

Intraoperative Cell Salvage: Under Used and Under-Appreciated?

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DESCRIPTION

It is well documented that Intraoperative Cell Salvage (ICS) is a cost-effective, safe, and viable alternative to allogeneic transfusions [1]. It enables replacement of blood lost surgery without the incumbent risks of donor blood. A comprehensive meta-analysis, in 2016, showed that ICS use enables avoidance of allogeneic erythrocyte transfusions, and its associated risks; better recovery and a reduced length of stay in the hospital [2,3]. Compared with stored allogeneic red cells, ICS red cells retain their elliptical profiles and their deformability better, they have higher concentrations of 2,3-diphosphoglycerate and ATP and thus provide superior tissue oxygen delivery [4]. Transfusion of allogeneic blood products is expensive and is associated with well documented risks. Allogeneic blood relies on a precious, limited resource. In October 2022, an amber alert for the stocks of red blood cells was issued by National Health Service (NHS) Blood and Transplant in England, highlighting the fragility of this system and the need to find strategies to conserve expensive blood stocks [5].

The UK Cell Salvage Action Group (UKCSAG) supports establishment of intraoperative cell salvage and provides training resources for cell salvage operators [6], UKSCAG designed a survey to estimate the extent of ICS use, volumes of blood reinfused, service delivery models, staff training and governance arrangements. The survey was conducted in 2021 to assess practice in 2019, pre-pandemic [7]. The survey demonstrated that ICS use is widespread across UK hospitals, but data collection is inconsistent and incomplete. Despite this the data showed that ICS had been setup in at least 22,382 cases. Only 38 out of the 92 centres were able to provide a complete dataset. A total of at least 8800 units of blood were reinfused with a median reinfusion rate of 56%. Although this cannot be equated to exact number of allogeneic transfusions avoided, it is obvious that ICS makes a significant contribution to patient blood management and helps reduce the demand on our transfusion services. However, despite this the impact of ICS remains unrecognized by blood transfusion services across the UK [7].

Although, the UKCSAG provides resources for education and training, and there are guidelines from both National Institute for Health and Care Excellence (NICE) and the association of anesthetists, there remains a lack of regulation of the use of cell salvage by a national body at present. Perhaps, having a national framework will increase the use of cell salvage with improved consistency and improve patient safety. The lack of consistent data collection means that an accurate assessment of the full impact of ICS on transfusion services remains impossible. However, even with incomplete data, it evidently has a significant impact on this precious and limited resource. Of concern, a lack of governance within a number of ICS services was evident. Quality assurance of ICS was undertaken by only 29% of responding centres. Frequency of testing and parameters tested varied significantly. There was also variation in the reporting and management of adverse events, with wide underreporting to Serious Hazards of Transfusion (SHOT) [8].

Cell salvage safety concerns and contraindications

Despite the UKCSAG survey showing underreporting to SHOT, the safety profile of cell salvaged blood is high [9]. There is no risk of transmission of viruses such as virus Creutzfeldt-Jakob Disease (vCJD) and there is complete avoidance of incompatibility reactions. The safety profile is further increased by the blood being processed and attached to the patient whilst within the operating theatre preventing administration of wrong blood to the wrong person; there are clear guidelines on the minimum information that must be labelled on the salvaged bag of blood. There are relatively few absolute contraindications to ICS-namely patient refusal and lack of availability of trained staff to operate the equipment. Of note cell salvaged blood should never be pressurized through a leukocyte depletion filter as this may result in significant hypotension.

Sepsis and infection cases

Sepsis is not an absolute contraindication to ICS use but where concerned, heavily contaminated fluids should be suctioned using a standard, non-ICS suction and a leukocyte depletion

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filter may be used when reinfusing blood. Cell salvage should also be avoided if there is heavy contamination of the surgical field with bowel contents [4].

