Royal Brompton & Harefield NHS
NHS Trust

POLICY FOR THE PROVISION OF PERIOPERATIVE RED CELL SALVAGE

JOINT TRANSFUSION COMMITTEE

PATIENT RELATED POLICIES

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Surgeons
Anaesthetists
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SUMMARY OF THE DOCUMENT

This document sets out the way in which intraoperative cell salvage is implemented, and monitored across the Trust.

TIMETABLE

The authorised policy will be distributed to ward areas, the theatre suites and Departments of Perfusion at the Royal Brompton Hospital and Harefield Hospital in paper format and posted on the Trust Intranet – Policies & Guidelines/Policies and Procedures/patient related.

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1. INTRODUCTION

Cardiac surgery is associated with the risk of substantial blood loss. Bélisle and Hardy in 1996 reported that the mean blood loss in 4399 patients undergoing cardiac surgery was in the region of one litre (1). There is no evidence to suggest that this figure has been greatly reduced in recent years, and certainly within this Trust, with a substantial proportion of complex and redo procedures, blood loss may on occasions be considerably greater than this.

Blood and blood products are however a limited resource and in the future may be even more so. With the advent of leucocyte filtration the cost of blood and blood products has risen dramatically. In view of this, the Medical Director of the NHS Executive issued a Health Service Circular entitled Better Blood Transfusion (HSC 1998/224). In this he recommended that *"by March 2000 all NHS Trusts, where blood is transfused should have explored the feasibility of autologous blood transfusion… in particular they should have considered the introduction of perioperative cell salvage"(2).* A second Health Service Circular entitled Better Blood Transfusion 2 (HSC 2002/009) has subsequently reiterated the need to examine the option of autologous blood transfusion including cell salvage, and to use it where appropriate (3).

This recommendation is clearly applicable to cardiac surgery; indeed cell salvage has been in use in many institutions since 1976, and has been shown to significantly and safely reduce the requirement for homologous blood transfusion (4,5). There is also evidence that the reinfusion of unwashed blood from the bypass circuit during cardiac surgery may impair coagulation and contribute to increased postoperative bleeding (6). It must be remembered however that although the salvage, washing and reinfusion of autologous red blood cells is an important tool in both limiting and supporting the appropriate use of bank blood, it is only one facet of a comprehensive approach to safe, appropriate blood transfusion practice within the Trust.

2. PATIENT SELECTION AND PREPARATION

Patient selection for cell salvage is at the discretion of the surgeon and anaesthetist caring for the patient. Patients to be considered for selection (see section 2.1 and 2.2 below) include all adult and paediatric patients over one year of age undergoing cardiac surgery with cardiopulmonary bypass unless a specific contraindication is identified.

All patients admitted to hospital prior to cardiac surgery will receive the National Blood Service information leaflet entitled "Blood Transfusion" including information regarding cell salvage. In addition during the anaesthetic preoperative assessment, the anaesthetist will be available to discuss issues related to blood transfusion including perioperative cell salvage.

2.1 INDICATIONS FOR CELL SALVAGE

The specific indications may vary at the discretion of the consultant surgeon or consultant anaesthetist responsible for the care of each individual patient as stated above, but may in the absence of contraindications include:

2.1.1 Adult and paediatric patients over one year of age undergoing routine or emergency cardiac surgery in which cardiopulmonary bypass is used. It may be cost effective, at the discretion of the surgeon or anaesthetist, to set up the suction apparatus and collection reservoir but only process the blood aspirated if the volume salvaged exceeds a specified volume (Cobe Brat 2 600mls, Medtronic ATLS 500mls).

2.1.2 Adult patients undergoing surgery in which the blood loss is or expected to be greater than 20% of the patient's estimated blood volume (7).

2.1.3 Patients undergoing cardiac surgery in which cardiopulmonary bypass is not used, but the blood loss may be excessive. Again it may be cost effective, at the discretion of the surgeon or anaesthetist, to set up the suction apparatus and collection reservoir but only process the blood aspirated if the volume salvaged exceeds a specified volume (Cobe Brat 2 600mls, Medtronic ATLS 500mls).

2.1.4 Patients who for moral, religious or haematological reasons are unable to undergo homologous blood transfusion but may consent to autologous transfusion.

