North Bristol NHS Trust

Intraoperative Cell Salvage for Obstetrics

Authors(s), Owner (Names and designations)	Version and date written	Reason for review	Ratified date and Team
Nicola Weale, Consultant Anaesthetist	v.1 - 2013		
Chris Laxton, Consultant Anaesthetist	v.2 - 2017	Change in practice	18/01/18 Maternity Guideline Group
Elmarie Cairns, Blood Conservation Practitioner	v.3 - 2018		
Nasreen Edgington, Blood Conservation Administrator	v.4 - 2019	New NHS format	
Nicola Weale, Consultant Anaesthetist	v.5 - 2019	Change in Practice	

Patient information leaflet: Y

If yes title: Cell salvage for caesarean birth

Best Practice Points

- Intraoperative cell salvage (ICS) is a safe and valuable part of managing obstetric haemorrhage
- ICS should be available at all times in obstetric theatres
- It should be used routinely for any high risk elective CS and high risk emergency CS. This includes, but not limited to:
    - Placenta praevia and placenta accreta
    - Previous classical incision
    - Category 1 or 2 CS after failed instrumental delivery
    - Multiple pregnancy
- It should be set up ready, but not connected to the patient for all CS. In the event of heavy bleeding, ICS can be quickly connected and started. Any consumables that are not used within 24 hours will need to be discarded.

- Risks and benefits should be discussed with mothers where time allows including the use of 'Cell salvage for caesarean birth' patient information leaflet

- A completed green patient identification sticker should be attached to the blood bag prior to reinfusion

- Reinfused blood must be prescribed on the anaesthetic chart.

- All information on ICS use in Obstetrics including patient information leaflets can be found at MyPregnancy@NBT Smartphone App.

Intraoperative Cell Salvage for Obstetrics

Introduction

Intraoperative cell salvage (ICS) is an efficacious technique for blood replacement in which red blood cells lost during surgery are recovered, washed and re-infused to the patient. The procedure is being increasingly accepted as a safe and valuable part of managing obstetric haemorrhage[1,2].

The use of ICS in obstetrics has been endorsed by:

- Confidential Enquiry into Maternal and Child Health (CEMACH)[3]
- Obstetric Anaesthetists Association (OAA)[4]
- Association of Anaesthetists of Great Britain and Ireland (AAGBI)[4,5]
- National Institute for Health and Clinical Excellence (NICE)[6]

Benefits

Intraoperative cell salvage enhances the safety of Caesarean Section (CS) for patients who decline blood products from donors.

Use of ICS helps to avoid the risks and problems associated with conventional homologous transfusion:

- infection (viruses, bacteria and prions)
- acute incompatibility / allergic reactions
- development of antibodies
- cost
- increasing scarcity
- recipients can not become blood donors (historically a ‘rich source’)

Theoretical Risks

1 Amniotic Fluid Embolism (AFE)

Amniotic fluid embolism is a rare condition. It is not solely related to amniotic fluid entering the circulation at the time of delivery, which occurs in normal women. Rather it seems to be due to an unpredictable complex series of physiological reactions mimicking those seen in anaphylaxis and sepsis. Cell salvage using modern leucocyte depletion filters (LDF) has been shown to remove all particulate components to a level equivalent to maternal blood at time of delivery[7,8,9].Increasing concerns of hypotension associated with the use of LDF and the slow rates of infusion has meant that a 40 micron filter may be used as an alternative, especially in cases of rapid blood loss. No case of AFE has been reported associated with the use of obstetric cell salvage.

2 Sensitisation to Fetal Red Cells

The cell saver is unable to distinguish between maternal and fetal red cells. If cell salvaged blood is transfused back to the mother, fetal red cells may be present in higher concentration in the maternal circulation than often occurs naturally at delivery. Maternal sensitisation to fetal red cell antigens may occur. Rhesus D incompatibility is relatively common but sensitisation can be prevented with adequate anti-D administration after delivery.

Indications and Patient Selection

Cell salvage should be available at all times in CDS theatres. All ODPs providing resident cover to CDS will be cell salvage trained.

