D.N.F. has received consulting/speaker's fees from Eli Lilly, Daiichi-Sankyo, Abbott Vascular, Pfizer, and Bristol-Myers Squibb. All other authors have nothing to disclose with regard to commercial support.

PERI- AND POSTOPERATIVE CARE AFTER CORONARY ARTERY BYPASS GRAFTING IN LOW VERSUS HIGH VOLUME CENTERS

Reply to the Editor:

We thank Dell'Aquila and colleagues for their editorial regarding our article. Indeed, the care of patients with coronary artery disease undergoing coronary artery bypass grafting is incredibly complex. Upon entering the hospital, the typical patient encounters a myriad of health care providers and staff: the surgical team, anesthesiology team, perfusionists, nursing staff, intensive care unit staff, physical and occupational therapists, nutritionists, and additional consulting teams. Hospital management staff strives to meaningfully and efficiently coordinate these providers to ensure operational success and superior patient outcomes.

Given its limited scope, the National Inpatient Sample database cannot account for the quality and interaction among the aforementioned factors, particularly at the level of preoperative and postoperative care. Higher-volume centers tend to have more resources devoted to the treatment of critically ill patients, whereas lower-volume centers may have insufficient allocation or availability of resources, inadequate intensive care, lack of specialty consultants, or poor hospital management. Poor outcomes may be less related to surgical case volume and more heavily influenced by other forces.

There have been numerous reports demonstrating an association between hospital volume and outcome, for instance in carotid endarterectomy,¹ septal myectomy,² and surgical aortic valve replacement.³ Given the familiarity of operators and staff with the performance of inherently complicated procedures and subsequent postoperative care, higher-volume centers may be a surrogate for quality insofar as they have the ability to coordinate the various resources necessary to produce better patient outcomes. Better organized health systems may mitigate the negative effects of lower-quality operators.

Our article seeks to inform the readers that complications, including perioperative mortality, are more frequent in hospitals that perform coronary artery bypass grafting less often (Figure 1). Causal relationships cannot be inferred because many variables, not accounted for in the

FIGURE 1. Adverse event rates after elective coronary artery bypass grafting by quartiles of hospital volume.

database, affect quality beyond patient level characteristics and hospital volume. Further elucidation of the relative contribution of each factor to clinical outcomes is beyond the scope of our article and represents an opportunity for additional investigation and research.

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<http://dx.doi.org/10.1016/j.jtcvs.2016.06.042>

SECOND STAGE OF HYBRID PATHWAY: HAVE WE REACHED A CONCLUSION?

To the Editor:

There is no doubt that patients with hypoplastic left heart syndrome continue to present a challenge, none more so than those who have received initial hybrid palliation, a procedure reserved for high-risk patients in many institutions. The anatomic constraints imposed by the initial pulmonary artery (PA) banding and duct stenting further complicate

Authors have nothing to disclose with regard to commercial support.

matters. We read with interest the institutional protocol reported by Galantowicz and Yates¹ for second-stage management of these patients. Their work is a tremendous contribution to the literature on this subject; however, both they and the accompanying editorial fail to adequately appraise the published literature.

First, Galantowicz and Yates describe a learning curve in terms of patient selection for a comprehensive second stage identical to that recently published by our group.² They advise “avoidance of procedures on an emergent basis or in patients aged <3 months” and “use of a systemic PA shunt in cases of too-small superior vena cava and/or PA.” Our own learning curve and subsequent published protocol advises avoidance in those “with suspected increased pulmonary vascular resistance...; those presenting with an indication for an early second stage...; those with anomalous pulmonary venous drainage, in whom intervention on the superior vena cava or longer complex procedure is anticipated; and those in whom better development of branch PA is required.”²

Second, there is already wide agreement that the branch PA banding during the hybrid procedure makes later reconstruction difficult.³ Moreover, our group and others have described the anatomic LPA constraints between the neo-aorta and descending aorta.^{4,5} These factors increase the risk of thrombosis. In the presented series, implementation of an exit angiography revealed 4 patients requiring LPA reintervention. This vigilance, rather than anticoagulation, could be responsible for the absence of further thrombosis. In our own comprehensive second-stage series, the sole case of thrombosis was due to a kink in the branch PA.² Furthermore, there are no reported cases of late thrombosis in our series or in that of Galantowicz and Yates to support a 6-week policy of anticoagulation.

We agree with the editorial by Sanjiv Gandhi, that the ultimate goal is to push patients forward to the comprehensive stage II. However, our published experience agrees with that reported by Galantowicz and Yates—that is to say, there are clear indications for a “2-stage” second stage (ie, arterial shunt first and delayed venous cavopulmonary shunt). Moreover, in our series, those undergoing this 2-stage approach have shown better PA development at the time of Fontan surgery.²

Finally, Galantowicz and Yates have made a significant contribution to the hybrid literature with their proposed protocol. With time, our knowledge and experience are

building, and it's becoming increasingly evident which patients will benefit from which strategy.

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<http://dx.doi.org/10.1016/j.jtcvs.2016.02.049>

HYBRID PALLIATION AND PULMONARY ARTERY ARCHITECTURE Reply to the Editor:

I read the recent article by Galantowicz and Yates with regard to improving surgical outcome of comprehensive stage II hybrid palliation in patients with hypoplastic left heart syndrome (HLHS) with great interest.¹ The study is the largest clinical series of comprehensive hybrid stage II palliation consisting of 119 consecutive patients. The study focused on the impact of the changes in perioperative management protocol on survival and morbidities.

New treatment paradigms for HLHS as alternatives to the classic Norwood palliation, such as the Sano