In all situations where cell salvage is used, the autologous blood must be re-infused in preference to bank blood.

2.2 CONTRAINDICATIONS TO CELL SALVAGE

The risk benefit ratio of intraoperative red cell salvage must be assessed for each individual patient by the surgeon and anaesthetist involved in the patient's care. Most of the contraindications listed here are relative; few data are available regarding the complications associated with the re-infusion of shed blood.

2.2.1 Heparin induced thrombocytopenia

2.2.2 Infection at the site of the wound

2.2.3 Contamination of the wound with bowel contents

2.2.4 Sickle haemoglobin – there is at least one report in the literature documenting massive sickling within the cell saver precluding the subsequent use of the salvaged blood in a patient with sickle cell trait. (8).

2.3 CAUTIONS

2.3.1 Topical iodine containing solutions should be not aspirated, as they are not licensed for intravenous use.

2.3.2 Re-infusion of blood from the primary re-infusion bag when it is still connected to the cell saver may lead to air embolism. The primary re-infusion bag **must** be disconnected from the cell saver circuit and all air evacuated from the bag prior to re-infusion.

2.3.3 Topical antibiotics (e.g. bacitracin, neomycin, polymyxin) should not be aspirated as intravenous administration may cause renal and neurological toxicity.

2.3.4 Topical clotting agents (e.g. thrombin, cellulose, collagen, gelatin, fibrin glue) should not be aspirated as they may cause clotting within the system, or cause adverse effects when re-infused intravenously.

2.5.5 Gastric or pancreatic secretions should not be aspirated as they may cause enzymatic haemolysis and are not reliably removed by the washing procedure.

2.3.6 Pleural effusions should not be aspirated and should be drained prior to cell salvage. However blood which subsequently accumulates in the pleural space, may be aspirated.

2.3.7 Methyl methacrylate, in the liquid form may cause circulatory collapse and in the solid state will clog the suction apparatus.

2.3.8 Amniotic fluid must not be aspirated as it contains proteolytic enzymes that may activate the clotting cascade, and squamous cells that may form pulmonary emboli.

2.3.9 Case reports have appeared in the literature of malignant hypertension following re-infusion of blood during resection of a phaeochromocytoma (9)

2.3.10 Malignancy – there are now many reports in the literature of the use of perioperative cell salvage in cancer surgery without obviously leading to early metastasis. If the need for blood conservation outweighs the as yet unproven risks of cell salvage in the presence of malignant disease, it may be used at the discretion of the surgeon or anaesthetist, with the proviso that it may be appropriate to re-infuse the red cells via a leucocyte filter in place of the standard filter.

The processed blood must be appropriately labelled and under no circumstances should it be separated from the patient from whom it was

salvaged. If this occurs the blood must be disposed of without being re-infused.

3. THE MANAGEMENT OF MASSIVE TRANSFUSION

It is essential to understand cell salvage is not without risks, in particular, in common with the transfusion of large volumes of bank blood, the return of large volumes of red blood cells will lead to the depletion of platelets and clotting factors resulting in a potentially severe coagulopathy.

Patients who undergo cell salvage should have blood taken when the re-infusion of the salvaged red cells is complete (RBH only). The request form should be labelled with a red "CELL SALVAGE FIRST" sticker to facilitate laboratory identification. This will enable a full blood count, prothrombin time, activated partial thromboplastin time and heparin concentration to be routinely performed. If the re-infusion of red cells is not complete before the patient leaves theatre the anaesthetist should ask the nurse caring for the patient to take blood for these tests as soon as re-infusion is complete.

In the event of a massive transfusion, it is strongly recommended that the patient has these investigations performed following the re-infusion of each litre of salvaged blood in order to rapidly detect and appropriately treat the potential coagulopathy. It is vital to ensure that these patients receive transfusion of platelets, fresh frozen plasma and cryoprecipitate in accordance with the Trust transfusion guidelines, in addition to the correction of developing hypocalcaemia.

4. METHODOLOGY OF CELL SALVAGE

Intraoperative cell salvage involves three processes: collection and anticoagulation, processing and re-infusion. (For the standard operating procedures for the current cell salvage machines in use within the Trust see Appendices 3 and 4).

