Anemia, transfusion, and outcome: Both are bad...does it really matter which is worse?

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Central Message

Anemia and transfusion each independently predict worse outcomes after coronary artery bypass grafting. Increasing use of multimodality blood conservation measures to avoid both and reduce unnecessary transfusion is indicated.

See Article page 66.

An exhaustive, and some might even opine exhausting, literature has repeatedly demonstrated the association of red blood cell (RBC) transfusion with increased morbidity and mortality after coronary artery bypass grafting.¹⁻³ An equally compelling volume of evidence similarly documents poor outcomes related to anemia that worsen further still when accompanied by transfusion.⁴⁻⁸ This is perhaps more simply stated as anemia is bad, transfusion is worse, and both together are worse than either one alone. With this large multicenter study of patients from the Virginia Cardiac Services Quality Collaborative undergoing isolated primary coronary artery bypass grafting, the authors add to the literature yet another attempt to unravel the conundrum of transfusion-related outcomes.⁹

Using what I am certain was a sophisticated “risk adjusted hierarchical modeling of preoperative Hct as a continuous function” and “... adjustment for the confounding influence of baseline patient risk profile,” the authors demonstrate that preoperative anemia was associated with an increase in the probability of RBC transfusion, the risk of postoperative renal failure, and mortality. Even stronger associations were noted between RBC transfusion and mortality, renal failure, and stroke.

These findings are neither surprising nor new and differ from other studies mainly in the statistical methodology that modeled hematocrit as a continuous rather than as a discrete variable or range of values. The conclusion that transfusion contributes more to poor patient outcomes than anemia alone does little to clarify our understanding of the clinical factors that drive this interaction between the risks of transfusion versus anemia and the subsequent association with outcome. Although the authors modeled preoperative hematocrit, they acknowledge that they did not consider the effects of intraoperative anemia. As with essentially all reports on transfusion-related outcomes, information regarding the level of hematocrit, in which patients, under which conditions, or for which specific clinical indications the transfusions were administered is lacking. Taken a step further, we are no better informed

about the circumstances for which transfusion might be appropriate. Given 2 patients with the same hematocrit level, it would seem important to know why one received transfusion and the other did not before deciding that transfusion at a given level of anemia is harmful or responsible for a poor outcome.

Despite the inability to conclusively correlate transfusion with outcome as cause and effect, it remains appropriate to argue that avoiding transfusion can have both clinical and financial benefits.^{1,2} To this end, the real emphasis should be on avoiding the conditions that lead to transfusion. This study then is particularly worthwhile in that it leverages its results to make sensible recommendations regarding the benefits of comprehensive multimodality blood management programs to drive blood conservation.^{10,11} If worsening anemia predicts both need for transfusion and worsening outcome, then efforts to optimize preoperative hematocrit in concert with additional perioperative measures that further limit the degree of anemia should decrease the need for subsequent and what are often unnecessary transfusions. Whether due to the patient or due to the transfusion, patients do better without transfusions.

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