

Abstract

Evaluation of residual blood from the cardiopulmonary bypass circuit using different emptying methods

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Background

Cardiopulmonary bypass (CPB) is associated with blood loss and coagulopathy, making effective blood conservation strategies essential in cardiac surgery. Residual CPB blood represents a valuable autologous resource that can be reinfused to reduce allogeneic transfusion requirements. However, handling and processing of this blood may influence its quality.

Aim

To compare the quality of residual CPB blood collected in an infusion bag using two techniques: wash-in to bag and retrograde emptying to bag.

Method

This quality improvement study included 26 patients undergoing elective isolated coronary artery bypass grafting or aortic valve replacement. Residual CPB blood was collected into an infusion bag using either wash-in to bag or retrograde emptying to bag. Blood samples were analyzed for hemoglobin (Hb), hematocrit (HCT), platelet count, leukocytes, plasma free hemoglobin (pfHb), D-dimer, and platelet aggregation (TRAP, ADP, and ASPI) using whole blood impedance aggregometry.

Results

No statistically significant differences were observed between the groups in Hb, HCT, platelet count, leukocytes, or D-dimer levels. A trend toward higher pfHb was observed in the retrograde group, suggesting increased hemolysis, although this did not reach statistical significance ($p = 0.06$). Platelet aggregation analysis showed a significantly lower ASPI value in the wash-in to bag group ($p = 0.03$), while no differences were found for TRAP or ADP. The volume of collected blood was borderline significantly higher in the wash-in to bag group ($p = 0.05$).

Conclusion

Both techniques preserved overall blood composition and coagulation parameters to a similar extent. Differences in hemolysis and platelet function were limited and of uncertain clinical relevance. Further studies, including clinical outcomes and baseline measurements are needed to determine the optimal strategy for handling residual CPB blood.