Blood is aspirated from the surgical field at vacuum levels of less than 150mmHg or 20kPa as far as possible avoiding skimming of the surface of the blood in order to minimise blood cell trauma. It is mixed with an heparin near the tip of the suction cannula and the anticoagulated blood is collected into a sterile blood collection reservoir. Following successful separation of the patient from cardiopulmonary bypass, the contents of the bypass circuit should be flushed into the cell salvage reservoir with a minimum of 1-2 litres of Hartmann's solution until the fluid remaining is clear. When a sufficient amount of blood has been collected (500-600mls), processing may start.

The Cobe Brat 2 and Medtronic ATLS cell salvage systems employ semi-continuous flow centrifugation. The blood is centrifuged at 3,600rpm so that the higher density red blood cells are packed against the outer wall of the spinning bowl. During the wash cycle, normal saline is pumped into the spinning bowl and displaces material that is less dense than the red blood cells including clotting factors, platelets, inflammatory mediators, free

haemoglobin and heparin away from the outer wall of the bowl and subsequently into the waste bag. The washed and packed cells suspended in saline (haemoglobin concentration 15-20g/dl) are then pumped into the re-infusion bag. It is important to note that over filling of the re-infusion bag, or re-infusion under pressure may cause the bag to rupture.

In order to reduce the risk of air embolus, any air in the re-infusion bag must be purged utilising the purge facility in the Cobe Brat II and Medtronic software, and the re-infusion bag **must** be disconnected from the cell saver prior to re-infusion. Re-infusion of the red blood cells then occurs under the supervision of the anaesthetist. The red cells must be infused via an in line micro-aggregate filter within four hours of salvage.

4.1 METHOD OF USE

The Cobe Brat 2 and Medtronic ATLS cell salvage systems may be used in either manual or automatic operating modes. Manual operation allows faster processing times because the system is under the direct control of the operator. The automatic operating mode allows the processing of blood with minimal operator intervention. This should not however lead to operator complacency and the system should never be left unattended when in operation. The automatic mode of operation is strongly recommended in all but the most urgent situations.

4.2 ANTICOAGULATION

Porcine heparin (Cobe system - 40,000 units/litre, Medtronic ATLS system 30,000 units/litre) is added to 1 litre of normal saline and delivered to the tip of the suction cannula via the smaller bore lumen of the suction assembly at 1-2 drops/sec. Approximately 100mls of the anticoagulant solution is allowed to collect in the reservoir prior to blood collection. The anticoagulant solution delivered to the tip of the suction catheter is then aspirated together with the blood salvaged from the surgical field through the larger bore lumen of the suction assembly into the reservoir. The flow of anticoagulant into the reservoir is manually controlled by a roller clamp in the anticoagulant line. This flow must be adjusted according to the rate of blood collection from the surgical field, if the supply of anticoagulant is too low for the rate of aspiration of blood the blood in the reservoir may clot prior to processing. Thus once collection begins the operator must be present and aware of the rate at which blood is being collected in order to adjust the flow rate of the anticoagulant accordingly. If there is evidence of clot in the reservoir this blood should be discarded without re-infusion and the flow rate of the anticoagulant increased prior to recommencing blood salvage.

4.3 WASH VOLUME AND SOLUTION

It is necessary to collect at least 600mls of blood in the Cobe Brat 2 reservoir and 500mls in the Medtronic ATLS reservoir prior to processing. Sterile normal saline is used as the wash solution. The blood is deemed adequately washed when a minimum wash volume of 1000mls in the Cobe or 250mls in

the Medtronic system has been used, and the overflow line into the waste bag is clear. If fat or debris is detected in the re-infusion bag the blood should be returned to the system and rewashed. Following separation of the patient from bypass and removal of the aortic cannula, the blood remaining in the bypass circuit should be washed through into the cell saver reservoir for processing.

4.4 LABELLING

All salvaged blood must be labelled clearly to include the patient's name, hospital number, date of birth, the date and time of collection, expiry time (4 hours post processing) and the name of the person carrying out the procedure. The volume of salvaged blood and volume of packed cells for re-infusion must also be recorded. The label must be clear and should state **"UNTESTED BLOOD: FOR AUTOLOGOUS USE ONLY"**. Pre-infusion checks remain mandatory and should be in accordance with the Trust policy for positive patient identification.

