Study examines stroke risk among patients undergoing cardiac surgery

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Among patients undergoing cardiac surgery, post-operative stroke occurred in approximately 2 percent, was not correlated with significant carotid artery narrowing, but was more common among patients who had combined cardiac and carotid procedures, according to a report in the September issue of *Archives of Neurology*.

Complications involving the blood vessels leading to the brain—most often resulting in stroke—are a major source of illness and death following heart surgery, according to background information in the article. Factors causing postoperative stroke may include carotid artery stenosis (narrowing of the artery in the neck supplying blood to the brain), low blood pressure, irregular heartbeat, atherosclerosis or plaque buildup in the aorta (the body's largest artery) and a temporarily increased tendency for blood to clot.

"The presence of multiple co-existing causes makes studying the mechanism of stroke challenging. Significant carotid stenosis has been recognized as a positive predictor of postoperative stroke in patients receiving cardiac surgical procedures. However, studies directly addressing the role of severe carotid stenosis are lacking," the authors write. "Despite this lack of evidence, combined carotid and cardiac surgical procedures are performed frequently in an effort to reduce the incidence of postoperative stroke."

Yuebing Li, M.D., Ph.D., John E. Castaldo, M.D., and colleagues at Lehigh Valley Health Network, Allentown, Penn., studied 4,335 patients

undergoing coronary artery bypass grafting, aortic valve replacement or both between 2001 and 2006. Of those, 3,942 (90.9 percent) underwent ultrasonography to evaluate the carotid artery before their procedure.

A total of 76 patients (1.8 percent) had a clinically definitive stroke following surgery. Stroke was more common in individuals with carotid stenosis than in individuals without (7.5 percent vs. 1.8 percent); however, most strokes (76.3 percent) occurred in patients without significant carotid stenosis, and 60 percent of strokes were not confined to a single carotid artery. "According to clinical data, in 94.7 percent of patients, stroke occurred without direct correlation to significant carotid stenosis," the authors write.

In a subgroup of 53 patients who had significant carotid stenosis (artery narrowed by 70 percent or more) before surgery and underwent combined cardiac and carotid procedures, eight patients had postoperative strokes (15.1 percent). Among 51 patients who had a similar level of carotid stenosis but did not undergo a combined procedure, zero had a postoperative stroke.

"Multiple causes other than carotid stenosis could account for postoperative stroke in patients undergoing cardiac procedures," the authors write. "For example, coexistence of aortic atherosclerosis has been demonstrated to be a significant determinant of postoperative stroke. In some studies, clamping and manipulation of the aorta or heart could account for more than 60 percent of emboli [clots or masses that block blood vessels]." In addition, particles released from the cardiopulmonary bypass pump used during surgery could contribute to stroke, as could postoperative heart rhythm disorders.

"We confirmed a higher incidence of stroke in the subgroup of patients with significant carotid stenosis," the authors conclude. "However, most strokes have no direct causal relationship with the diseased carotid artery

. Combined carotid and cardiac procedures result in a significantly higher incidence of post-operative stroke and should be avoided. Pre-operative studies such as echocardiography or computed tomography or magnetic resonance imaging of the heart and aorta could identify disease-free areas for manipulation and clamping to prevent postoperative strokes."

More information: *Arch Neurol*. 2009;66[9]:1091-1096

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