

Point-of-care coagulation management in cardiac patients

Kai Zacharowski, M.D.*

* Department of Anesthesiology, Intensive Care Medicine & Pain Therapy, University Hospital Frankfurt, Germany.

In patients undergoing cardiac surgery, perioperative coagulopathy and the use of allogenic blood products are independently associated with increases in mortality and major perioperative cardiac and non-cardiac adverse events. Early and specific diagnosis and effective and targeted therapy of the underlying hemostatic pathology are of high clinical relevance. In this context, algorithm-based hemostatic therapy shows to be superior to empiric hemostatic therapy that is based on clinical judgment.

There is some evidence from studies using viscoelastic analyses of clot formation and dissolution that the implementation of point-of-care (POC) measurements in hemostatic therapy algorithms may reduce the transfusion rate of allogenic blood products and positively influence clinical outcomes. Additional implementation of aggregometric measures for platelet function analyses could synergistically expand the diagnostic spectrum by assessing the effects of antiplatelet drugs or cardiopulmonary bypass itself on platelet function, and therefore may allow for more targeted and effective coagulation management.

We conducted a trial to compare the efficacy of hemostatic therapy algorithms based either on conventional laboratory testing or on POC-guided coagulation management using viscoelastic and aggregometric measurements. The primary outcome of this study was the amount of perioperatively

transfused units of packed erythrocytes. Usage and costs of any other hemostatic therapy and clinical outcome parameters were secondary outcomes.

Patients undergoing complex cardiac surgery were assessed for eligibility. Those patients in whom diffuse bleeding was diagnosed after heparin reversal or increased blood loss during the first 24 postoperative hours were enrolled and randomized to the conventional or POC group. Thromboelastometry and whole blood impedance aggregometry have been performed in the POC group.

There were 152 patients who were screened for eligibility and 100 patients were enrolled in the study. After randomization of 50 patients to each group, a planned interim analysis revealed a significant difference in erythrocyte transfusion rate in the conventional compared with the POC group. The study was terminated early. The secondary outcome parameters of fresh frozen plasma and platelet transfusion rates, postoperative mechanical ventilation time, length of intensive care unit stay, composite adverse events rate, costs of hemostatic therapy, and 6-month mortality were lower in the POC group.

Overall, hemostatic therapy based on POC testing reduced patient exposure to allogenic blood products and provided significant benefits with respect to clinical outcomes.

RECOMMENDED READINGS

1. Murphy GJ, Reeves BC, Rogers CA, et al. Increased mortality, postoperative morbidity, and cost after red blood cell transfusion in patients having cardiac surgery. *Circulation*. 2007;116:2544-2552.
2. Moulton MJ, Creswell LL, Mackey ME, et al. Reexploration for bleeding is a risk factor for adverse outcomes after cardiac operations. *J Thorac Cardiovasc Surg*. 1996;111:1037-1046.
3. Goodnough LT: Risks of blood transfusion. *Crit Care Med*. 2003;31:678-686.
4. Ak K, Isbir CS, Tetik S, et al. Thromboelastography-based transfusion algorithm reduces blood product use after elective CABG: a prospective randomized study. *J Card Surg*. 2009;24:404-410.
5. Westbrook AJ, Olsen J, Bailey M, et al. Protocol based on thromboelastograph (TEG) outperforms physician preference using laboratory coagulation tests to guide blood replacement during and after cardiac surgery: a pilot study. *Heart Lung Circ*. 2009;18:277-288.
6. Girdauskas E, Kempfert J, Kuntze T, et al. Thromboelastometrically guided transfusion protocol during aortic surgery with circulatory arrest: a prospective, randomized trial. *J Thorac Cardiovasc Surg*. 2010;140:1117-1124.e2.
7. Weber CF, Görlinger K, Meininger D, et al. Point-of-care testing: a prospective, randomized clinical trial of efficacy in coagulopathic cardiac surgery patients. *Anesthesiology*. 2012;117:531-547.