21. 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 pre-operative autologous donation.

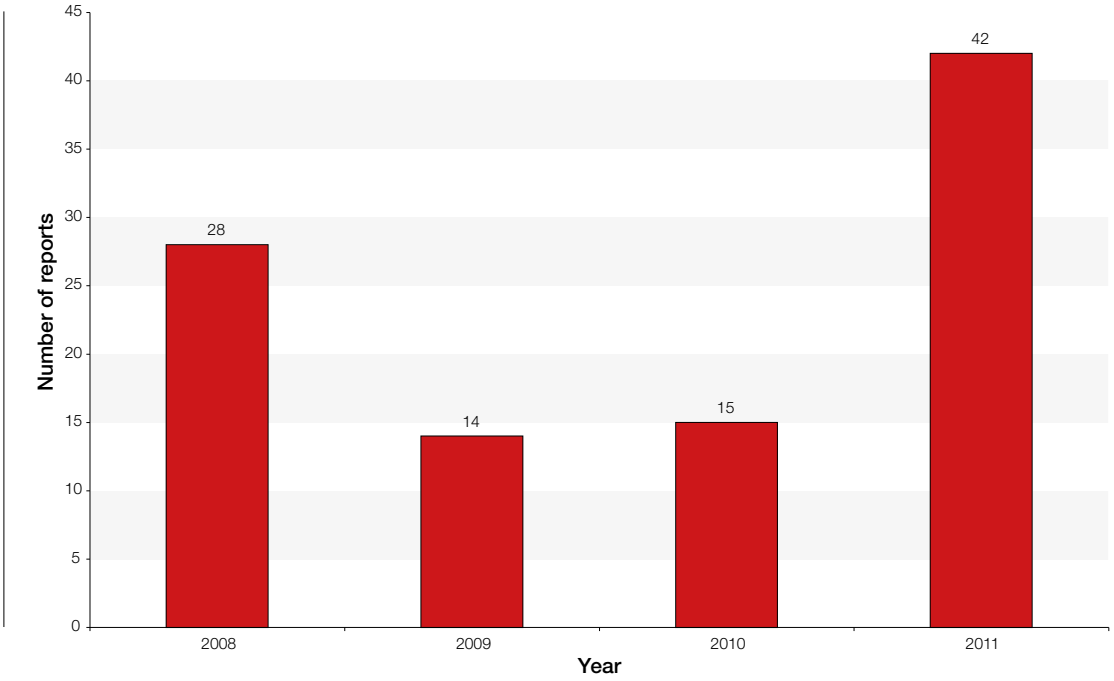
DATA SUMMARY - CELL SALVAGE
Total number of cases: 42

Implicated components		Mortality/morbidity	
Red cells	42	Deaths *probably/likely* due to transfusion	0
FFP	0	Deaths *possibly* due to transfusion	0
Platelets	0	Major morbidity	0
Other (granulocyte)	0		
Unknown	0		

Gender		Age		Emergency vs. routine and core hours vs. out of core hours		Where transfusion took place	
Male	24	≥ 18 years	40	Emergency	5	A&E	0
Female	16	16 years to <18 years	0	Routine	37	Theatre	0
Not known	2	1 year to <16 years	0	Not known	0	ITU/NNU/HDU/Recovery	0
		>28 days to <1 year	0			Wards	0
		Birth to ≤28 days	0	In core hours	29	Community	0
		Not known	2	Out of core hours	11	Outpatient/day unit	0
				Not known	2	Not known	42

There were 42 cell salvage reports (intraoperative and postoperative) submitted this year. There were none submitted related to adverse events whilst undertaking acute normovolaemic haemodilution (ANH) or preoperative autologous donation (PAD). Both these techniques are rarely undertaken and their use not routinely recommended. The 42 reports were submitted by 22 different Trusts/Health Boards. The increased numbers submitted this year probably reflect the increased awareness of the requirement to report to SHOT.

Figure 21.1
Autologous adverse events



Adverse events by type of autologous transfusion

Post operative cell salvage (PCS) – 25, intraoperative cell salvage (ICS) - 17, Combined - 0

Adverse events by specialty

Orthopaedic - 28, Obstetrics – 5, Urology – 2, Cardiac – 2, Gynaecology -1, General surgery – 2 and Vascular surgery – 2

Incidents

Postoperative Cell Salvage (PCS) n=25

In this category the following reports were filed:

- 8 reactions with varying reports of rigors, dyspnoea, hypertensive episodes and feeling unwell.
- 8 equipment not assembled correctly
- 7 paperwork not completed correctly - this included information on patient identification and/or time of collection
- 2 other

Case 1

Air in the reinfusion line

A patient was admitted for total knee replacement. Following the procedure the patient went to the intensive therapy unit (ITU). The patient had a cell salvage autologous drain in-situ. The nurse in ITU had received no training in the use of these drains or how to reinfuse red cells from them. The nurse continued and reinfused the blood from the drain but did not retro-prime the line. He/she then decided to put the salvaged blood through a pressure bag which is contra-indicated. At the end of the infusion the member of staff noticed air had been infused into the patient. The patient became very unwell and subsequently had a cerebrovascular accident (CVA).

