

Introduction

Cardiovascular surgery still remains responsible for approximately 10-20% of all transfusions in the United States despite recent evidence demonstrating that transfusions are independently linked to increased short and long term morbidity and mortality. (1-3)

ECC circuits have long been viewed as a contributor to hemodilution but more recently considered as the cause of aminotransferase elevations of 1000–1500 units/l and hemolysis, and can be RAP’d (Retrograde Auto Primed) to reduce the hemodilution even further. Blood volume remaining in the ECC at aortic declination has been traditionally salvaged by either processing with a “Cell Saver” or the ECP, which reduces the patient's blood volume by more than a 260% increase. Saving autologous factors is critical & economical today. (4)

Use of this new technique offers advantages over the current technologies of salvaging blood from ECCs while offering the potential to improve patient outcomes. (2, 5-10) The Hemobag® is used successfully with Jehovah Witness patients. (12)

The Hemobag® is gaining ground successfully in cardiothoracic and vascular programs throughout the USA. Prospective clinical studies are ongoing focusing on blood avoidance, outcomes and costs when salvaging autologous whole blood with the use of the Hemobag®. So far the results show a strong causal-comparative relationship when using the Hemobag® where patients do much better when their blood is more concentrated perioperatively and less diluted by any kind of IV-intra-vascular volume replacement. (13)

Method

The Hemobag® technique is a new blood conservation method and technology that is FDA cleared for blood salvaging that deals directly with the aortic blood decanulation. It recovers and concentrates essentially all autologous whole blood and proteins from the ECC in a timely fashion for infusion, while maintaining the integrity and security of a safe primed circuit at all times. Use of the Hemobag® circuit allows for conventional ECC altration during the procedure and works with any commercial Hemocenters.

After IRB approval a total of 204 patients undergoing cardiac surgery with CPB at Salem Hospital (Salem, Oregon) were arbitrarily assigned the use of the Hemobag® Blood Salvage Device (Global Blood Resources, Somers, CT 06071). Data was analyzed using SPSS 13.0 (SPSS Inc., Chicago, IL 60606). Five patient outliers from each group in regard to blood product usage were removed prior to group comparisons. Figure Two explains the method in more detail.

Results

There were no significant differences between the two groups in regard to patient morphology and demographics. There was similar use of intraoperative ATS and preoperative ANH in both groups to enhance blood conservation.

The average volume returned to the patient from the Hemobag® was 852 ml (SD = 197 ml). The average time to fully concentrate the Hemobag® was 11 minutes. All blood fractions showed a statistically significant improvement from the baseline when concentration was achieved in the Hemobag®.

The Hemobag® Blood Salvage Device is a reservoir system that allows the patient’s own whole blood to be salvaged, hemoconcentrated, and infused back to the patient quickly, and can be RAP’d (Retrograde Auto Primed) to reduce the hemodilution even further. Blood volume remaining in the ECC at aortic declination has been traditionally salvaged by either processing with a “Cell Saver” or the ECP, which reduces the patient’s blood volume by more than a 260% increase.

More detailed results are presented in Table Two and Figures Three and Four.

Discussion

Infusion of the CPB circuit residual blood concentrate with the Hemobag® safety recovers proteins, clotting factors and cell volumes for all types of cardiac procedures which leads to reduced patient donor exposures, improved outcomes and reduction in the related costs.

Use of the Hemobag® allowed the clinicians to capture blood platelets and proteins that would have been normally discarded, (2, 5-8) Factor V, X, and FVII levels in the Hemobag® contents averaged more and can be RAP’d (Retrograde Auto Primed) to reduce the hemodilution even further. Blood volume remaining in the ECC at aortic declination has been traditionally salvaged by either processing with a “Cell Saver” or the ECP, which reduces the patient’s blood volume by more than a 260% increase.

The Hemobag® is gaining ground successfully in cardiothoracic and vascular programs throughout the USA. Prospective clinical studies are ongoing focusing on blood avoidance, outcomes and costs when salvaging autologous whole blood with the use of the Hemobag®. So far the results show a strong causal-comparative relationship when using the Hemobag® where patients do much better when their blood is more concentrated perioperatively and less diluted by any kind of IV-intra-vascular volume replacement.
Hemobag® Case Series Conclusions

HB vs. NHB group comparison:

- Significantly more Hemobag® patients received no blood products and experienced substantially less chest tube drainage.
- HB patients received about 1/4 less total donor exposures compared to control group, and had fewer average exposures to FFP, platelet packs, cryoprecipitate and RBC transfusions.
- HB patients experienced substantially lower pulmonary complications and significantly shorter hospital lengths of stay.
- HB patients tended to have higher hematocrit nadirs and higher post-operative platelet counts.
- HB technique retrieved and concentrated blood proteins including fibrinogen and precious clotting Factors VII, IX and X.
- The Hemobag® is an efficient technique in the treatment of Jehovah's Witness patient’s wishes & guidelines.
- Use of the Hemobag® is safe and effective, even when employed in conjunction with multiple blood conservation techniques.