Cell salvage should be routinely used for:

- All women undergoing a category 1 or 2 Caesarean section, following a failed instrumental delivery.
- All women that have had a prolonged labour on Syntocinon infusion.
- Any other caesarean section with an anticipated EBL > 1000ml
    - Placenta praevia
    - Suspected placenta accreta
    - Classical incision
    - Past history of uterine atony
    - Multiple pregnancy
    - Transverse lie

- All women with atypical red cell antibodies, regardless of category of Caesarean section
- All women who are anticoagulated or have a clotting disorder
- All women who decline blood products who undergo a Caesarean section, unless the woman specifically refuses cell salvage.
- Preoperative anaemia

Cell salvage should be **prepared and available** if required, for all Cat 1 and Cat 2 caesarean sections.

Contraindications

- Patients with sickle cell disease
- Faecal soiling / pus in the surgical field

Relative contraindications

- Significant systemic sepsis

See also Postpartum Haemorrhage guideline: available on sharepoint

Consent

- **A patient information leaflet** (Cell salvage for caesarean birth) is available on CDS and should be given to the patient prior to the procedure, particularly for non-emergency surgery. Adequate time should be given to allow the patient to read the leaflet and discuss any queries with their anaesthetist.

- If a patient information leaflet is not available, discussions should include an outline of the procedure, the known risks of conventional blood transfusion and the theoretical risks of ICS. This should then be documented either in the notes or on the anaesthetic chart.

- In urgent situations, the doctor should consider the procedure as part of his or her duty to act in the patient's best interests. An exception to this would be when the doctor knows in advance that the patient would not accept ICS.

The Procedure of ICS

1 Collection & Processing

- Instructions for set up of collection and processing kits can be found attached to the cell salvage machine.

- A wide bore sucker (aspiration anticoagulation line) is attached to a vacuum of 150 mmHg and blood is collected in a reservoir.
- A separate sucker should be used to aspirate the majority of amniotic fluid except when blood is likely to be lost before amniotic fluid (e.g. anterior placenta praevia
- The machine will automatically process (spin, wash & package) red blood cells for re-infusion when enough fluid is present in the reservoir.
- In cases where there is doubt about the extent of expected blood loss, it is economical to set up the collection kit only – the decision to process and re-infuse can be made when the degree of haemorrhage has become clear.
- In the presence of **heavy bleeding**, vacuum settings may need to be increased (maximum of 300mmHg). The rate of anticoagulant will also need to be increased to maintain a 1:7 anticoagulant : blood ratio.

2 Scrub Midwife Responsibilities

- The sterile aspiration anticoagulation line will be handed to the scrub midwife. The bifurcated double end should be handed back to the cell salvage operator. The other end with fused double channel should remain sterile and be positioned for use by the surgeon. A yankeur tip is best avoided unless specifically requested by the surgeon as there is risk of damage to red cell integrity.
- A sterile bowl should be filled with 1000mls of sterile 0.9% **intravenous** saline. Blood stained swabs should be placed in the bowl immediately to prevent clots forming and further red cell damage from drying out. The swabs should gently agitated to maximise red cell recovery. The swabs **should not be wrung** as this may damage the red cells. This blood/saline solution can then be aspirated into the reservoir for processing. The saline for swab wash should be replaced at intervals during the case if swabs are heavily blood stained.

3 Re-infusion

- The decision to re-infuse should be made jointly by the obstetrician and anaesthetist in discussion with the woman whenever possible.

- A **green patient identification label** (see example appendix 1) should be completed from details on the patient's wristband and attached to the salvaged blood bag. Details should include:
  - Full name
  - Date of Birth
  - Hospital number
  - Collection start date and time
  - Expiry date and time

  The peel out section of the label should be detached and placed on the patient blood management audit form. These labels can be found in the cell salvage machine consumables trolley.

- The blood should be prescribed on the anaesthetic chart as 'autologous blood'. It can also be noted on a fluid prescription chart but this is not adequate alone as a prescription for blood.

- Re-infusion of the salvaged blood must take place within **6 hours** of the completion of processing. Prior to a decision to use the blood, the bag must remain at the patient's bedside and not stored in a fridge.

- Blood warmers and pressurised bags should **not** be used.

- **Massive re-infusion** of salvaged red blood cells will result in depletion of platelets and clotting factors. The need for additional appropriate transfusion support e.g. platelets, fresh frozen plasma and cryoprecipitate, must be considered and should be guided by bedside tests of coagulation (ROTEM) where feasible

- **Adverse Events** (e.g. severe reaction on reinfusion of salvaged blood) should be documented, have an datix completed and be reported to Dr C. Laxton, Anaesthetic Consultant, and the Blood Conservation Practitioner for NBT

4 Data Collection

- **Patient Blood Management Monitoring forms** MUST be completed for all cases, even if only collection (no processing or re-infusion) takes place. This is the responsibility of the cell salvage operator.

