Intraoperative Cell Salvage

(things I think you need to know)

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The outline

- Is it value for money?
- Does it cause harm?
- How to maximise your yield?
- Does it have any flaws?
- Is it for everyone?

Is it cost effective ?

- The cost of the service
  - The machines are usually on a “ use plan”
  - Cost of consumables in dependent on usage and plan
  - Our cost for a full-setup
  - Cost of training
- The cost of red blood cells
  - Price of a unit of packed cells £125
  - Cost of blood transfusion training

Our cost savings in open AAA's

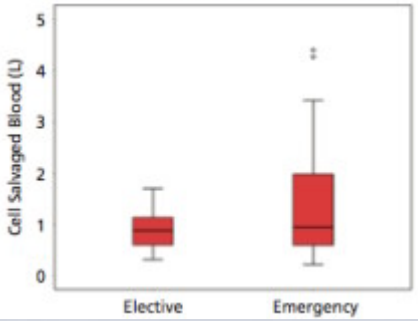
Results

- 41 patients were identified.
- Intraoperative cell salvage was implemented in all patients.
- Allogenic red cell transfusion was avoided in 73% of elective and 8% of emergency patients.
- The equivalent of 162 units of red cells were re-transfused using cell salvage.
- Estimated savings were £16,150 compared with allogenic blood transfusion.

Summary of results

	Elective	Emergency
n	16	25
Median (range) salvaged blood re-transfused	880 ml (305-1699)	945 ml (207-4400)
Equivalent allogenic packed red cell units "saved"	44	118
Cost of "saved" packed red cells	£5,500	£14,750
Cost of ICS disposables	£1,600	£2,500
Overall savings	**£3,900**	**£12,250**

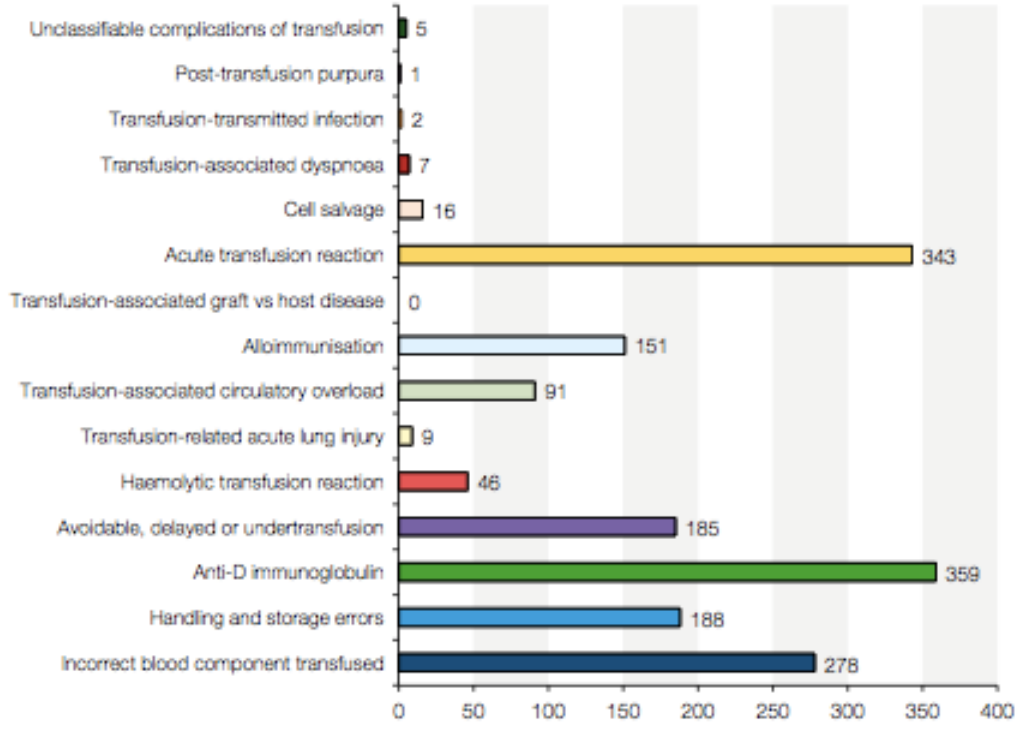
Salvaged blood re-transfused



Does it cause harm?

