Cell Salvage in Obstetrics (GL754)

Approval

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<tr>
<th>Approval Group</th>
<th>Job Title, Chair of Committee</th>
<th>Date</th>
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<tr>
<td>Maternity &amp; Children’s Services</td>
<td>Chair, Maternity Clinical Governance Committee</td>
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<td>Clinical Governance Committee</td>
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Change History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author, job title</th>
<th>Reason</th>
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<tbody>
<tr>
<td>5.0</td>
<td>May 2017</td>
<td>Dr S Williams, Consultant Anaesthetist</td>
<td>Reviewed and changes throughout to reflect current guidance &amp; references</td>
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<tr>
<td>6.0</td>
<td>May 2019</td>
<td>Dr Guy Jackson Consultant Anaesthetist, Dr Ryan Jones, CT2 Anaesthetist</td>
<td>Review due. Changes made to reflect current national guidance</td>
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Introduction

Cell salvage avoids some of the risks of autologous transfusion such as incompatibility reactions and may be an acceptable alternative to donor blood in those who would otherwise decline a blood transfusion. The use of cell salvage in obstetrics has previously been controversial due to concerns with the risk of amniotic fluid embolus (AFE) and alloimmunisation, however with precautions its use is now widely established.

In vitro work has shown that the use of Haemonetics Cell Saver 5 combines with the Pall RS Leucocyte depletion filter will effectively remove all elements of amniotic fluid that have been studied. (1,2) Case series studying the use of cell salvage in obstetrics have been published with few complications reported. (3,4) The safety of cell salvage in obstetrics has not been established in randomised controlled trials (RCT) however a RCT has completed recruiting and publication of results is awaited. No confirmed cases of AFE associated with cell salvage have been reported. (3,5)

Despite this, recent publication from the guideline working party no longer recommend the use of double suction (to avoid amniotic fluid) or the use of the leucodepletion filters (LDFs) in obstetric practice (6,7), which brings our cell salvage set up into line with that used in other theatres such as orthopaedics. This should increase the number of cell saver technicians available as the set up familiarity increases.

Two CEMACH Reports have encouraged the use of cell salvage in major haemorrhage and patients refusing blood (8,9), and it was approved by NICE in 2005 (10). It is also suggested as a strategy in the OAA/AAGBI Guidelines for Obstetric Anaesthetic Services 2005 (11) and is endorsed by the Royal College of Obstetricians and Gynaecologists. (12) There is therefore professional and national support for its use.

An OAA survey in 2012 showed that 74% of UK maternity units use cell salvage with 36% providing a reliable 24 hour service. (13) There have been no reports to the UK regulatory body (MHRA and SHOT via the SABRE reporting system) of any adverse reactions to cell salvage, in maternity or other applications, and its safety has been established by clinical use.

Indications for use

Current evidence does not support the routine use of cell salvage during caesarean section. Cell salvage should be considered in the ‘collect only’ mode in women undergoing caesarean section who are anaemic before surgery, in women anticipated to be at high risk of haemorrhage or if unanticipated bleeding develops during surgery.

Other scenarios outside of anaemia in which to consider cell salvage include:

- patients undergoing a post-delivery laparotomy
- Haemoglobin less than 85 g/l
- Placenta praevia or abnormally invasive placenta
- Delivery in theatre at full dilatation
- Blood disorders including known red cell antibodies
- Refusal of allogenic transfusion
- Emergency when allogenic transfusion is not available, for example the patient has antibodies and suitable donor blood cannot be supplied.

Other situations where blood loss during caesarean section is unpredictable include:

- Multiple pregnancies
- Emergency caesarean section with previous caesarean section
- Previous classical section/myomectomy
- Placental abruption
- Previous history of postpartum haemorrhage

### Protocol

#### Prior to use

- The woman should be counselled as to why cell salvage is recommended. She should be given a copy of the NICE patient information leaflet. Link to NICE website and leaflet: [http://www.nice.org.uk/guidance/IPG144](http://www.nice.org.uk/guidance/IPG144)
- Patients who are Jehovah’s Witnesses should have been seen earlier during their pregnancy in obstetric and anaesthetic clinics. See Blood Product refusal protocol (CG477)

#### In theatre

- All anaesthetists and obstetricians involved must have knowledge of the indications, contraindications, effects, benefits and risks of cell salvage. ODAs, scrub nurses and other theatre personnel also must be aware of the benefits of the proper use of cell salvage. There is an excellent e-learning module called ‘learn cell salvage’ on the BTS website at:
- Anaesthetic practitioners who are operating the equipment should have received suitable training and competency assessment in its use which must be updated every two years.

A list of personnel who have been trained is held by Philip Thomas, Clinical Lead Anaesthetic Practitioner in the Anaesthetic Department and by the manager of Gynae/Maternity theatres.

- Only theatre personnel who have completed the trust training programme should use cell salvage in obstetrics. A member of the anaesthetic team should take responsibility for running the machine and make decisions about when blood should be re-transfused.
- It may be used for any situation in which allogenic blood is used, but in practice this has so far been confined to Caesarean sections and uterine-re-exploration/laparotomy following post-partum haemorrhage.

