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Commentary: Knowledge is key: We may have been looking in the wrong place

Danny Ramzy, MD, PhD

In the minds of most patients, death is the worst possible outcome. However, cardiac surgeons know all too well that there are results far worse than death. Stroke is a dreaded complication beyond the physical and cognitive impairment; strokes can also increase the likelihood of developing respiratory failure, sepsis, and thromboembolic complications. Strokes also impact long-term survival, with just a 60%, 5-year survival rate post incident.¹⁻⁴ It has long been known that cerebral atherosclerosis (CAS) is associated with increased likelihood of postoperative ischemic strokes.⁵⁻⁷ This has led to imaging of the carotid and extracranial vessels becoming a universally standard, preoperative protocol before cardiac surgery. However, the literature is focused on extracranial atherosclerosis (ECAS), particularly of the carotids, with little known about the risk from intracranial atherosclerosis (ICAS) on perioperative ischemic stroke.

In the current issue of the *Journal*, Kim and colleagues⁸ provide what may become a landmark investigation of CAS and its association with ischemic strokes. Their new and refreshing perspective highlights the importance of ICAS and its severity on the risk of developing an ischemic stroke post left-sided valvular heart surgery. Using magnetic resonance angiography screening, they found that a very significant portion of patients have CAS. The unique aspect of their study is that their definition of CAS is not limited to the classical heart surgeon view of carotid disease as a central aspect of CAS. Instead, they examine both the ECAS and ICAS in a much-needed effort to broaden our view of

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CENTRAL MESSAGE

Knowledge is key: knowing where to look, our surgical community must be vigilant at preventing strokes and realizing that the intracranial vessels may play the biggest role.

the many contributing pathologies to the risk of stroke. They also create a grading system ranking the severities of CAS. In doing so, they discover a proportionate relationship between the severity of CAS and the relative risk of ischemic stroke. However, most notably, their results also reveal ICAS as a risk factor for early ischemic stroke, suggesting the importance of atherosclerosis in the intracranial arteries as a key determinant of risk. Furthermore, they offer new revelations that ICAS is actually a stronger predictor for stroke compared with ECAS. This directs our attention to the importance of cerebral parenchymal perfusion to the development of postoperative strokes. To illustrate this point, Kim and colleagues⁸ compares the risk of perioperative ischemic strokes between groups of patients with and without ICAS and/or ECAS. They find that the stroke rate is no different between the no-CAS control group versus the ECAS groups (1.9% vs 1.5%). However, the greatest stroke rate occurs in patients with both ICAS and ECAS (8.5%). Most significantly, the authors demonstrate that the presence of ICAS alone is sufficient to increase stroke risk by a factor of 4.2%.

By expanding their parameters and not limiting their investigation to extracranial atherosclerosis, Kim and colleagues⁸ demonstrate that ICAS is the primary cause of strokes in left-sided valve replacements. This may explain why our surgical community sees strokes in patients with normal extracranial vessels. The conclusion cannot be clearer: the time has come to develop guidelines for ICAS

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Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication May 29, 2020; revisions received May 29, 2020; accepted for publication June 1, 2020; available ahead of print June 24, 2020.

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J Thorac Cardiovasc Surg 2022;163:977-8

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.06.010>

screening as a best practice, just has long been the standard for carotid screening. But as emphatic as this conclusion is, their study does lead to further questions and challenges. Most prominent is the need for a risk-reduction strategy or protocol. Knowledge is power. Armed with the new findings, our cardiothoracic surgery community now has an expanded capability to formulate risk-reduction strategies, and the time has come for us to take note and to determine our next steps in moving forward.

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Commentary: It's all in your head

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Ischemic stroke remains among the most serious potential complications following cardiac surgery. With a reported incidence of 1.6% to 5.5%, stroke leads to increased mortality coupled with long-term disability in >50% of patients.¹ The cause of ischemic stroke is multifactorial, with embolism and hypotension during surgery known predisposing factors. Cerebral atherosclerosis (CAS), particularly of the major intracranial arteries (ICAS), is an increasingly identified cause of stroke worldwide, particularly prevalent in Asian, African American, and Hispanic populations.²⁻⁴ Despite these observations, reports of ICAS related to stroke in the setting of cardiac surgery

Kevin P. Landolfo, MD, MS (left), and William D. Freeman, MD (right).

CENTRAL MESSAGE

ICAS is an important predisposing factor for ischemic stroke following cardiac surgery.

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Disclosures: The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication June 10, 2020; accepted for publication June 11, 2020; available ahead of print June 30, 2020.

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J Thorac Cardiovasc Surg 2022;163:978-9

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.06.074>

are limited. Kim and colleagues⁵ analyze CAS and stroke following left-sided valve replacement surgery. A prospective cardiac surgery database housed at Asan Medical Center (Seoul, Korea) was analyzed retrospectively to identify 2085 patients who underwent preoperative magnetic resonance angiography (MRA) before elective valve replacement surgery over a 10-year period (2005-2015). The extent of CAS, both ICAS and extracranial CAS were scored by MRA and 30% of the study population had significant CAS (>50% stenosis) identified. A total of 54