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Commentary: Simplified innominate artery antegrade cerebral perfusion

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The incidence of neurologic dysfunction following arch surgery remains significant (6%-16%) and varies with the extent, complexity, and acuity of the underlying pathology.¹⁻⁵ Protective strategies to mitigate neurologic dysfunction following arch surgery continue to evolve and include systemic hypothermia, typically supplemented with retrograde and/or antegrade cerebral perfusion (ACP; unilateral, bilateral, axillary/subclavian or innominate arteries). Results (mortality and permanent neurologic deficits) are comparable between cerebral perfusion strategies, with a trend toward lower transient neurologic deficits and intensive care unit stays with ACP.⁴ ACP is recommended by current guidelines^{6,7} and is the workhorse cerebral-protection strategy for complex arch reconstructions. Axillary artery cannulation, typically using a graft sewn in an end-to-side fashion, serves as a convenient and useful way to provide both systemic perfusion and ACP. However, concerns exist over the small but significant risk of vessel injury, brachial plexopathy, or pectoral muscle atrophy.² This has led to increasing enthusiasm for innominate artery cannulation for ACP delivery as an alternative to axillary cannulation.

Sang and colleagues⁸ present their technique and results of a simplified technique of direct innominate artery cannulation with a 12/14-French pediatric arterial cannula used during elective non-redo hemiarch replacements,

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CENTRAL MESSAGE

Direct innominate artery cannulation is a safe and effective tool to deliver ACP during aortic arch reconstruction and should be incorporated as part of complementary neuroprotective strategies.

demonstrating safety and efficacy. This technique avoids the added length, complexity, and complications associated with axillary artery exposure, addresses ACP, but requires supplementation with central cannulation to accomplish systemic flows. The authors certainly demonstrate the safety of this technique in a low-risk population, as no innominate artery injuries were noted. However, the fact remains that in straightforward hemiarch reconstructions, given circulatory arrest times are typically at or below 20 minutes, there exist a multitude of cerebral-protection strategies that are safe and effective, including retrograde cerebral perfusion techniques. It is in the more complex aortic arch procedures that this protection strategy will likely enjoy the most utility, including in transverse arch reconstruction and frozen elephant trunks, as an alternative to axillary cannulation or direct cerebral vessel cannulation. Further, some groups have advocated for innominate (or carotid) cannulation during acute type A dissection repair with cerebral malperfusion.⁹

It is critical for the aortic surgeon to be facile with multiple cerebral-protection strategies and avoid a “one-size-fits-all approach.” These therapies are complementary, and their use (of one or multiple strategies) needs to be individualized to meet an anatomical, aortic pathology, and

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patient-specific needs and enhance outcomes. Direct innominate artery cannulation is a safe and effective tool for deliver ACP during aortic arch reconstruction, and its utility will continue to evolve.

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