ANNUAL SHOT REPORT 2014 SUMMARY

Figure 2: SHOT cases reviewed in 2014 (excluding near miss and right blood right patient) for the cumulative data chart please see website www.shotuk.org

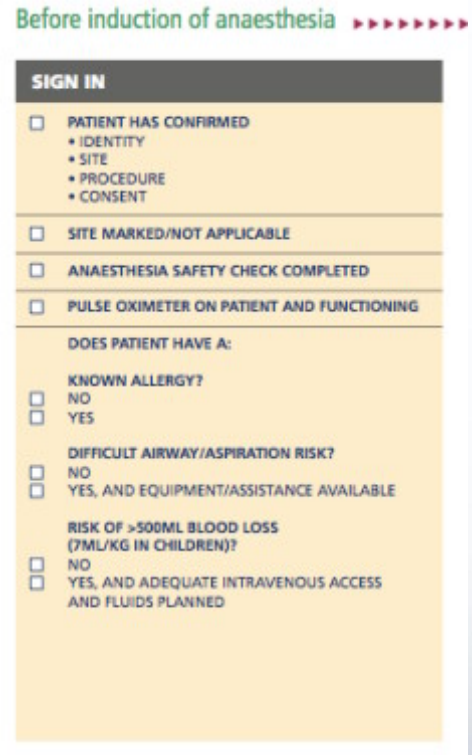


Details of the 16 cases

- Adverse reactions n=3
  - Post-operative cell salvage
  - 2 hypotension
- Excessive time to re-infuse n=2
  - Infused > 6 hours after collection
- Machine failure n=8
  - 4 leaking bowl
  - 3 suction failure
  - 1 non-specified
- Operator error n=1
- In commentary “ No fatality has been reported in either obstetric haemorrhage or use in urological surgery”

How to maximize your yield

Early decision



Before induction of anaesthesia ▸▸▸▸▸▸▸▸

SIGN IN

- ☐ PATIENT HAS CONFIRMED
  - IDENTITY
  - SITE
  - PROCEDURE
  - CONSENT
- ☐ SITE MARKED/NOT APPLICABLE
- ☐ ANAESTHESIA SAFETY CHECK COMPLETED
- ☐ PULSE OXIMETER ON PATIENT AND FUNCTIONING

DOES PATIENT HAVE A:

KNOWN ALLERGY?
- ☐ NO
- ☐ YES

DIFFICULT AIRWAY/ASPIRATION RISK?
- ☐ NO
- ☐ YES, AND EQUIPMENT/ASSISTANCE AVAILABLE

RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)?
- ☐ NO
- ☐ YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED

AAGBI recommendations

ICS is indicated in surgery with:

- Anticipated blood loss of >1000mls or >20% Estimated Blood Volume.
- Patients with a low Hb or increased risk factors for bleeding.
- Patients with multiple antibodies or rare blood types.
- Patients with objections to receiving allogeneic (donor) blood.

Swab washing

Sterile set-up

- Swab washing
  - About 50% of surgical loss is collected in swabs
  - Sterile bowl 1000mls of IV Normal Saline
  - Soak swabs and gently compress to remove excess
  - Aspirate swab wash solution during case or near end
  - Formula to calculate blood loss

Does it have any flaws ?