4.5 EQUIPMENT LOCATION AND MAINTENANCE

The cell savers will be stored within the Departments of Perfusion at the Royal Brompton and Harefield Hospitals for use within the theatre suites and the Intensive Care Units. All cell savers will be serviced and maintained in accordance with the manufacturers instructions. All repairs must be performed by qualified service technicians only, and a record of maintenance kept by the Chief Perfusionists at both hospitals.

The disposable equipment will be stored within the Departments of Perfusion under conditions between –40 and 54^0C and at 10 to 100% relative humidity (manufacturer's recommendations). Disposables must not be used beyond their expiry date.

4.6 SET UP OF EQUIPMENT

The disposables must be installed into the cell saver under aseptic conditions and only sterile 0.9% normal saline should be used as a wash solution in accordance with the manufacturers instructions.

4.6.1 Set Up for Standby

If it is not certain that enough blood will be recovered to make re-infusion worthwhile, set up for standby may be used. A straight reservoir outlet clamp is attached to the outlet port of the blood collection reservoir. The clamp should be closed until sufficient blood is collected to justify processing. Aspiration of blood from the wound can begin as soon as the anticoagulant is prepared, the suction assembly is attached to the top of the reservoir and the reservoir is connected to the vacuum source.

4.6.2 Set Up for Red Cell Recovery and Re-infusion

Once the decision has been made to process the blood, the processing set can be quickly installed into the cell saver and connected to the blood collection reservoir via the outlet clamp according to the manufacturers instructions.

4.6.2 Disposal of Used Cell Salvage Equipment

Following use, all cell salvage disposable equipment will be disposed of in accordance with the Trust Health and Safety Policy for the disposal of perfusion equipment contaminated with blood in sealed plastic medical waste containers.

4.6.3 Cleaning and Disinfection of Cell Salvage Machines

Following use all cell salvage machines will be cleaned in accordance with the Trust Infection Control Policy

5. RECORD KEEPING

A copy of the perfusion record will be filed in the patient's notes (RBH) or a record will be made in the notes that cell salvage has been used (HH). In both hospitals the original perfusion record will be stored in the Perfusion Offices by the perfusionist responsible for the case. This will contain details of the cell saver used, the type and amount of anticoagulant used, the volume of blood processed, the volume of blood re-infused, the operator name, procedure, date, and any complications or comments relating to the use of cell salvage. For audit and quality assurance purposes, this data will also be entered into the PATS database at both hospitals.

The anaesthetist will record on the anaesthetic paper record or CareVue the volume of red cells re-infused, details of bank blood, platelet, fresh frozen plasma and cryoprecipitate usage. Also available laboratory test results and any complications or comments relating to the use of cell salvage will also be entered on the anaesthetic paper record or Carevue.

6. QUALITY ASSURANCE

Specific areas in which audit may be appropriate include:

6.1 Procedure: (See Appendix 5- Machine Quality Assurance)

6.1.1 Patient selection – which patients are missed, equipment availability
6.1.2 Technical process – adherence to SOP
6.1.3 Wash efficiency – pre and post processing - white cell count, haemoglobin and free haemoglobin concentrations, and heparin concentration of blood before and after processing

6.1.4 Labelling of red cell re-infusion bags

6.2 Documentation:

6.2.1 Patient's notes – perfusion record, anaesthetic chart, PATS

6.3 Haematological Assessment of Patient:

6.3.1 Prothrombin time, activated partial thromboplastin time, fibrinogen, heparin concentration
6.3.2 Haemoglobin and free haemoglobin concentrations

6.4 Blood component use:

6.4.1 Blood, platelets, fresh frozen plasma, cryoprecipitate

6.5 Clinical outcome:

6.5.1 Blood loss (Carevue RBH)

Quality assurance data will be collected on all machines at each hospital each month, in order to monitor the safety and efficacy of the process.

The two Cell Salvage Working Groups will review all local quality assurance and audit data on a monthly basis. Those results that fall outside agreed limits (prothrombin time > 20sec, activated partial thromboplastin time >50sec, patient plasma heparin concentration > 0.1unit/ml, platelet count < 100 x 10^9/L free haemoglobin > 0.1g/l) will be discussed and if appropriate further action taken. The minutes for each cell salvage group will be made available to the other.

