Cell Salvage n=20

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Definition:

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

Twenty cases were reported; on review none were withdrawn, transferred to another section or transferred in from another section. This chapter describes the main findings from 20 completed questionnaires.

There were no reports submitted during this reporting period which related to adverse events whilst undertaking acute normovolaemic haemodilution (ANH) or preoperative autologous donation (PAD).

Cell salvage adverse events

The collection of adverse events related to autotransfusion is now in its 8th year and reports have been entirely related to cell-salvage autotransfusion. A pattern has developed showing events related to vasoactive responses to reinfused blood particularly related to the use of leucocyte depletion filter (LDF). During the 2015 reporting year there were 3 instances of major morbidity reported requiring intensive care admission, 5 minor morbidities and in the remaining 12 cases there were no clinical consequences. All 3 patients requiring intensive care survived.

Specialty

Obstetric operations had the most reported cases with 9 reports related to use of cell salvage in caesarean section and there were 4 cases related to orthopaedic surgery. There were 2 gynaecology and 3 urology reports. Unusually there was one case of cell salvage used during cardiac catheterisation and another during bleeding for an abdominal procedure post splenectomy.

Type of cell salvage

Intraoperative cell salvage (ICS) involved 18 patients and there was only one report related to postoperative cell salvage (PCS) and one case where both ICS and PCS had been used.

Operator error

Five of the reports involved failure to set up the equipment correctly, ignoring sensors and warnings. One operator was suspended as a result of incorrect assembly of equipment and use.

Clinical adverse events

It should come as no surprise that human errors are as likely during collection, preparation and the administration of autologous blood as with allogeneic blood components. This year there were incidents related to wrongly labelled autologous blood and human error or violation of procedure when setting up the disposable components of the cell salvage equipment.

Yet again hypotensive reactions were observed when cell-saved blood is reinfused via a LDF. It was reassuring however that there was no mortality as a result of these events and the immediate clinical responses were appropriate and timely.

When the blood was clinically needed the LDF was removed and the blood transfusion continued. In addition the investigation of the clinically adverse events took into consideration the advice and suggestions included in previous Annual SHOT Reports and one such case is outlined below.

A clinically significant event included the use of a LDF in a patient undergoing radical cystectomy. The initial hypotension was coincident with re-infusion of cell-saved blood, but the patient remained hypotensive after stopping the cell-saved blood. When the situation was assessed in retrospect it was thought that overall blood loss and the fact the patient was routinely receiving an angiotensin-converting-enzyme (ACE) inhibitor had contributed to the longer period of hypotension. He made a complete recovery but required a period of observation postoperatively on intensive care.

Another event resulting in major morbidity and intensive care admission was as a result of cell salvage not being set up early enough during a caesarean section. As a consequence not all salvageable blood was collected and this resulted in a low haemoglobin level in the woman after the surgical intervention and need for close observation. She survived the event.

One adverse report related to the anaesthetist's instruction NOT to use a LDF as the blood reinfused too slowly via such a filter. The collected blood was reinfused without a LDF and there were no clinical problems.

Case 26.1: Cell salvage for an obstetric complication associated with disseminated intravascular coagulation (DIC)

A woman with a low lying placenta and a history of a previous myomectomy was undergoing a lower segment caesarean section. The initial procedure appeared relatively uneventful and the woman's transfusion requirements included a single bag of packed red cells and 770mL of cell-saved blood.

Two hours later the patient developed gum bleeding and experienced a 600mL haematemesis and the laboratory findings revealed an extremely low fibrinogen especially for a woman at term and in addition activated partial thromboplastin time ratio (APTT-R) and international normalised ratio were both elevated at 2.3 and 2.4 respectively. Her platelets had dropped to 96x10^9/L.

A diagnosis of DIC was made and the woman treated with 4 units of packed red cells, 2 pools of cryoprecipitate, 3 units of fresh frozen plasma and an adult unit of platelets. She underwent hysterectomy for Couvelaire syndrome (haemorrhage that penetrates into the uterine myometrium forcing its way into the peritoneal cavity).

Comment: Previous adverse reactions during the administration of cell-saved blood have mainly involved an immediate hypotension reversed by stopping the infused cell saved red blood cells, clear fluid resuscitation with the use of an intravenous vasoconstrictor. It has been postulated that the presence of free cytokines have led to profound vasodilation, which is treatable and the effect is only transient due to the short half-life of the vasoactive cytokines. In all cases a LDF has been used and where the red cells were urgently needed the LDF was removed and the remaining cell salvaged red cells were infused successfully. No cases of amniotic fluid embolus have been reported.

The case above is unlikely to be directly related to the cell salvage. The time scale of development of bleeding suggests a different aetiology for deranged coagulation and very low fibrinogen. The correction of the low fibrinogen with FFP and cryoprecipitate supports this theory and there are case reports of this obstetric complication associated with hypofibrinogenaemia in the literature (McHenry 1956, Cheng and Lin 2008). The administration of a platelet transfusion was probably not necessary, unless the woman had been taking medication to interfere with platelet activity; a platelet count of 90x10^9/L even in the presence of haemorrhage should have been sufficient. This is a rare obstetric complication and hysterectomy is not usually necessary (Rathi et al. 2014).

General comments arising from cell salvage reports

It is reassuring that close observation of cell-salvage autotransfusion via the SHOT reporting system has not identified any mortality related to its use. Furthermore the observation that significant hypotension can occur when LDFs are used has identified serious adverse events and allowed widespread dissemination of knowledge of this problem allowing practitioners to develop and publicise clinical responses that can help treat the adverse event. It needs to be stated that the awareness of this problem amongst obstetric anaesthetists using intraoperative cell salvage gives further reassurance that the possible risk of amniotic fluid embolism amongst this population of pregnant women when receiving reinfused cell-saved blood does not seem to be a problem with no reports received yet attributing the hypotension to this condition. It is worth restating that there have been NO reported deaths as yet associated with the use of cell-salvage autotransfusion.

Recommendations

- All cell salvage operators must undertake initial and regular update training and be assessed as competent (there should be documented evidence of competence in the form of a training record)
- All bags of cell salvage blood must be fully labelled with the patient identification and unique case number
- All hospitals where intraoperative cell salvage (ICS) and postoperative cell salvage (PCS) are undertaken should report adverse events to SHOT
- Monitoring of patients is as important for the reinfusion of red cells collected by ICS or PCS as it is for allogeneic red cells
- Practitioners need to revisit previous Annual SHOT Reports particularly related to autologous transfusion to ensure historic incidents are not repeated

Action: Cell salvage teams

References

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