- Individual machines have different foibles
  - Newer generations much improved
- Biggest obstacle is reinfusion
  - Rapid reinfusion is an issue
  - Exacerbated in cancer and obstetric cases

How to increase flow rate

- You CANNOT pressurise the bag
- Place a 3-way tap and syringe in
- Utilise both outlets
- 2 blood giving sets
- Separate cannula or y-connector

The filter

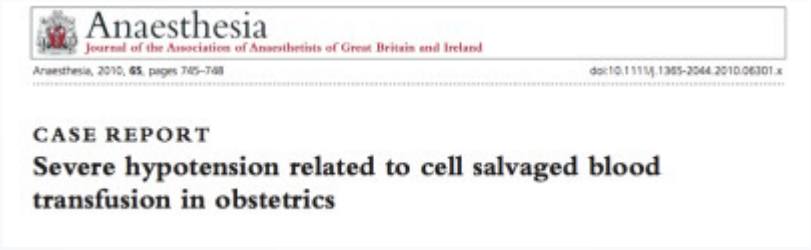
RS Leukocyte Reduction Filter for Intraoperatively Salvaged Washed Blood

For the filtration of a maximum of two bowls or 450 mL of intra-operatively salvaged, washed, and concentrated autologous blood.

The RS Leukocyte Reduction Filter is designed to reduce the levels of leukocytes, fat globules, and microaggregates.

- Provides 40 µm screen filtration in addition to leukocyte reduction (approximately 99%) and fat globule (approximately 84%) removal capability for a transfusable unit of wound drainage.
- Low residual blood hold-up volume (35 mL) ensures the highest recovery of blood component being transfused.
- Rapid flow capability averaging 80 mL/min at 300 mmHg.
- Latex-free.

More bother…..

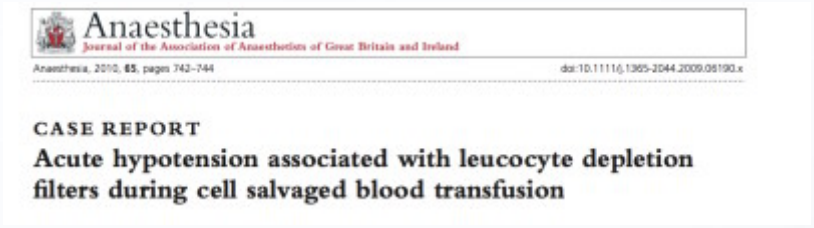


Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland

Anaesthesia, 2010, **65**, pages 745–748 doi:10.1111/j.1365-2044.2010.06301.x

CASE REPORT

Severe hypotension related to cell salvaged blood transfusion in obstetrics



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Anaesthesia, 2010, **65**, pages 742–744 doi:10.1111/j.1365-2044.2009.06190.x

CASE REPORT

Acute hypotension associated with leucocyte depletion filters during cell salvaged blood transfusion