The machine quality assurance data and audit data if available will be published monthly with the minutes of the Cell Salvage Working Groups, in addition Mr S Davidson (RBH) and Dr D Cummins (HH) will keep a formal record of all quality assurance results. A summary of these results, in addition to general information regarding the service will be presented to the Harefield and Royal Brompton Hospitals Blood User Groups biannually.

7. TRAINING

All members of staff must receive formal training prior to performing intraoperative cell salvage and be able to demonstrate that they have attended an annual update to ensure continuing good practice. The Chief Perfusionists at both hospitals will maintain and hold the training records.

8. RESPONSIBILITIES AND REVIEW

The day-to-day management of perioperative cell salvage will be the responsibility of the Departments of Perfusion with a Consultant Anaesthetist providing overall clinical responsibility at each hospital. They, in conjunction with the Blood Users Group and the Cell Salvage Working Group, will be responsible for the development of protocols guiding the use of cell salvage, quality assurance and a formalised programme of training. The cell salvage working groups will report to their local Blood User Group twice per year to review the guidelines established, and the effectiveness of the programme.

The individual companies will be responsible the servicing of any equipment held by the Trust and written documentation of such maintenance will be kept by the Chief Perfusionist (RBH) and Chief Perfusionist (HH).

10. REFERENCES

1. Bélisle S, Hardy JF. Haemorrhage and the use of blood products after adult cardiac operations: Myths and realities. Annals of Thoracic Surgery 1996; 62:1908-1917.
2. Better Blood Transfusion. Health Service Circular 1998/224
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11. GLOSSARY OF TERMS

11.1 INTRAOPERATIVE CELL SALVAGE

A process by which blood is salvaged from a surgical wound, washed and the red blood cells re-suspended in saline and re-infused into the same patient.

11.2 MASSIVE TRANSFUSION

A situation in which the patient receives a blood transfusion greater than their calculated circulating volume within 24 hours.

APPENDIX 1

1.0 ADVANTAGES OF CELL SALVAGE

1.1 Decreased or avoidance of exposure to allogeneic blood

1.2 Lack of viral disease transmission

1.3 Reduced risk of alloimmunisation

1.4 Potentially unrestricted use in patients with moral, religious or haematological contraindications to the transfusion of allogeneic blood

1.5 Possible reduction in the immunosupressive effects of allogeneic transfusion.

1.6 Normal red blood cell oxygen carriage and 2,3 DPG levels

1.7 Removal of activated clotting factors and inflammatory cytokines

1.8 Normal potassium concentration

1.9 Cells re-infused are at room temperature

2.0 DISADVANTAGES OF CELL SALVAGE

Effective and safe cell salvage requires meticulous clinical practice including adherence to the manufacturer's operating instructions and the principles of this policy. Failure to observe this may increase the risk of the following complications:

2.1 Coagulopathy secondary to unrecognised dilution of platelets and clotting factors. N.B. the risk of developing dilutional coagulopathy in patients undergoing red cell salvage is no greater than the risk in those patients who receive similar volumes of bank blood.

2.2 Red cell lysis due to excessive suction or turbulence associated with the mixing of air with the blood during suctioning ("skimming").

2.3 Inadequate washing resulting in a significant level of free haemoglobin and stroma potentially leading to renal damage.

2.4 Air, fat or amniotic fluid embolism.

2.5 Sepsis secondary to the re-infusion of blood from a contaminated wound.

2.6 The theoretical risk of disseminated malignancy if tumour cells are aspirated and re-infused (see appendix 3).

2.7 Hypocalcaemia may occur when large volumes of unwashed citrated (rather than heparinised) salvaged blood are re-infused into patients with liver impairment.

APPENDIX 2

MANUFACTURER'S INSTRUCTION MANUALS

The manufacturer's instruction manuals for the Brat II cell savers (RBH) and the Medtronic ATLS Systems (HH) will be kept in the Departments of Perfusion at the appropriate hospital where they may be accessible for reference at any time.

APPENDIX 3

Cell Salvage Standard Operating Procedure for Routine Cardiac Surgery

Harefield Hospital
Medtronic AutoLog

Universal Precautions and aseptic technique must be used at all times.

