Commentary: Blood transfusions in transcatheter aortic valve replacement—Less is more

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The need for red blood cell (RBC) transfusion during transcatheter aortic valve replacement (TAVR) is the result of a major vascular complication or of a life-threatening, disabling, or major bleeding event. In this issue of the *Journal*, Kolte and colleagues¹ report a large, retrospective cohort study in which they investigated the rates, trends, and predictors of RBC transfusion in high-risk and extreme-risk patients with severe aortic stenosis undergoing TAVR between January 2012 and September 2015. To review all patients undergoing TAVR, they accessed the National Inpatient Sample (NIS) database, the largest publicly available all-payer inpatient healthcare database in the United States. During the period of the study, the rates of RBC transfusion decreased from 29.5% to 10.8%. Preoperative anemia, older age, female sex, peripheral vascular disease, chronic kidney disease, and coagulopathy were detected as independent predictors of RBC transfusion in TAVR. Propensity-matched analysis detected higher complication rates in patients without bleeding who received RBC transfusion compared with those who did not; however, these differences were not seen in patients with overt bleeding.

Despite the less invasive nature of transcatheter techniques relative to surgical aortic valve replacement, vascular mishaps or other comorbidities may require blood transfusion in TAVR. Previously, this same group from Brown University published a single-center study of RBC transfusion in TAVR and showed that transfusion in TAVR was associated with higher morbidity and mortality.² Although the initial rate of blood transfusion in first-generation TAVR systems has been reported at approximately 30% to 40%,³⁻⁶ the advent of improved technology and decreasing sheath size has increased the rate of percutaneous transfemoral techniques and therefore decreased the rates of blood transfusion, as also shown by the current work of Kolte and colleagues.¹ Report of the Society of Thoracic Surgeons and American College of Cardiology Transcatheter Valve Therapy Registry

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Central Message

Blood transfusion is associated with worse outcomes in TAVR, although the rate has been decreasing. Restrictive blood transfusion strategy, preoperative optimization, or both may minimize it further.

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showed similar trends, with reduction in the rate of blood transfusion in TAVR from 45% in 2012 to 22% in 2015.⁶ This trend might have been driven by combination of change in patients' risk profile (inoperable and high to intermediate), increased use of a transfemoral approach, and the use of low-profile sheaths, minimizing the risk of vascular access complications. Most recently, we have noted only a 2.0% RBC transfusion rate at 30 days for low-risk patients undergoing transfemoral TAVR with the third-generation system.⁷

What can we do to decrease further the rate of blood transfusion and improve the outcome of TAVR? Restrictive transfusion strategy is one of the key factors to achieve this goal. To date, there are no transfusion guidelines for patients undergoing percutaneous TAVR. The threshold for blood transfusion in TAVR varies, and no definitive criteria exist. Many investigators have tried to create a threshold and attempted restrictive transfusion strategy to decrease unnecessary transfusions in cardiac surgery, but not for TAVR. Mori and colleagues⁸ recently published a 52% reduction of blood transfusion requirement with their restrictive transfusion strategy, without any difference in postoperative outcomes. Preoperative hemoglobin optimization is another interesting topic. Many investigations have reported that preoperative anemia is an independent

predictor of blood transfusion in TAVR^{1,5,9}; therefore, hemoglobin optimization or an anemic workup may be beneficial to minimize postoperative blood transfusion. To perform TAVR safely for a specific group of patients refusing blood transfusion, Binder and associates⁹ set the preoperative hemoglobin goal to more than 12.0 g/dL, and hemoglobin optimization was achieved with erythropoietin or iron supplement therapy. These protocols would be beneficial not only for the specific group of patients refusing transfusion, but also for other patients with preoperative anemia undergoing TAVR.

We congratulate Kolte and colleagues¹ for providing provocative data from one of the largest cohorts undergoing TAVR in the United States. Although it was observational study involving some confounding factors that may have affected the outcomes, this report highlights the clinical management of patients undergoing TAVR and further investigations to minimize blood transfusion.

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