Hybrid aortic arch surgery: Have we reached clinical equipoise?

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In their article entitled, “Objective Analysis of Midterm Outcomes of Conventional and Hybrid Aortic Arch Repair by Propensity-Score Matching,” which appears in the current issue of the *Journal*, Hiraoka and colleagues¹ from the Sakakibara Heart institute of Okayama, Japan, report their growing experience with hybrid aortic arch repairs. Hiraoka and colleagues¹ use propensity-score matching to adjust for baseline differences between hybrid arch repair patients and a concurrent group of patients undergoing conventional total arch repair. They found no difference in 30-day, in-hospital, or 5-year mortality in the matched group analysis. Permanent stroke, however, was more frequently observed in the hybrid arch repair group. Hiraoka and colleagues¹ concluded that outcomes between conventional arch repair and hybrid arch repair were equivalent at midterm analysis.

Conventional open arch repair remains the criterion standard against which all hybrid and total endovascular repairs must be compared. The morbidity and mortality associated with open arch repair are not insignificant, and many patients are simply not candidates for open repair that requires cardiopulmonary bypass and circulatory arrest with complex cerebral perfusion strategies. The difficulty in comparing the two techniques lies in the inescapable fact that the operations are currently applied to two distinct clinical populations. Propensity-score matching attempts to adjust for this inherent selection bias that occurs in routine (and good) clinical judgment when one evaluates a patient with an arch aneurysm. The patients undergoing hybrid arch repair in the current series were older, were more likely to have had a previous cardiac operation, were more likely to have chronic obstructive pulmonary failure, and presented more frequently with rupture. Hiraoka and colleagues¹ are to be commended for their results in patients who are considered to be at “high risk.”

There are, however, several limitations of this study that should be mentioned. Because of the small number of cases,

A picture of a completed type 2 hybrid arch repair.

Central Message

This series reinforces that acceptable outcomes can be achieved in “high-risk” patients who undergo hybrid aortic repair. Propensity matching adjusts for baseline differences and selection bias.

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the hybrid repair group was a heterogeneous cohort of patients and procedures consisting of a conglomeration of 1-, 2-, or 3-branch vessel extra-anatomic debranching procedures, whereas the conventional total arch repair group involved bypass of all 3 brachiocephalic vessels. It is logical that a patient undergoing a carotid-subclavian bypass and thoracic endovascular aortic repair for a distal arch aneurysm does not have the same risk as and should not be directly compared with a patient undergoing a total arch repair under circulatory arrest. It is imperative for authors reporting results of hybrid arch repairs to use the Ishimaru classification² of landing zones and the hybrid arch repair classification proposed by our group at the University of Pennsylvania³ to allow the direct comparison of techniques involving similar arch anatomic pathologies.

The current body of literature comparing hybrid and conventional arch repairs mirrors the series of Hiraoka and colleagues,¹ with acceptable early and midterm results.⁴ At present, however, there are limited long-term data available for such “high-risk” patients undergoing hybrid repair. Others have used similar statistical means to adjust for differences between these two populations. The literature would suggest possible clinical equipoise with respect to mortality between hybrid and conventional repairs. As reported in this series, and also by others, a high rate of stroke remains associated with patients undergoing hybrid arch repair. Whether this is a result of inherent risk factors

associated with this patient population or a risk of the procedure itself remains to be determined. This increased risk of stroke is clearly a limiting factor in widespread adoption of hybrid techniques for aortic arch repair.

The Society of Thoracic Surgeons is currently developing an aortic surgery database that will allow the comparison of hybrid and conventional techniques. This prospectively captured database will help aortic surgeons determine the most appropriate procedure for their patients with complex aortic disease. The term *clinical equipoise* refers to the concept of genuine uncertainty between treatment options for a particular disorder. The preceding article adds to this uncertainty and adds further weight to the need for a prospective randomized trial in patients at “average risk” undergoing aortic arch repair. The future of aortic surgery will depend on data

generated from the Society of Thoracic Surgeons aortic database and (we hope) a prospective, randomized trial to determine the appropriate role of hybrid and conventional techniques.

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