3.1Setup of Disposables:

3.1.1 OPCAB Surgery, J Gaer or by request only

- 3.1.1.1 Check integrity and sterility of collection only packaging
- 3.1.1.2 Assemble reservoir, clamp outlet and attach vacuum tubing
- 3.1.1.3 Prepare anticoagulation solution: 30,000i.u heparin in 1000mls 0.9% saline solution or for shorter cases: 15,000i.u heparin in 500mls 0.9% saline solution

3.1.2. Bypass Surgery

- 3.1.2.1 Follow steps a – c as above
- 3.1.2.2 Load processing set according to manufacturer's instructions
- 3.1.2.3 Ensure outlet to waste bag is open and outlets of transfusion bag closed
- 3.1.2.4 Use litre bags of 0.9% saline as the wash solution
- 3.1.2.5 Check cell saver set for new patient with volume on 0 mls

3.2 Collection:

- 3.2.1 Attach sterile suction tubing from operating table to reservoir
- 3.2.2 Apply vacuum of 100mmHg by pressing "vacuum" button on cell saver
- 3.2.3 Connect anticoagulation solution to second lumen of suction tubing
- 3.2.4 Allow 100mls of anticoagulation solution to collect in reservoir
- 3.2.5 Reduce anticoagulation solution drip rate to 1 drop/second

3.3 Processing:

- 3.3.1 Process the contents of the reservoir when the blood volume exceeds 500mls
- 3.3.2 Press "Go" processing button
- 3.3.3 Continue automatic processing until reservoir is empty
- 3.3.4 If final bowl is not full press "final cycle" button to complete filling of bowl by returning cells from the holding bag to the centrifuge and beginning the wash cycle
- 3.3.5 When processing is complete purge air from reinfusion bag by selecting "purge" option from special menu

3.4 Reinfusion:

- 3.4.1 Clamp inlet and disconnect reinfusion bag from processing set
- 3.4.2 Ensure patient ports are clamped and inlet capped
- 3.4.3 Attach blood transfusion filter to patient port

3.4.4 Complete label supplied and fix to reinfusion bag including patient name, hospital number, volume of red cells, date and time of collection and expiry time (4 hours later)

3.4.5 Give to anaesthetist for reinfusion

3.4.6 Record cell salvage details on perfusion record, in PATS and write volume on salvaged blood sticker and put on anaesthetic chart

3.5 Disposal:

3.5.1 Remove disposables from cell saver and discard in yellow bin for contaminated waste

3.5.2 Wipe cell saver machine with universal surface cleaning wipes.

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APPENDIX 4

Cell Salvage Standard Operating Procedure for Routine Cardiac Surgery

Royal Brompton Hospital
Brat II

Universal Precautions and aseptic technique must be used at all times.

4.1 Setup of Disposables:

4.1.1 OPCAB Surgery Only:

4.1.1.1 Check integrity and sterility of collection only packaging

4.1.1.2 Assemble reservoir, clamp outlet and attach vacuum tubing

4.1.1.2 Prepare anticoagulation solution: 40,000i.u heparin in 1000mls 0.9% saline solution

4.1.2 Bypass Surgery:

4.1.2.1 Follow steps a – c as above

4.1.2.2 Load processing set according to manufacturer's instructions

4.1.2.3 Use litre bags of 0.9% saline as the wash solution

4.1.2.2.4 Check cell saver menu for "new case" (tally should equal zero)

4.1.2.2.5 Set up for protocol 363

4.2 Collection:

4.2.1 Attach sterile suction tubing from operating table to reservoir

4.2.2 Apply vacuum of 100mmHg by pressing "vacuum" button on cell saver

4.2.3 Connect anticoagulation solution to second lumen of suction tubing

4.2.4 Allow 100mls of anticoagulation solution to collect in reservoir

4.2.5 Reduce anticoagulation solution drip rate to 1 drop/second

4.3 Processing:

4.3.1 Process the contents of the reservoir when the blood volume exceeds 600mls

4.3.2 Press "automatic" processing button

4.3.3 Continue automatic processing until reservoir is empty

4.3.4 If final bowl is not full press "concentrate" button to complete filling of bowl

4.3.5 When processing is complete purge air from reinfusion bag by selecting "purge" option from special menu

4.4 Reinfusion:

4.4.1 Clamp inlet and disconnect reinfusion bag from processing set

4.4.2 Ensure patient ports are clamped and inlet capped

4.4.3 Attach blood transfusion filter to patient port

4.4.4 Complete label supplied and fix to reinfusion bag including patient name, hospital number, volume of red cells, date and time of collection and expiry time (4 hours later)

4.4.5 Give to anaesthetist for reinfusion
4.5.6 Record cell salvage details on Perfusion record and in PATS

4.5 Disposal:

4.5.1 Remove disposables from cell saver and discard in yellow bin for contaminated waste
4.5.2 Wipe cell saver machine with universal surface cleaning wipes.