- The machine is set up and operated in accordance with the standard operating procedures. ACD-A should be used as the anti-coagulant in the suction system. No alterations are to be made to the wash volume. The machine should be placed between the anaesthetic machine and the surgical assistant.

- In non-Jehovah’s Witness patient, it is economical to set up the aspiration and reservoir kit only. The decision to process and re-transfuse can be made when the degree of haemorrhage has become clear (e.g. "expected" bleeding from placenta praevia)

- If the woman is a Jehovah’s Witness the equipment can usually be set up as for non-Jehovah’s Witness patients, that is, there is usually no requirement for a continuous connection from the patient to the cell salvage system and back to the patient. This is a new, 2018, recommendation. However, some patients may request, as a matter of personal preference, some form of continuous connectivity. (This means that the whole circuit is run through with saline and the re-transfusion bag connected to the IV cannula prior to the salvage suction making contact with the shed blood, at which point a “continuous circuit” is established between the blood lost and the recipient vein). It should be clearly documented in the medical record to which treatments/procedures the patient consents and those to which they do not consent.

- Amniotic fluid may be removed by separate suction prior to starting cell salvage, but recent work suggests this may not be necessary, as clearance of amniotic fluid appears to be independent of the initial load.\(^{(5,6,14)}\) This means that while it may seem safer to suction the amniotic fluid separately, there is no evidence for this and it is no longer recommended.

- Suction should be via the wide bore sucker in the kit and the surgeon should try to suction blood from pools rather than dabbing tissue surfaces with the sucker which disrupts erythrocytes.

- Blood from swabs should be gently washed with IV quality isotonic saline solution and salvaged from a sterile bowl into the main reservoir.

- Suction pressure should be kept as low as practicable (<300 mmHg) to avoid red cell damage, although higher vacuum may be used if necessary.

- Only isotonic saline for intravenous use may be used for any wash or irrigation associated with cell salvage process.

- Cell salvage should be temporarily discontinued when substances not licensed for intravenous (IV) use are present within the surgical field and could potentially be aspirated into the collection reservoir. The standard theatre suction should be used to aspirate the surgical field and the wound should be irrigated with copious 0.9% sodium chloride before resuming cell salvage. Injury to bladder/ureters is not a contraindication to cell salvage because cell salvage is widely used in urological surgery. However, the manufacturers contraindicate the use of cell salvage in the...
presence of bowel contents although it has been used in laparotomy for abdominal trauma with no deleterious effects.\(^{(15)}\)

Examples of substances that should not be aspirated into the cell salvage system include:

- Antibiotics not licensed for IV use
- Iodine, chlorhexidine, alcohol or hydrogen peroxide
- Topical clotting agents

- Salvaged blood should always be immediately labelled in theatre with a patient identity sticker and time of the start of collection.

**Re-infusion should begin before the patient leaves the operating theatre in order to avoid ‘wrong blood, wrong patient’ errors. Processed blood must NOT be infused under pressure because of the risk of air embolism.**

**Reinfusion should be completed before patient leaves recovery and within 6 hours of collection.**

- It is was previously recommended to use the Pall RS Leukocyte Depletion filter in the re-transfusion circuit if there is any risk of amniotic fluid contamination. The guideline working party no longer recommends the use of double suction (to avoid amniotic fluid) or the use of leukocyte depletion filters (LDFs) in obstetric practice.

- The blood must be prescribed and the time and amount of blood re-infused and should be clearly documented in the patient notes.

- As with any transfusion, the patient should be carefully monitored, **Post usage**

- The cell saver freely aspirates foetal red cells and cannot distinguish them from maternal red cells. Therefore if the patient is Rhesus negative she will require anti D prophylaxis and should have a Kleihauer test as soon as possible (125 iu Anti-D per ml of foetal blood contamination)

- A national database of Cell Salvage cases is currently being set up and units using cell salvage should keep careful local records for audit reporting in due course, and any adverse clinical reaction should be reported through the national web-based SABRE system to MHRA/SHOT. **See Appendix 1** below and follow link to form on Stationery
References

5. Goucher, Haley MD; Wong, Cynthia A. MD; Patel, Samir K. MD; Toledo, Paloma MD, MPH. Cell Salvage in Obstetrics. Anes & Analg Vol121(2), 2015; 465–468
11. OAA / AAGBI Guidelines for Obstetric Anaesthetic Services 2013
12. RCOG. Blood Transfusions in Obstetrics (Green-top Guideline No. 47) 2015
Cell Salvage record form
Obstetrics Case

Patient name
NHS no
Affix patient label here

<table>
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<tr>
<th>Date</th>
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|  | Decision for use made by |
|  | Surgeon |
|  | Scrub nurse |
|  | ODP |
|  | Anaesthetist |
|  | Staff member responsible for cell salvage operation |
|  | Total volume suctioned |
|  | Volume of swab wash used |
|  | Volume of processing wash used |
|  | Volume of blood collected |
|  | Administered | Yes/No |

Reason for not administering

Any problems

Author: Dr G Jackson  Date: November 2019
Job Title: Consultant Anaesthetist  Review Date: November 2021
Policy Lead: Director Urgent Care  Version: V4.0 ratified 1/11/19
Location: Policy hub/ Clinical/ Maternity/ Stationery/ Anaesthetics