Based on the report, this is probably not a major morbidity due to cell salvage and the CVA was not related to the transfusion.

Learning points

- Only staff who have been trained and shown to be competent in using cell salvage equipment should administer red cells collected by autologous equipment.
- Regardless of the component being transfused staff need to be vigilant to avoid air in the giving set.

Intraoperative cell salvage (ICS)

Events of varying clinical severity were reported. These included 2 febrile reactions and 6 adverse events, all of which had an element of hypotension, but only one that had a serious adverse reaction. The remainder were classed as minor morbidity. There were 9 events reported to be related to equipment or operator error.

Table 21.1 Hypotensive reactions and use of leucodepletion filter (LDF)

Cases	Gender	Age	Clinical specialty	Anticoagulant
1	F	28	Gynaecology	ACD
2	F	32	Obstetrics	ACD
3	F	24	Obstetrics	Heparin
4	F	NS	Urology	NS
5	F	38	Obstetrics	ACD
6	F	39	Obstetrics	ACD

This report again identifies hypotensive reactions associated with LDF when re-infusing cell-salvaged red cells. However for the first time this year there is a hypotensive reaction involving ICS use with LDF when heparin was used as the anticoagulant. Only one of these hypotensive events resulted in a clinical reaction requiring ITU admission. Anaphylaxis was suspected at the time but serum mast cell tryptase was negative suggesting the hypotension may have been secondary to the infusion of cell-saved blood again via a LDF. In one of the other cases the hypotension was reported but on removal of the filter a further 1.5 litres of cell saved blood was infused without problem. In all cases a full recovery was made with no long-term morbidity.

This phenomenon had been acknowledged and noted in the Association of Anaesthetists Great Britain and Ireland (AAGBI) cell salvage guideline and in the Medicines and Healthcare products Regulatory Agency (MHRA) “one liner”[69]. (This is a news sheet aimed at healthcare professionals, which highlights problems with the use of medical devices[70]). There is as yet no further evidence to show whether these events are actually related to the use of the filter.

It is important that hypotension with the use of a leucodepletion filter is recognised as a possible adverse event and may be treated by discontinuation of the infusion of the salvaged red cells and appropriate vasopressors.

Learning point

- Monitoring of patients is as important for the reinfusion of red cells collected by intraoperative cell salvage (ICS) or postoperative cell salvage (PCS) as it is for allogeneic red cells.

A case involving ICS is commented on in the Inappropriate, Unnecessary or Under/Delayed Transfusion (I&U) chapter (Case 2 Chapter 9). During the operation 3279mL of salvaged blood were reinfused (equivalent to approximately 13 units) to the patient, in addition to 18 units of allogeneic blood, 8 units of fresh frozen plasma, 3 units of platelets and 2 units (one therapeutic dose) of cryoprecipitate were given. The post-operative Hb showed a haemoglobin result of 19.1g/dL and deranged coagulation results.

Learning point

- Intraoperative cell salvaged red cells and allogeneic red cells have no associated coagulation factors and it is absolutely essential to monitor haemoglobin and coagulation tests and to replace coagulation factors in these massive blood loss cases.

COMMENTARY

There have been several cases reported this year where the autologous blood has not been labelled with the correct patient identification. In some cases this has been noted by staff in the clinical area prior to reinfusion but not always. Patient identification is critical step in any clinical intervention and patients undergoing autologous transfusion must have the red cells for reinfusion fully labelled with the appropriate patient identification and other necessary information.

Learning point

- Maintaining the correct patient identification is a critical point in the process.

Recommendations

- All intraoperative cell salvage (ICS) and postoperative cell salvage (PCS) related adverse events and reactions should be reported to SHOT. Hospital Transfusion Teams (HTT) should develop a process to ensure all these events are reported to SHOT.
- Training and competency for cell salvage operators should be in place in all organisations where cell salvage is undertaken.
- Replacement of coagulation factors is essential when reinfusing large volumes of salvaged red cells.
- The use of the UK Cell Salvage Action Group label is recommended for both ICS and PCS red cells for reinfusion allowing all necessary patient information and collection information to be documented[71] (These labels are supplied by the manufacturers of both intra and postoperative systems).

  Action: HTTs, Cell Salvage Teams; Anaesthetists

For active recommendations from previous years and an update on their progress, please refer to the SHOT website