- All documentation can be found in the top draw of the cell salvage trolleys The sticker from the autologous blood transfusion label should be transferred to the patient blood management form.

- A white sticker to document cell salvage (collection only or processing) must be attached to the anaesthetic chart to allow for appropriate coding and tariff

5 Responsibilities following ICS

- The cell salvage operator is responsible for dismantling the cell salvage machine and discarding disposables in a yellow rigid clinical waste bin.

- Any obvious external blood contamination of the machine must be cleaned.

- The cover should be replaced and the machine returned to its original storage place.

- Following contamination of the equipment internally, the equipment should be removed from use, identified as a potential biohazard and referred to the manufacturer

Women who Decline Blood Products

- Certain patients (e.g. Jehovah's Witnesses) may decline the use of primary products of blood (e.g. packed red cells). These patients may accept certain secondary products (e.g. fresh frozen plasma, factor VIII) and/or cell salvage. An Advance Directive should be completed antenatally to clarify these important issues. The anaesthetist should further discuss these issues with the patient prior to the procedure to ensure the patient's views have not changed and document the discussion in the notes.

- Most Jehovah's witnesses who accept cell salvage can be treated as documented above. However some demand that a continuous circuit must be in place for the return of blood. If this is the case the blood giving set should be primed with 0.9% intravenous (iv) saline and attached to the patient's IV line prior to starting the operation. This ensures continuity with their circulation from the point of salvage to the point of return at all times (step-by-step set up instructions are attached to the cell salvage machine).

Rhesus Negative Women

- The policy for the post delivery management of rhesus negative women is no different to routine cases except that a Kleihauer test should be performed 30-45 minutes after re-infusion of salvaged cells and the procedure recorded on the request form.
- In addition to a record in the patients notes, the anaesthetist must make it clear in the handover of care to the midwife that cell salvaged blood has been used. This may necessitate a higher than normal dose of anti D being required, which should be administered within 48-72 hours of delivery.

Training

- All persons operating the cell salvage machine should have undergone training and have the relevant competencies.

- There is an ongoing programme of training within the Trust. Please contact the Blood Conservation Practitioner for details.

Auditable standard

An audit will be undertaken at least every three years which will audit compliance with this guideline. Where NICE Clinical guidelines exist the NICE audit support tool will be utilise to measure against standards set. The audit will be presented at the divisional audit meeting following which an action plan will be formulated to correct any deficiencies identified and a date for re-audit planned. The implementation programme of the action plan will be reviewed 6 months after the presentation.

References

1) **Catling Sue, Joels Lisa** Cell Salvage in Obstetrics – the time has come *British Journal of Obstetrics & Gynaecology* 2005; **112:** 131-132

2) **Allam J, Cox M, Yentis S** Cell Salvage in Obstetrics. Int J Obstet Anesth. 2008 Jan ;17 (1):37-45

3) **CEMACH** 2003-2005 Saving Mothers Lives. Haemorrhage chapter 4 page 80
http://www.cemach.org.uk/getdoc/7cbb498a-f176-4cb5-ab83-6549bb19a886/Maternal-and-Perinatal-Health.aspx

4) **OAA/AAGBI** Guidelines for Obstetric Anaesthetic Services revised Edition May 2005 p25

5) **AAGBI** Safety Guideline. Blood Transfusion and the Anaesthetist; Intraoperative Cell Salvage. 2009 p11

6) **National Institute For Health & Clinical Excellence (NICE)** (2005) Intra-operative Blood Cell Salvage in Obstetrics – Guidance
http://www.nice.org.uk/nicemedia/pdf/ip/IPG144guidance.pdf

7) **Waters JH. Biscotti C. Potter PS Phillipson E** Amniotic fluid removal during cell salvage in the cesarean section patient; *Anaesthesiology* 2000; **92**: 1531-1536

8) **Sullivan I, Faulds J, Ralph C** Contamination of salvaged maternal blood by amniotic fluid and fetal cells during elective caesarean section. Br J Anaesth 2008; 101:225-229

