

Cell Saver Use Does Not Improve Outcomes and May Increase Complications in Adult Spinal Deformity Surgery: A Propensity-Matched Analysis

Sleiman Haddad (Barcelona, Espagne), Lluís Vila (Barcelona, Espagne), Susana Núñez-Pereira (Barcelona, Espagne), Anika Pupak (Barcelona, Espagne), Alejandro Gomez-Rice (Madrid, Espagne), Javier Pizones (Madrid, Espagne), Philippe Charles (Strasbourg, France), Ibrahim Obeid (Bordeaux, France), Frank Kleinstück (Zurich, Suisse), Ahmet Alanay (Istanbul, Turquie), Ferran Pellisé (Barcelona, Espagne), (Essg) European Spine Study Group (Barcelona, Espagne)

Introduction

The use of cell saver (CS) is common practice in complex spine surgery, aiming to reduce the need for allogenic transfusions and associated risks. However, its true benefit and safety profile in adult spinal deformity (ASD) remain controversial. Our objective was to evaluate the impact of CS on transfusion requirements and postoperative complication rates in patients undergoing ASD surgery.

Materials and Methods

A propensity score-matched analysis was conducted to compare outcomes between patients who received CS and those who did not. The study cohort consisted of 1,093 ASD patients from a prospective, multicenter European ASD registry, resulting in 375 matched 1:1 pairs (n = 750) after matching. Matching variables included age, prior spinal surgery, baseline deformity parameters (relative sagittal alignment [RSA] and coronal curve magnitude), surgical complexity (number of fused levels, pelvic fixation, and osteotomies), and intraoperative blood loss, achieving adequate balance between groups (all p > 0.05).

Primary outcomes were transfusion rates and volumes—including intraoperative allogenic transfusions, CS transfusions, postoperative transfusions, and total blood loss—as well as complication rates and types. Additionally, threshold analysis stratified by intraoperative blood loss was performed to identify blood loss cutoffs where CS provided significant volume-sparing benefits.

Results

S use was associated with a lower volume of intraoperative allogenic transfusion (223 vs 335 mL). Paradoxically, the CS group exhibited a higher total volume of intraoperative transfusions (550 vs 335 mL) and a significantly higher rate of postoperative allogenic transfusion (26.7% vs 16.5%; 170 vs 113 mL). Furthermore, the total volume of allogenic blood transfused was increased in the CS group (714 vs 608 mL).The overall complication rate was significantly higher in the CS group (52.0% vs 40.0% NNH=8,3), primarily driven by minor complications (33.9% vs 26.7%). Notably, medical complications doubled in the CS group (22.9% vs 12.5%), while wound infection rate remained similar between groups (4.8% vs 5.1%). Threshold analysis did not identify any volume of blood loss at which CS was associated with a transfusion-saving benefit

Conclusion

Routine CS use in matched ASD patients did not reduce allogenic transfusions and was associated with a 30% relative increase in overall complications -mainly minor and medical. Prospective studies controlling for confounders such as preoperative hemoglobin, CS device type, and local transfusion practices, are needed to confirm these findings

Variable	No Cell Saver (n=375)	Cell Saver (n=375)	p-Value	Relative Difference
TRANSFUSION OUTCOMES				
Transfusion Rate (%)				
Postoperative Transfusion Rate	16.5%	26.7%	< 0.001	+62% (NNH: 9.8)
Allogenic Transfusion Rate (Total)	40.3%	47.2%	n.s.	+17%
Transfusion Volume (Mean)				
Intraop. Allogenic Volume (mL)	335 mL	223 mL	< 0.001	-112 mL
Cell Saver Volume (mL)	0 mL	327 mL	N/A	+327 mL
Total Intraop. Volume (Allogenic+CS)	335 mL	550 mL	< 0.001	+64%
Postop. Transfusion Volume (mL)	113 mL	170 mL	0.021	+50%
Total Transfused Volume (Global)	608 mL	714 mL	n.s.	+17%
GLOBAL COMPLICATIONS				
Any Complication (%)	40.0%	52.0%	0.001	+30% (NNH: 8.3)
Major Complications (%)	25.9%	32.3%	0.068	+25%
Minor Complications (%)	26.7%	33.9%	0.013	+27%
COMPLICATION TYPES				
Neurologic	7.5%	14.1%	0.003	+89% (x1.9)
Mechanical	30.4%	36.5%	0.183	+20%
Infectious	5.1%	4.8%	0.860	-6%
Medical	12.5%	22.9%	< 0.001	+83% (x1.8)
Reoperations	24.3%	26.7%	0.528	+10%
Readmissions	20.0%	22.1%	0.592	+10%

