GUIDELINES FOR THE USE OF CELL SALVAGE IN OBSTETRICS

RATIONALE:

1. Obstetric haemorrhage remains a major cause of maternal mortality in the United Kingdom\(^1\).
2. Based on UKOSS figures\(^2\), with 8000 deliveries per year we would expect to see 3 – 4 peripartum hysterectomies due to haemorrhage. These represent extreme cases of massive obstetric haemorrhage.
3. Lesser degrees of blood loss, classified as moderate (1000 – 2000ml) or severe (>2000ml)\(^3\), occur on a weekly basis but are notoriously difficult to predict.
4. Blood transfusion can be life saving in severe haemorrhage but is not without risk, there are morbidities associated with allogenic blood transfusion\(^4\). The cost of allogenic blood products is rising and the donor pool is decreasing.
5. Intraoperative cell salvage (ICS) is a safe\(^5-12\), clinically effective\(^5,6,11\) and cost effective\(^13\) means of providing much needed red cells. It is helping to reduce the risk from and demand on allogenic blood products.

BACKGROUND:

1. As recommended by NICE\(^11\) we have the necessary equipment and have considerable expertise and experience in its use for many years. This is a very unique and valuable resource and we should put it to the best possible use.
2. Among the women having surgical delivery, local audit has identified the following categories who have had a transfusion : crossmatch ratio of 0.3 or more\(^13\):
   a. Haemoglobin less than 8.5 g/dl
   b. Placenta praevia
   c. Blood disorders including known red cell antibodies
   d. Delivery in theatre at full dilatation
3. Other situations where blood loss during caesarean section is unpredictable are:
   a. Multiple pregnancies
   b. Emergency caesarean section with previous caesarean section
   c. Previous classical section/myomectomy
4. A local audit of cell salvage use for all caesarean sections, (except those identified at minimal risk of blood transfusion), has demonstrated that this was cost effective and useful\(^13\).

INDICATIONS:
INTRAOPERATIVE CELL SALVAGE SHOULD BE USED FOR:
  ALL EMERGENCY Caesarean Sections
  ALL ELECTIVE Caesarean Sections (EXCEPT those with minimal risk of bleeding*)

INTRAOPERATIVE CELL SALVAGE SHOULD BE CONSIDERED FOR:
  All Cesarean Sections in those who object to receiving Allogenic Blood e.g. Jehovah’s Witnesses**

The maximum benefit of cell salvage can be gained by capture of emergency cases which often require large volumes of blood and blood products.

<table>
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<tr>
<th>*MINIMAL RISK BLEEDING:</th>
<th>Uncomplicated singleton pregnancy requiring caesarean section because of breech presentation, one previous c-section, previous perineal tear and maternal request with no added risk factors.</th>
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<tr>
<td><strong>Jehovah’s Witnesses</strong></td>
<td>In such patients discussion around cell salvage should take place as early as possible to ascertain if this is acceptable to them. It is a matter for individuals to decide, and their wishes must be recorded in the notes.</td>
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PROCESS:

Patient information leaflets about cell salvage are available throughout the trust. These should be given at an early stage to all elective patients in whom cell salvage is indicated so that they may have an opportunity to ask questions about it and give informed consent to its use. Clearly this may not always be possible in emergency cases, but wherever possible this must be discussed with patients.

All anaesthetists and obstetricians 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: http://www.transfusionguidelines.org/index.aspx?Publication=BBT&Section=22&pageid=974#lcs and it would be advisable for anyone involved in cell salvage to have done this module. In addition, ODAs who are operating the equipment should have received suitable training and competency assessment in its use which must be updated every two years.

- In the majority of cases, only the collection part of the cell salvage disposables should be initially set up, with the processing part of it ready to hand but unopened. Our audit indicated that there was sufficient collection of blood to trigger the processing in 17% of cases (when used for all c-sections except those at minimal risk of blood transfusion).
- A two suction system should be used to help reduce the contamination of salvaged maternal blood by amniotic fluid:
  1. Standard theatre suction should be used to remove amniotic fluid from the operative field during delivery of the baby
  2. Cell saver suction should be initiated after delivery of baby.
In cases of an anterior placenta praevia if the uterus in incised through the placenta, a lot of the blood loss occurs before the baby can be delivered, this blood should be collected and not wasted.

A wide bore suction catheter should be used to suction the blood from the operative field as this minimises destruction of the red cells.

A low vacuum pressure on the suction system will reduce haemolysis and increase the yield from cell salvage.

Blood soaked swabs may carry a large proportion of the blood loss and should be rinsed with isotonic saline which should be sucked into the cell salvage system for processing.

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

ICS 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 ICS. Injury to bladder/ureters is not a contraindication to cell salvage because cell salvage is widely used in urological surgery. However, the use of cell salvage in the presence of bowel contents is contraindicated by the manufacturers although it has been used in laparotomy for abdominal trauma with no deleterious effects.

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

- Antibiotics not licensed for IV use
- Iodine, chlorhexidene, 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.

Reinfusion of salvaged blood should always be through a LEUCODEPLETION FILTER to minimise amniotic fluid contamination.

Reinfusion 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.

Where cell salvage is used in Rh(D) negative women, a Kleihauer count should be obtained and the result of this test should be a guide as to whether additional Anti-D prophylaxis is needed.

An audit form must be completed for every case, so all cases where cell salvage is used can be identified and monitored annually for efficacy, safety and cost effectiveness.

There are no nationally agreed criteria for quality control in cell salvage at the moment. But a monthly analysis of free haemoglobin and heparin levels in the processed blood in random samples have been suggested as suitable tests, and maybe something we need to look into.
FINANCIAL AND RISK CONSIDERATIONS:

- Our unique situation with regard to our laboratory facilities make these recommendations necessary to increase the safety of women delivering in our Trust.
- The cost of a collection set is £18.50 and the processing component is £42. The cost of a unit of blood is around £140. So for the women in whom cell salvage proceeded to processing and blood was recovered to be returned the economics are well in favour of cell salvage especially those with moderate blood loss, who may have more than one unit returned to them. (Our record has been 3030 ml returned in one patient = 12 units!). Our audit showed that cell salvage used in all c-sections except those at minimal risk of bleeding resulted in blood being returned to 1 in 6 patients. So the collection set only was used and ‘wasted’ in 5. But looking at the service as a whole it would make economic sense, particularly when taken in the context of the added safety to the patients.
- It does place some additional strain on our service provided by the ODAs who run the cell salvage equipment especially out of hours, and we need to look at the way we are using theatre personnel at the moment and consider suitable modifications if appropriate to alleviate this.

REFERENCES


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