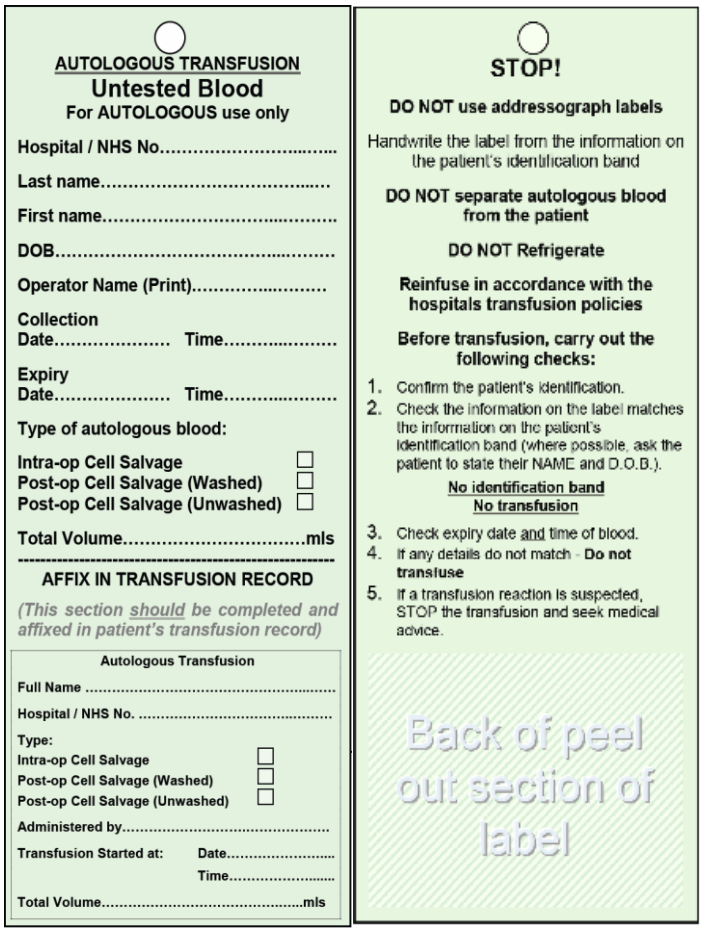
9) **Catling SJ, Williams S, Fielding** A Cell salvage in Obstetrics: an evaluation of the ability of cell salvage combined with leucocyte depletion filtration to remove amniotic fluid from operative blood loss at caesarean section. *Int. J. of Obstetric Anesthesia* 1999;**8**;79-8

10) **UK Cell Salvage Action Group** Intraoperative Cell Salvage in Obstetrics. Technical Fact sheet number 8. August 2008. http://www.transfusionguidelines.org.uk/index.aspx?Publication=BBT&Section=22&pageid=1461

11) **King M, Wrench I, Galimberti A, Spray R** Introduction of cell salvage to a large obstetric unit: the first six months.Int J Obstet Anesth (2009) 18, 111-117

Appendix 1

Autologous Transfusion Label



AUTOLOGOUS TRANSFUSION
Untested Blood
For AUTOLOGOUS use only

Hospital / NHS No.....

Last name.....

First name.....

DOB.....

Operator Name (Print).....

Collection
Date..... Time.....

Expiry
Date..... Time.....

Type of autologous blood:

Intra-op Cell Salvage ☐
Post-op Cell Salvage (Washed) ☐
Post-op Cell Salvage (Unwashed) ☐

Total Volume.....mls

AFFIX IN TRANSFUSION RECORD

(This section should be completed and affixed in patient's transfusion record)

Autologous Transfusion

Full Name .....

Hospital / NHS No. .....

Type:
Intra-op Cell Salvage ☐
Post-op Cell Salvage (Washed) ☐
Post-op Cell Salvage (Unwashed) ☐

Administered by.....

Transfusion Started at: Date.....
Time.....

Total Volume.....mls

STOP!

DO NOT use addressograph labels

Handwrite the label from the information on the patient's identification band

DO NOT separate autologous blood from the patient

DO NOT Refrigerate

Reinfuse in accordance with the hospitals transfusion policies

Before transfusion, carry out the following checks:

1. Confirm the patient's identification.
2. Check the information on the label matches the information on the patient's identification band (where possible, ask the patient to state their NAME and D.O.B.).
   No identification band
   No transfusion
3. Check expiry date and time of blood.
4. If any details do not match - Do not transfuse
5. If a transfusion reaction is suspected, STOP the transfusion and seek medical advice.

Back of peel out section of label