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Blood mixture and the danger of discharge in patients experiencing heart medical procedure with extracorporeal dissemination

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Abstract

Patients undergoing cardiac surgery with extracorporeal circulation (ECC) frequently present haemorrhages as a complication associated with high morbidity and mortality. One of the factors that influence this risk is the volume of blood infused during surgery. The objective of this study was to determine the optimal volume of autologous blood that can be processed during cardiac surgery with ECC. We also determined the number of salvaged red blood cells to be reinfused into the patient to minimize the risk of haemorrhage in the postoperative period. Methods: This was an observational retrospective cross-sectional study performed in 162 ECC cardiac surgery patients. Data regarding the sociodemographic profiles of the patients, their pathologies and surgical treatments and the blood volume recovered, processed, and reinfused after cell salvage were collected. We also evaluated the occurrence of postoperative haemorrhage. Results: The volume of blood infused after cell salvage had a statistically significant effect ($p<0.01$) on the risk of post-operative haemorrhage; the receiver operating characteristic sensitivity was 0.813 and the optimal blood volume cut-off was 1800 ml. The best clinical outcome (16.7% of patients presenting haemorrhages) was in patients that had received less than 1800 ml of recovered and processed autologous blood, which represented a volume of up to 580 ml reinfused red blood cells. Conclusion: The optimum thresholds for autologous processed blood and red blood cells reinfused into the patient were 1800 and 580 ml, respectively. Increasing these thresholds augmented the risk of haemorrhage as an immediate postoperative period complication.

Heart surgery with extracorporeal circulation has a marked effect on platelet function and coagulation accounting for abnormal blood loss and allegedly a low incidence of thromboembolic complications. Little is known about platelet function at the time of hospital discharge of routine patients.

Blood samples from 91 patients undergoing elective heart surgery were drawn before surgery and prior to discharge. Thirty-seven patients underwent coronary artery surgery and 54 an aortic valve implantation. The mean age of patients was 69+/-9 years. Fifty patients were male and 41 female. Platelet function was evaluated using plasma beta-thromboglobulin quantification in enzyme-linked immunosorbent assay. In addition, flow cytometric analysis of platelet-monocyte conjugates and platelet-neutrophil conjugates was performed.

The platelet count before discharge was significantly increased (265+/-86 vs. 212+/-61 x 10(9)/l preoperatively). beta-Thromboglobulin was significantly increased (176+/-127 vs. 79+/-70 ng/ml preoperatively) and flow cytometry proved a significant increase in monocyte-platelet aggregates (8.3+/-5.4% vs. 5.3+/-2.6% preoperatively) indicating platelet activation at the time of hospital discharge. There were no significant differences among the three subgroups coronary surgery, mechanical valve insertion and biological valve insertion.

Heart surgery with extracorporeal circulation leads to significant platelet activation and a reactive increase in platelet count before discharge. This is in contrast to the reduced platelet function immediately postoperatively.

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