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To salvage or not to salvage? A review of cell salvage at a tertiary centre at time of caesarean section between 2017 – 2021

Ahmadzai M[1], Sethna F[1]
The Canberra Hospital, Canberra, Australian Capital Territory, Australia

Background

In maternity settings, cell salvage use is recommended in deliveries where the anticipated blood loss is significant enough to cause anaemia requiring blood transfusion or to exceed 20% of estimated blood volume (1, 2), such as placenta praevia and placenta accreta spectrum (3). This audit sought to investigate the use of cell salvage at time of CS at our centre.

Methods

This was a retrospective case notes audit between 1/1/2017 – 31/12/2021. Inclusion criteria included women who underwent elective or emergent CS section where cell salvage was utilised. The control group included women who had a CS with a large volume blood loss ≥ 1.5L where cell salvage was not utilised. Outcomes measured included use of allogenic blood transfusion and intensive care admission.

Results

In the study period, there were 17964 births, of which 5952 (33.1%) were CS. The major primary post-partum haemorrhage (PPH) rate amongst this cohort was 4.9%. 250 women had a major PPH >1.5L during CS and no cell salvage (4.2% of all CS births). There were 45 cases of cell salvage use (0.8% of all CS births). Demographic data for this group are shown in Fig 1.
The indications for cell salvage use are displayed in Fig 3.

Figure 1: Demographics of cell salvage group	
Age (years)	
20-29	11 (24.4%)
30-39	29 (64.4%)
40-49	5 (11.1%)
BMI (kg/m²)	
<18.5	4 (8.9%)
18.5-24.99	18 (40.0%)
25-29.99	10 (22.2%)
30 or more	13 (28.9%)
Gestation (weeks)	
≥37	28 (62.2%)
<37	17 (37.8%)
Parity	
0	16 (35.6%)
1	14 (31.1%)
2	7 (15.6%)
3	3 (6.7%)
4	3 (6.7%)
5	2 (4.4%)
Mode of previous birth	
Vaginal	8 (27.6%)
Caesarean	21 (72.4%)
Urgency of caesarean	
Emergency	8 (27.6%)
Elective	21 (72.4%)

Figure 2: Comparison of outcomes	
Group 1: CS with cell salvage (n=45)	
Mean blood loss	1536mL
ICU admission	4 (8.9%)
Allogenic red cell transfusion	8 (17.8%)
Group 2: CS with no cell salvage PPH ≥1.5L (n=250)	
Mean blood loss	2030mL
ICU admission	18 (7.2%)
Allogenic red cell transfusion	73 (29.2%)

In the cell salvage group:

- 8.9% of women received other blood products (n=4)
- 28.9% of women had an iron infusion postnatally (n=13)
- The median pre-operative haemoglobin was 119g/L. The median post-operative haemoglobin was 100g/L.
- 20% of women had a blood loss <500mL (n=9)
- In 35.5% of cases, insufficient sample was collected therefore no blood was auto-transfused. (n=16)
- The range of blood volume re-transfused was 24mL-1779mL (Fig 4)

CS at high risk of blood loss performed during study period

- 75% of placenta accreta spectrum CS received cell salvage (n=6). Of those that did not receive cell salvage, its use was planned in 1 of 2 cases and it is unclear why this did not occur.
- 41.6% of CS performed for placenta praevia utilised cell salvage. All cases where cell salvage was not used were booked as emergency procedures.

Figure 3: Number of cases of cell salvage utilisation at time of caesarean, by year

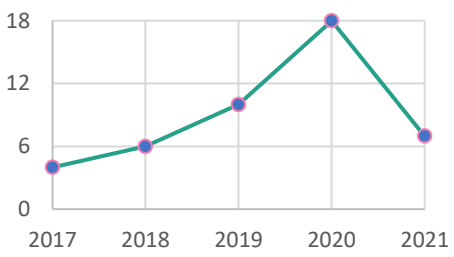
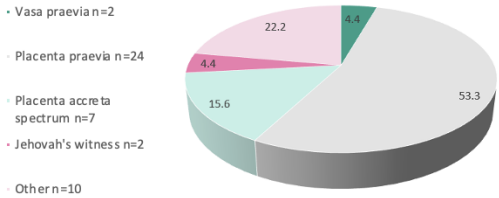
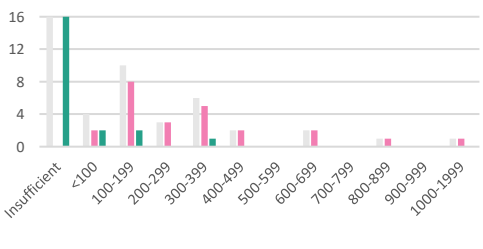


Figure 4: Indications for cell salvage use (%)



(classical caesarean, suspicion of abruption, suspicion of uterine rupture, previous PPH, anaemia, higher order caesarean)

Figure 5: Volume of blood (mL) collected and auto-transfused using cell salvage



Discussion

The cell SALvage in Obstetrics (SALVO) trial was a randomised non blinded, multicentre trial with cost-effectiveness analysis that compared cell salvage versus routine care without cell salvage in women undergoing caesarean section deemed at high risk of blood loss (4). Less women had allogenic transfusion in the intervention group, 2.5% compared to 3.5% amongst controls (OR 0.65. 95% CI 0.42 – 1.01, p = 0.056). There were no differences in secondary outcomes. The additional cost of routine cell salvage use was £ 8110 per donor blood transfusion avoided.

Similar to SALVO's findings, our audit demonstrated less allogenic blood transfusion in the cell salvage group. Rates of ICU admission were similar between the two groups. Although this sample was not sufficiently powered to demonstrate differences in outcomes, the results of this audit demonstrate promise with the use of cell salvage in our local context.

The cost of a single unit of packed red cell transfusion is $375.03. This is greater than the cost of cell salvage use at our institution, which totals $300.

Case selection appears to be largely for women deemed at high risk of blood loss, with placenta accreta spectrum and placenta praevia accounting for most cases of cell salvage use. Despite this, a significant proportion of placenta praevia CS at high risk of bleeding are not utilising cell salvage. This data indicates the need for further research to inform a standardised approach to and protocol for cell salvage utilisation.

It is likely that women who had cell salvage on the grounds that they may decline allogenic red cell transfusion (for example, Jehovah's witness women) are under-represented in this sample due to difficulty coding this data.

Cell salvage use appears to have increased each year at our institution, except for 2021. Several factors may contribute to this trend, including limitation of resources during the COVID-19 pandemic.

References

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(4) Khan KS, Moore P, Wilson M, Hooper R, Allard S, Wrench I, Roberts T, McLoughlin C, Beresford L, Geoghegan J, Daniels J. A randomised controlled trial and economic evaluation of intraoperative cell salvage during caesarean section in women at risk of haemorrhage: the SALVO (cell SALVage in Obstetrics) trial. Health Technology Assessment (Winchester, England). 2018 Jan;22(2):1.