or nurse will be able to advise you if it is suitable for you and for the operation you are having.

For further information about cell salvage visit:
www.transfusionguidelines.org.uk/ics/index.htm

The NICE guidance "Intraoperative blood cell salvage in obstetrics" recommends that "whenever possible, the woman understands what is involved and the theoretical risks, and agrees (consents) to have the procedure". When obtaining formal consent for a caesarean section, the obstetrician or anaesthetist should discuss the advantages and risks of ICS with the woman and document clearly her agreement to undergo the procedure. Such detailed consent may not be practicable in an emergency, in which case the use of ICS should be fully discussed with the mother following the procedure.

2. Indications for ICS

Patient selection for ICS is at the discretion of the obstetrician and anaesthetist caring for the woman. The type of obstetric cases that should be considered for selection include:

2.1 Emergency situations

- Ruptured ectopic pregnancy
- Placental abruption
- Any emergency caesarean section where there is:
  - An anticipated blood loss of >1000mls

  Or where any of the following are present:
  - Risk factors for bleeding
  - Low pre-operative Haemoglobin
  - Rare blood group / multiple antibodies
  - The woman has objections to receiving allogeneic blood but has consented to receiving cell salvage blood
- Surgical management of postpartum haemorrhage

2.2 Elective situations

- Women with an anticipated blood loss of >1000ml e.g. placenta accreta, large uterine fibroids, and other predictable causes of Major Obstetric Haemorrhage (MOH).
- Women who for religious or other reasons refuse allogeneic blood and have consented to the use of Intraoperative Cell Salvage in elective or emergency bleeding situations or in significant anaemia[8]

3. Additional measures necessary in obstetric ICS

3.1 Amniotic fluid and use of Leucocyte Depletion Filter

Amniotic fluid should theoretically not be aspirated into the collection reservoir, but should be removed by separate suction prior to starting cell salvage. This recommendation will reduce the initial contamination, although *in vitro* evidence consistently demonstrates that the cell salvage/filtration process can effectively remove plasma phase elements of amniotic fluid whatever the initial load[7,8]. In life-threatening haemorrhage, therefore, a clinical decision to salvage red cells ***from the start of the procedure*** should be carefully considered, and is supported by current *in vitro* evidence. The UK Cell Salvage Action Group is aware that since 2008, when the paper by Sullivan *et al*[8] provided evidence that

the one suction approach could be safely considered, a number of hospitals in the UK have adopted this approach irrespective of estimated blood loss.

To ensure efficient washing, use a quality wash programme and consider increasing the standard saline wash volume. Do not process incomplete bowls as this will compromise the washing efficiency (use "concentrate" where appropriate).

After processing, a Pall RS filter (LeukoGuard RS, Pall Biomedical Products Co., East Hills, NY) should be used to reinfuse the cell salvaged blood*. This is the only filter proved to effectively eliminate residual particulate elements of amniotic fluid[9]. It should be remembered that prior to the year 2000, this filter was not available, but over 250 cases worldwide had safely received cell-salvaged blood without a problem. This filter slows infusion rates considerably. When blood loss is rapid, the flow rate through the filter may not be sufficient to give back large volumes of blood quickly. Using a filter in each port will double the flow rate. The use of a pressure cuff is not advised due to the risk of air embolus and the unknown impact of pressure on the retention of amniotic contaminants within the filter. In life-threatening haemorrhage, however, where allogeneic blood may not be readily available or is refused, a clinical decision to remove the filter completely should be carefully considered.

***Caution:** MHRA Safety Alert[10]
Nationally there have been an increasing number of reports regarding severe hypotension observed during reinfusion of salvaged blood when using leucodepletion filters. The MHRA produced a safety alert in January 2011 regarding the use of leucodepletion filters in cell salvage. Since this safety alert was published, a case report of severe hypotension occurring without the use of leucodepletion filter was published in the 2012 SHOT Report[11]. The cause of the hypotensive incidents remains unknown. All such incidents should be reported to SHOT[12].

3.2 RhD immunisation and estimation of Feto Maternal Haemorrhage (FMH) (Kleihauer or Flow Cytometry)

In any pregnancy, if the mother is RhD negative and the fetus is RhD positive there is a danger of RhD immunisation if the maternal circulation is exposed to fetal red cells. Antibodies against the fetal red cells can cause haemolytic disease of the newborn in subsequent pregnancies if untreated, consequently all RhD negative women who deliver an RhD positive baby will have a FMH test performed post delivery. FMH testing is required to establish the amount of fetal red cell exposure and ensure the recipient receives an appropriate dose of anti-D immunoglobulin (usually 125 iu/ml of fetal blood). Depending on the results of this (and if the baby is RhD positive) a minimum of 500iu anti-D will be given. The same protocol should apply for RhD negative women who have received salvaged red cells. If cell salvage is used in such women, exposure to fetal red cells is very likely because the cell saver centrifuge cannot distinguish fetal from maternal red cells. Where cell savage is used and where cord blood group is confirmed as RhD positive (or unknown) **an initial dose of 1500iu anti-D is recommended** following reinfusion of the ICS blood. **The sample for Kleihauer testing should be taken 30 – 40 minutes after the reinfusion of the ICS blood** and depending on the results it

may be that **further doses of anti-D** will need to be administered[13]. Administration of anti-D should occur within 72 hours of delivery.

It should be remembered that the risk of sensitisation to other antigens may also be higher as a result of cell salvage being used. It has therefore been suggested that all women receiving cell salvaged blood should be followed up between 4 – 6 months post delivery to check for antibody formation, however this is not currently practicable in most centres.

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