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Commentary: Radiographic stroke: The silent killer?

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Since Griep and colleagues' initial report¹ of arch replacement using deep hypothermic circulatory arrest, cerebral-protection strategies have rapidly evolved. In the last decade, there has been an increase in use of moderate hypothermic circulatory arrest (MHCA) with antegrade cerebral perfusion (ACP) via the right axillary (RA) or innominate artery (IA). Despite multiple retrospective reports on the safety of IA cannulation for ACP, the site of arterial cannulation for ACP has never been rigorously investigated. This month's report on the Aortic Surgery Cerebral Protection Evaluation (ACE) trial answers this question.²

This Canadian multicenter trial randomized 111 patients undergoing proximal aortic surgery with hemiarch replacement to either RA or IA cannulation for the delivery of ACP during the period of MHCA (nasopharyngeal temperature 25.7°C). Patients received pre- and postoperative diffusion-weighted magnetic resonance imaging (DW-MRI) of the brain as well as postoperative neurocognitive and serum biomarker assessments. The overall results were excellent, with a <4% mortality rate and a reported incidence of stroke/transient ischemic attack of 5.4%, although neurologic examinations were performed by the surgeon alone. It has been demonstrated that postcardiac surgery adverse neurologic events are underreported when adjudicated by the surgeon as opposed to a neurologist.³ There were no significant differences in operative time, mortality, stroke/transient ischemic attack, radiographic or serum markers of neurologic injury, or neurocognitive outcomes between the 2 different methods of cannulation for ACP. Based on these results, the authors concluded that



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CENTRAL MESSAGE

The incidence of MRI-adjudicated neurologic injury is high following hemiarch replacement. The clinical significance of this injury remains poorly understood.

ACP with IA cannulation is safe and affords equivalent neuroprotection as ACP with RA cannulation.

The primary finding of the ACE trial is the confirmation of safety and efficacy of IA cannulation for ACP. However, an equally important product of this trial is the information gleaned from the DW-MRI data. Despite a low incidence of clinically evident adverse neurologic events, 69% of patients with IA and 59% of patients with RA had new postoperative ischemic strokes by DW-MRI. Furthermore, by the authors' definitions, 39% of patients with RA and 34% of patients with IA had new severe ischemic brain lesions postoperatively. The clinical significance of these silent infarcts is poorly understood; however, total infarct volume by MRI has been correlated with cognitive decline in patients following surgical aortic valve replacement.⁴

A high incidence of postoperative clinically silent MRI-adjudicated brain injury following hemiarch replacement was also recently reported in a pilot study that randomized patients to either MHCA + ACP or deep hypothermic circulatory arrest and retrograde cerebral perfusion.⁵ The wide discrepancy observed between clinical and radiographic stroke from both of these trials supports the notion that clinical stroke alone is an inadequate metric to evaluate the efficacy of cerebral protection. Instead, a combination of clinical, radiographic, and neurocognitive data is necessary to comprehensively assess neurologic injury following circulatory arrest operations. The optimal cerebral

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protection for hemiarch replacement is widely debated and has yet to be proven. The path forward is to conduct prospective randomized trials of cerebral-protection strategies that incorporate rigorous, comprehensive neurologic investigations such as the current study.

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