Neurosurgeons Champion Brain Bypass For Select Patients

A microsurgical procedure that has lost some ground to advances in endovascular therapy still plays a critical role in the management of selected neurovascular disorders, according to a University Hospitals Case Medical Center neurosurgeon who performs the procedure. "Though its indications are rare, the ability to perform brain bypass correctly can make all the difference for certain patients who have complex brain aneurysms or other cerebrovascular disorders," said Nicholas C. Bambakidis, MD, Director, Cerebrovascular and Skull Base Surgery, University Hospitals (UH) Neurological Institute in Cleveland, OH.

Brain bypass, also known as extracranial to intracranial bypass, was first performed successfully in 1967 to treat a blocked internal carotid artery. The procedure involves connecting the external carotid artery to the internal carotid artery, either directly or by grafting a vein or artery. The choice of graft depends on the size of the recipient and donor vessels, graft availability and the extent of required blood flow augmentation. In a *Journal of NeuroInterventional Surgery* article (2010;2:229-236) discussing the current role of cerebral revascularization for ischemic disease, Dr. Bambakidis and co-author Shakeel Chowdhry, MD, Neurological Institute, UH Case Medical Center, Resident, Department of Neurological Surgery, Case Western Reserve University School of Medicine, note that the procedure was originally envisioned as a treatment option for cerebrovascular occlusive and ischemic disease, but is now rarely used for these indications.

"As newer, minimally invasive technology has come online in vascular treatment, the pendulum swings toward avoidance of surgical treatment at all costs," said Dr. Bambakidis. "As a result, many centers are doing endovascular treatment of aneurysms, but fewer are doing brain bypass procedures. In a sense, it's almost becoming a lost art. The expertise is becoming more and more concentrated in larger centers."

While an endovascular procedure is the optimal treatment for many brain aneurysms, in select cases, endovascular treatment poses a higher risk of stroke than brain bypass, Dr. Bambakidis said. "There are certain brain aneurysms that simply can't close without the sacrifice of some normal blood vessels," he explained. "The EC-IC bypass is designed to bypass the aneurysm and provide blood to those vessels which you would otherwise have to close off, and having that blood supply reduces the risk of stroke."

Complex giant aneurysms (greater than 2.5 cm) are the main indication for brain bypass, although Dr. Bambakidis recently performed the procedure on a young patient with a smaller aneurysm. "This was a 14-year-old boy with a 2-cm

aneurysm; we did the bypass using a radial artery from his wrist," he noted. "Aneurysms in younger people are rare, but when we do see them they tend to be these larger ones that often require some kind of bypass or complicated open surgery." He added that although brain bypass is not typically indicated for ischemic brain stroke, it is a critical treatment modality for certain young patients with vascular insufficiency and resultant ischemic or hemorrhagic strokes.

"These patients, who often have a disease called moyamoya syndrome, can have their symptoms improve dramatically after surgery," Dr. Bambakidis said. New technology such as fluorescent videoangiography is making brain bypass easier and safer, Dr. Bambakidis said, but it is still a delicate procedure that's difficult to perform well. "Multi-disciplinary expertise and coordination of care between neuroradiologists and neurosurgeons is critical to achieving an optimal result for the patient," he said.

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