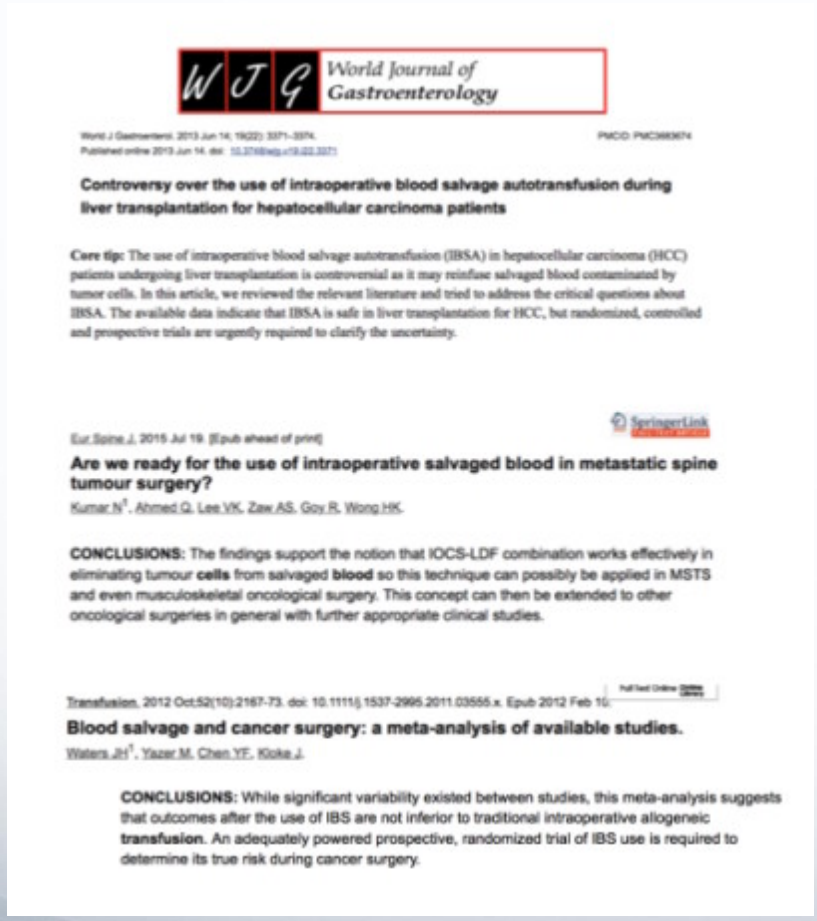
How to negotiate around this

- Transfuse as-you-go (start early)
- Use all the outlet ports
- Risk/benefit analysis
- Individual patient decision
- Consider abandoning the filter

Is it for everyone?

- Largest remaining controversy is malignancy
- Evidence is probably in favour of use
- No large RCT for definitive evidence
- Balanced by evidence of a worse outcome in patients who have allogenic blood in cancer surgery
- Recommended by NICE
- Individual considerations

An MDT decision



World Journal of Gastroenterology

Controversy over the use of intraoperative blood salvage autotransfusion during liver transplantation for hepatocellular carcinoma patients

Core tip: The use of intraoperative blood salvage autotransfusion (IBSA) in hepatocellular carcinoma (HCC) patients undergoing liver transplantation is controversial as it may reinfuse salvaged blood contaminated by tumor cells. In this article, we reviewed the relevant literature and tried to address the critical questions about IBSA. The available data indicate that IBSA is safe in liver transplantation for HCC, but randomized, controlled and prospective trials are urgently required to clarify the uncertainty.

Eur Spine J. 2015 Jul 19. [Epub ahead of print]

Are we ready for the use of intraoperative salvaged blood in metastatic spine tumour surgery?

Kumar N[1], Ahmed Q, Lee VK, Zaw AS, Goy R, Wong HK.

CONCLUSIONS: The findings support the notion that IOCS-LDF combination works effectively in eliminating tumour **cells** from salvaged **blood** so this technique can possibly be applied in MSTS and even musculoskeletal oncological surgery. This concept can then be extended to other oncological surgeries in general with further appropriate clinical studies.

Transfusion. 2012 Oct;52(10):2167-73. doi: 10.1111/j.1537-2995.2011.03555.x. Epub 2012 Feb 10.

Blood salvage and cancer surgery: a meta-analysis of available studies.

Waters JH[1], Yazer M, Chen YF, Kloke J.

CONCLUSIONS: While significant variability existed between studies, this meta-analysis suggests that outcomes after the use of IBS are not inferior to traditional intraoperative allogeneic **transfusion**. An adequately powered prospective, randomized trial of IBS use is required to determine its true risk during cancer surgery.

Clinicians wishing to undertake intraoperative red blood cell salvage during radical prostatectomy or radical cystectomy should ensure that patients understand the possible risks and benefits of the procedure compared with those of allogeneic blood transfusion, and provide them with clear, written information. In addition, use of the Institute's information for patients

Malignancy		
Primary at Operative site	Evidence indicates the procedure is safe and does not increase the incidence of metastatic disease. The decision to use cell salvage in malignancies must be left to the discretion of the surgeon.	Medical risks and benefits should be discussed between the surgeon and the lead clinician for cell salvage. Avoid blood recovery at tumour site. Consider the use of a leucoreduction filter.

In summary

- Is it value for money ? □
- Is it safe ? □
- Can you maximize your yield ? □
- Can you bypass the flaws ? □
- Is it for everyone ? □

Any questions?