Commentary: Stroke after type A aortic dissection repair—A web of risk with no single answer

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Right to left: Robert B. Hawkins, MD, MSc, J. Hunter Mehaffey, MD, MSc, and John A. Kern, MD

In this issue of the *Journal*, Ghoreishi and colleagues¹ have performed a tour de force in attempting to analyze 5 major factors potentially associated with stroke after type A aortic dissection repair. The etiology of stroke after aortic surgery is an entanglement of numerous complex factors that place patients at risk for both ischemic and embolic neurologic insults. Decisions about the extent of surgical repair, cannulation site, cerebral perfusion strategy, and degree of hypothermia are all interrelated. A patient with limited dissection may be amenable to innominate artery cannulation and an isolated hemiarch repair where cerebral perfusion is performed because it is already set up, not because the arrest time requires it. Alternatively, femoral cannulation in a patient in hemodynamically unstable condition allows rapid decompression and cooling, and retrograde cerebral perfusion can easily be added. Thus far only retrospective studies have been performed, although this is one of the largest sample sizes to date and uses a contemporary cohort of patients. Regression can only correct known risk factors, and the Society of Thoracic Surgeons database lacks the detailed anatomic pathology seen with advanced imaging used for surgical decision making.

Ghoreishi and colleagues¹ found that axillary and direct aortic cannulation were associated with lower stroke rates than femoral cannulation. In addition, retrograde cerebral perfusion may have advantages relative antegrade perfusion; however, the lack of interaction terms in their models limits the implications of these findings. Because of this, the supplemental tables are unusually informative. Table 1E in that article shows a high rate of axillary cannulation with antegrade cerebral perfusion, whereas femoral cannulation was typically paired with retrograde or no cerebral perfusion. This split limits the power of the analysis to separate out the effects. In the article's Table E2, we see that for patients with retrograde cerebral perfusion, axillary and direct aortic cannulation lose their stroke advantage relative to femoral cannulation. Even if the axillary artery is free of dissection and suitable for cannulation, these results support caution in use of antegrade perfusion.

Central Message

Femoral cannulation and antegrade cerebral perfusion were associated with higher rates of stroke in some cases. As such, an individualized repair strategy based on aortic pathology is still required.

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Although axillary cannulation providing antegrade flow theoretically reduces the risk of malperfusion or embolization, it is time consuming and not always anatomically feasible or lower risk. High-volume centers of excellence report excellent outcomes with both axillary and femoral cannulation.^{2,3} Rosinski and colleagues² demonstrate how even an axillary-first approach will sometimes require femoral cannulation, providing an insightful look into how retrospective analyses may bias against femoral cannulation in ways not easily controlled for. Also notable is the reliance of Ghoreishi and colleagues¹ on retrograde cerebral perfusion regardless of cannulation site. Ghoreishi and colleagues¹ found a trend toward volume as a risk factor, but perhaps volume of aortic dissections is the wrong metric to be using. There has been a trend toward increasingly complex operations being performed, particularly a shift away from isolated ascending repair.⁴ In the study of Ghoreishi and colleagues,¹ there was no increased risk for hemiarch relative to ascending-only repairs, supporting more aggressive attempts to stabilize the arch. Total arch repair remains a risk factor for stroke, however, and an individual's or hospital's experience should likely dictate the threshold for intervening on the arch or even descending aorta.

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