Malignancy

Historically there have been concerns with using ICS in patients with malignancy, with the theory that malignant cells may be reinfused with a risk of metastases. A 2022 meta-analysis of current literature has reinforced the results of 2012 and 2020 meta-analysis, concluding that the outcome for patients receiving ICS blood was similar if not better than those receiving allogenic or no blood transfusion [10]. There is evidence that allogenic red blood cell transfusion is associated with cancer recurrence potentially due to dis-regulated recipient immune response [11]. NICE and the association of anaesthetist's guidelines currently recommend ICS use during urological surgery for malignancy [12,13].

Haemoglobinopathies

Haemoglobinopathies are a relative contraindication. ICS is not recommended in patients with Sickle Cell Disease (SCD) and processing and centrifugation would undoubtedly cause sickling and hemolysis in these patients [4]. There is no evidence of similar cell lysis in patients with sickle cell trait [14]. However, it has been suggested that if concerned, it would be safer to check the percentage of sickled cells in the collected blood prior to reinfusion.

CONCLUSION

In summary, although the initial cost of equipment and staff training may be high, the ongoing benefits and cost saving of appropriate use of autologous reinfusion cannot be ignored. Staff operating ICS equipment are most commonly members of the theatre team so no extra staffing should be required, also enabling the provision of a 24 × 7 service. The reduction in the demand on allogenic blood stocks and the associated cost would certainly be significant. There may be a reduction in post-operative (post-op) infection rates and hospital length of stay. Patients are not exposed to the risks of allogenic blood transfusion and the associated morbidity and mortality. Governance and patient safety are of utmost importance in

delivery of any service and therefore reporting of any adverse events to SHOT along with mandatory training for all those involved in operation of the cell salvage machine must be addressed. UKSCAG continue to urge all UK trusts to review their ICS services.

REFERENCES

1. Spahn DR, Muñoz M, Klein AA, Levy JH, Zacharowski K. Patient blood management: Effectiveness and future potential. *Anesthesiology*. 2020;133(1):212-222.
2. Meybohm P, Choorapoikayil S, Wessels A, Herrmann E, Zacharowski K, Spahn DR. Washed cell salvage in surgical patients: A review and meta-analysis of prospective randomized trials under PRISMA. *Medicine (Baltimore)*. 2016;95(31):e4490.
3. Palmer AJ, Lloyd TD, Gibbs VN, Shah A, Dhiman P, Booth R, et al. The role of intra-operative cell salvage in patient blood management for revision hip arthroplasty: A prospective cohort study. *Anaesthesia*. 2020;75(4):479-486.
4. Carroll C, Young F. Intraoperative cell salvage. *BJA Educ*. 2021;21(3):95.
5. NHS blood and transplant. Amber alert issued on blood stocks-existing O Neg and O Pos donors asked to make appointments. NHS. 2022.
6. UKSCAG. UK Cell Salvage Action Group. 2006.
7. Kumar MM, Choksey F, Jones A, Carroll C, Brownhill B, Cairns E, et al. Intraoperative cell salvage: A survey of UK practice. *Br J Anaesth*. 2024;132(5):995-997.
8. Serious hazards of transfusion. Annual reports (1996-2016).
9. Ashworth A, Klein AA. Cell salvage as part of a blood conservation strategy in anaesthesia. *Br J Anaesth*. 2010;105(4):401-416.
10. Frietsch T, Steinbicker AU, Horn A, Metz M, Dietrich G, Weigand MA, et al. Safety of intraoperative cell salvage in cancer surgery: An updated meta-analysis of the current literature. *Transfus Med Hemother*. 2022;49(3):143-157.
11. Remy KE, Hall MW, Cholette J. Pediatric critical care blood research network (Blood Net). *Transfusion*. 2018;58(3):804-815.
12. National Institute for Health and Care Excellence. Blood transfusion. NICE Guidance. 2015.
13. Klein AA, Bailey CR, Charlton AJ, Evans E, Guckian-Fisher M, McCrossan R, et al. Association of anaesthetists guidelines: Cell salvage for peri-operative blood conservation 2018. *Anaesthesia*. 2018;73(9):1141-1150.
14. Okunuga A, Skelton VA. Use of cell salvage in patients with sickle cell trait. *Int J Obstet Anesth*. 2009;18(1):90-91.