Commentary: Preoperative inflammation and intraoperative blood—A bad marriage?

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Richa Dhawan, MD, MPH (left), and Mark A. Chaney, MD (right).

Central Message

Decisions regarding intraoperative transfusion during cardiac surgery are complicated, and preoperative patient specific risk factors may warrant closer investigation.

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Whether perioperative red blood cell (RBC) transfusion increases morbidity and mortality in patients undergoing cardiac surgery remains controversial. Probably even more controversial is whether perioperative inflammation has similar effects. In this issue of the *Journal*, Nam and colleagues,¹ a group of investigators from the Republic of Korea, are perhaps the first to probe the potential link between preoperative inflammation and intraoperative transfusion on outcome after cardiac surgery.

Nam and colleagues¹ retrospectively evaluated 1636 patients undergoing off-pump coronary artery bypass grafting at a single Institution. Blood C-reactive protein (CRP) level, a general marker of inflammation, was obtained in all patients within a month of surgery. Patients were divided into 4 groups: elevated preoperative CRP level with intraoperative RBC transfusion, elevated preoperative CRP level without intraoperative RBC transfusion, normal preoperative CRP level with intraoperative RBC transfusion, and normal preoperative CRP level without intraoperative RBC transfusion.

Kaplan-Meier curves demonstrated that cumulative survival (30 days, 90 days, 1 year, 3 year) differed significantly among the groups, with the elevated CRP level and intraoperative transfusion group exhibiting the poorest survival. These results are impressive and seem to indicate that the combination of elevated preoperative CRP level (inflammation) and intraoperative RBC transfusion increases mortality. Nam and colleagues¹ suggest that CRP level (normal vs elevated) should be considered before transfusing patients in this setting (perhaps setting a higher transfusion threshold for patients with elevated CRP level).

There are several notable limitations to this retrospective data analysis. There were multiple statistically significant differences in the baseline characteristics between the groups with high CRP and low CRP. Patients in the group with both high CRP and transfusion were older, were more likely to have had a myocardial infarction

and congestive heart failure, and were less likely to be receiving preoperative aspirin and statins. These important characteristics contribute to an overall increased inflammatory state, and they cannot be excluded as possible covariates in the observed differences in mortality. Equally interesting is the role of secondary prevention after coronary revascularization and the optimal medical therapy to mitigate a major adverse cardiac event and ongoing inflammation. The patients were continued on a regimen of aspirin and clopidogrel for 1 year after the operation, with statin therapy used if the low-density lipoprotein level was greater than 100 mg/dL. The American Heart Association and the American College of Cardiology, however, have published detailed guidelines that include specific drug recommendations and disease management and lifestyle changes intended to mitigate the effects of ongoing inflammation.² It is unclear from the study of Nam and colleagues¹ whether patients adhered to these potentially disease modification guidelines postoperatively, which could certainly affect mortality 1 and 3 years after the operation.

The significance of this article is its exploration of the concept of patient-driven transfusion triggers in cardiac surgery, not just hematocrit-driven thresholds. Why do certain patients appear to benefit from transfusion and others have complications? Could it be that the same patients we think may benefit from transfusion (high burden

of cardiovascular disease) are in fact more susceptible to the adverse effects of transfusion? Although there are certainly numerous viable concerns regarding any such large retrospective analysis, the data seem at least to justify further well-designed clinical investigation to probe the potential relationship between preoperative inflammation and intraoperative blood transfusion in patients undergoing cardiac surgery.

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