20 Cell Salvage and Autologous Transfusion (CS)

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Definition:

Any adverse event or reaction associated with autologous transfusion including intraoperative and postoperative cell salvage (washed or unwashed), acute normovolaemic haemodilution or preoperative autologous donation.

In addition specific definitions for cell salvage events are as follows:

- **Adverse events due to operator error, machine failure and availability of trained staff where the event impacts on the care of the patient**
- **Adverse clinical events during the cell salvage process**
- **Pathological reactions to *reinfused* blood**

DATA SUMMARY
Total number of cases: n=12

Implicated components		Mortality/morbidity	
Red cells	12	Deaths definitely due to transfusion	0
Fresh frozen plasma (FFP)	0	Deaths probably/likely due to transfusion	0
Platelets	0	Deaths possibly due to transfusion	0
Cryoprecipitate	0	Major morbidity	0
Granulocytes	0	Potential for major morbidity (Anti-D or K only)	0
Anti-D Ig	0		
Multiple components	0		
Unknown	0		

Gender		Age		Emergency vs. routine and core hours vs. out of core hours		Where transfusion took place	
Male	7	≥18 years	9	Emergency	5	Emergency Department	0
Female	4	16 years to <18 years	0	Urgent	0	Theatre	0
Not known	1	1 year to <16 years	1	Routine	7	ITU/NNU/HDU/Recovery	0
		>28 days to <1 year	0	Not known	0	Wards	0
		Birth to ≤28 days	0			Delivery Ward	0
		Not known	2	In core hours	6	Postnatal	0
				Out of core hours	3	Medical Assessment Unit	0
				Not known/Not applicable	3	Community	0
						Outpatient/day unit	0
						Hospice	0
						Antenatal Clinic	0
						Other	0
						Unknown	12

(ITU=Intensive therapy unit; NNU=Neonatal unit; HDU=High dependency unit)

Twelve cases were reviewed and none were withdrawn. No cases were transferred to another chapter. There were no reports of adverse events related to acute normovolaemic haemodilution or preoperative autologous donation (the use of these autologous transfusion methods is almost non-existent within current UK practice since the European Blood Directive).

Specialty involved in the event

The following specialties were involved in the 12 cases reviewed:

- 5 were orthopaedic
- 5 were obstetric
- 1 was neurosurgery
- 1 was vascular

Type of cell salvage

- In 8 cases intraoperative cell salvage was involved
- In 3 cases postoperative cell salvage was involved
- In 1 case a combined system was used

Adverse reactions n=8

There were 8 adverse reactions reported this year. Two reactions occurred in postoperative systems and one in a combined system (postoperative phase) where the reporters classed the reactions as minor morbidity. In these three cases the patients displayed rigors and hypotension. Five reactions occurred where intraoperative cell salvage was being undertaken and in none of these cases did the reporters class the reaction as major morbidity although all cases showed signs of severe hypotension. In the five cases of hypotension reported, four occurred during reinfusion of cell saved blood through leucodepletion filters (LDF) and in all cases the anticoagulant used was acid citrate dextrose (ACD). Three of these cases are described in the vignettes below. The fifth case was an orthopaedic procedure where the patient was undergoing a revision hip replacement. The hypotension was associated with the reinfusion of the intraoperatively collected blood following washing and filtration. In this instance no LDF was used and the anticoagulant used was heparin.

Case 1: Hypovolaemia related to leucodepletion filter use in obstetrics (1)

A young woman was taken to theatre for resuscitation, laparotomy and hysterectomy. The haemorrhage was surgically under control and the patient haemodynamically stable. Cell salvage was used and while reinfusing autologous blood, the patient became profoundly hypotensive (systolic pressure 60mmHg) which was corrected with vasopressors, fluids, and the patient's observations normalised. The autologous blood reinfusion was recommenced and again immediate hypotension occurred. It was therefore assumed to be related to the LDF. The filter was removed and autologous blood reinfused without problem. The patient remained intubated and ventilated postoperatively in ITU.

Case 2: Hypovolaemia related to leucodepletion filter use in obstetrics (2)

The patient's blood was collected using cell salvage during an emergency caesarean section. After the procedure the patient was haemodynamically stable but had lost a reasonable amount of blood which was processed and 800mL given back to the patient again through an LDF. After about 15 minutes of commencing the cell salvage reinfusion (estimated 100mL) the patient became hypotensive and with a systolic blood pressure of <90mmHg, the patient felt dizzy and nearly fainted. The transfusion was stopped and the blood pressure returned to a normal value and the dizziness settled. The patient also stated that she felt her vision was blurry and she developed a mild facial rash, all of which resolved after stopping the transfusion.

Case 3: Hypovolaemia related to leucodepletion filter use in tumour removal

A patient was undergoing removal of a giant nerve sheath tumour from the lumbar spine region and the intraoperatively collected blood was filtered through an LDF because of the malignant nature of the tumour. Hypotension occurred on reinfusion.

Description of these cases has been included to make clinicians aware and vigilant of similar adverse reactions when using leucocyte depleting filters (LDF) combined with cell salvage and to encourage reporting to SHOT if they occur.

Adverse events n=4

There were four reports in this category. Two were related to machine failures and therefore no blood could be processed or reinfused. In another case black particulate material was noted in the processed blood. In the fourth case the infusion of postoperative autologous blood continued well outside the specified time.

COMMENTARY

Again this year we have reports of significant hypotension which is managed by stopping the reinfusion of cell salvaged red cells. In one of the cases the link with LDFs became more obvious when the reinfusion of salvaged blood was continued without the LDF and no hypotension occurred. This is a recognised complication which may be related to elevated levels of interleukin 6 [71], and is reviewed by Sreelakshmi [72].

Learning points

- The use of leucodepletion filters (LDF) with cell salvaged blood can, rarely, cause significant hypotension
- Stopping the infusion and resuscitation with fluids and vasopressors may be necessary although all reports describe only transient hypotension
- In cases where there is brisk haemorrhage and the blood is needed, try infusing without the LDF

Recommendations

- Ensure that all cell salvage users in your institution are made aware of this complication and the simple measures that need to be taken should it occur

Action: Hospital Transfusion Committees (HTC), Hospital Transfusion Teams (HTT)

- Ensure all cases of serious reactions are reported to SHOT via the hospital transfusion team

Action: HTTs, Operating Department Practitioners, Cell Salvage Operators

- Consider where a machine failure occurs, which is not due to operator error, these are reported to the Medicines and Healthcare products Regulatory Agency (MHRA) under the Medical Devices reporting scheme

Action: Cell Salvage Operators, HTTs

Recommendations still active from previous years are available in the 2013 Annual SHOT Report Supplement located on the SHOT website, www.shotuk.org under SHOT Annual Reports and Summaries, Report, Summary and Supplement 2013.