

Surgery to prevent stroke causes too many complications

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An operation for preventing repeat strokes in high-risk patients has failed in a multi-institutional clinical trial, scientists report in the *Journal of the American Medical Association*.

The procedure restores [blood flow](#) to the brain using an approach similar to cardiac bypass. When one of the two main arteries that [supply blood](#) to the brain is blocked, surgeons take an artery from elsewhere in the body and use it to reroute blood flow.

Data [monitors](#) for the study stopped the trial, known as the Carotid [Occlusion](#) Surgery Study, when it became apparent that the operation was no better at preventing strokes than non-surgical treatments, such as drugs to [lower blood pressure](#) and cholesterol and block [clot formation](#).

“We’re still thinking about surgical approaches to remedy this problem that might have less risk of complications,” says senior author Colin P. Derdeyn, MD, professor of radiology at Washington University School of Medicine in St. Louis. “For now, though, non-surgical treatments are better at reducing risk.”

The study was led by William J. Powers, MD, formerly of Washington University and now at the University of North Carolina at Chapel Hill.

The carotid arteries in the neck are the biggest suppliers of blood to the brain. Blockages in these arteries are a common cause of stroke.

Inspired by the success of bypass procedures in the heart, neurosurgeons began using the brain bypass procedure frequently in patients with blocked carotid arteries in the 1970s and 1980s.

Researchers scientifically tested the surgery in the 1980s in patients who had suffered at least one stroke or “mini-stroke,” a temporary episode of faintness, vision loss, weakness or other symptoms that led doctors to identify a blocked carotid artery. They found the procedure was not helpful.

Given the significant increase in stroke risk caused by carotid blockage and the success of cardiac bypasses, though, some researchers continued to wonder if there were groups of people for which surgery could help.

In the 1990s, Powers, Derdeyn and Robert L. Grubb Jr., MD, professor of neurological surgery at Washington University, showed that a blocked carotid artery does not always significantly reduce blood flow to the brain or increase the risk of stroke.

“In most people, the body can get enough blood to the brain using other arteries as natural bypasses,” Derdeyn says. “These people have a very low risk of stroke.”

Derdeyn and his colleagues thought this might be why the trial in the 1980s failed to show a benefit of the bypass procedure: most people already had normal brain blood flow from natural bypasses.

However, their studies also showed that in a small percentage of patients, the brain does not receive a normal amount of blood. The brain can adapt by pulling oxygen more effectively from the limited supply of blood available to it, but this increases stroke risk.

Clinicians can directly assess brain oxygen usage through positron

emission tomography (PET) scans. So researchers decided to see if the bypass procedure could benefit patients with a blocked carotid and increased oxygen usage in the brain, a group at very high risk of future strokes.

The study began in 2002. Researchers enrolled 195 [high-risk](#) patients at 49 U.S. clinical sites. Half received prescription drugs and advice on changing their lifestyle to reduce [cholesterol](#) levels and blood pressure, two factors that affect stroke risk. The other half were given the same drugs and advice but also had the surgery. Scientists followed the patients for two years.

When the trial was halted in 2010, 20 patients in each group had suffered another stroke. In the surgical group, some of those strokes resulted from the surgery.

“If the surgical procedure went well and was free of complications, the brain had better blood flow and risk of stroke was reduced,” Derdeyn says. “But non-surgical treatment also decreased stroke risk.”

Researchers plan to investigate other approaches for decreasing [stroke](#) risk in these patients. One possibility is endovascular surgery, which involves operating on the blockage through a major blood vessel.

More information: Powers WJ, Clarke WR, Grubb Jr RL, Videen TO, Adams Jr HP, Derdeyn CP. Extracranial-intracranial bypass surgery for stroke prevention in hemodynamic cerebral ischemia. *Journal of the American Medical Association*, 306 [18], p.1983-1992.

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