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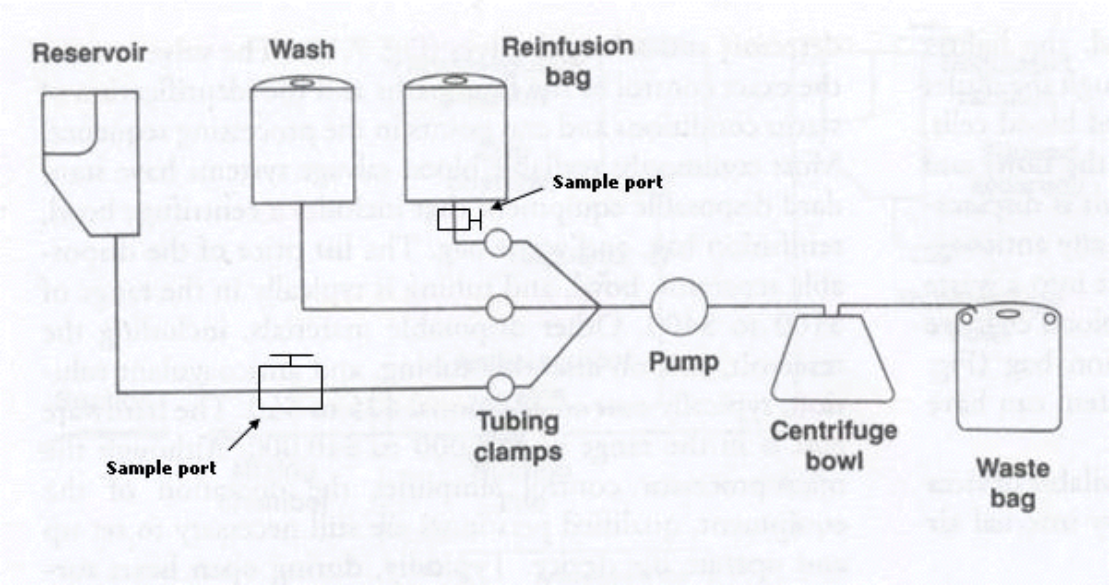
APPENDIX 5

Quality Assurance testing for cell salvage machines



Procedure:

5.1 Each machine will be tested every month:

5.1.1 Two connectors (3/16 x 3/16) with 3-way tap attached are inserted as shown in the diagram (sample ports)

1.1.2 10 ml samples will be drawn from the sample points as shown. Samples to be sent to haematology for the following tests:

1.1.3 Haemoglobin

1.1.4 White cell count

1.1.5 Free plasma haemoglobin

1.1.6 Heparin concentration

5.2 Blood Sample Request Form:

5.2.1 This will be completed by the Perfusionists

5.2.2 Clearly labelled as Cell Saver QA and the machine identified (Medtronic, Brat 2, A, B, C, D)

5.2.3 The form must be signed and dated

5.3 Labelling of Samples

5.3.1 For each set of tests, one EDTA Vacutainer tube (mauve) and one clotting Vacutainer tube (blue) should be used

5.3.2 The labelling should include the term pre wash or post wash (1, 2, etc) according to the source of the sample.

5.4 Sampling Technique:

5.4.1 The first sample should be taken from the reservoir, pre wash, when adequate mixing of the saline and blood has taken place.

5.4.2 The blood sample taken is injected into the EDTA and clotting tubes labelled pre wash.

5.4.3 Once the washing is complete 100mls of red cells should be allowed to enter the re infusion bag before taking post wash sample.

5.4.4 Repeat the above after each wash cycle.

5.5 Sample Reporting:

5.5.1 All quality assurance results will be presented at the monthly cell salvage meetings at both hospitals

5.5.2 The perfusion staff will be informed immediately of any abnormal results to allow further investigation.