A Pioneering New Technique for Mechanical Thrombectomy

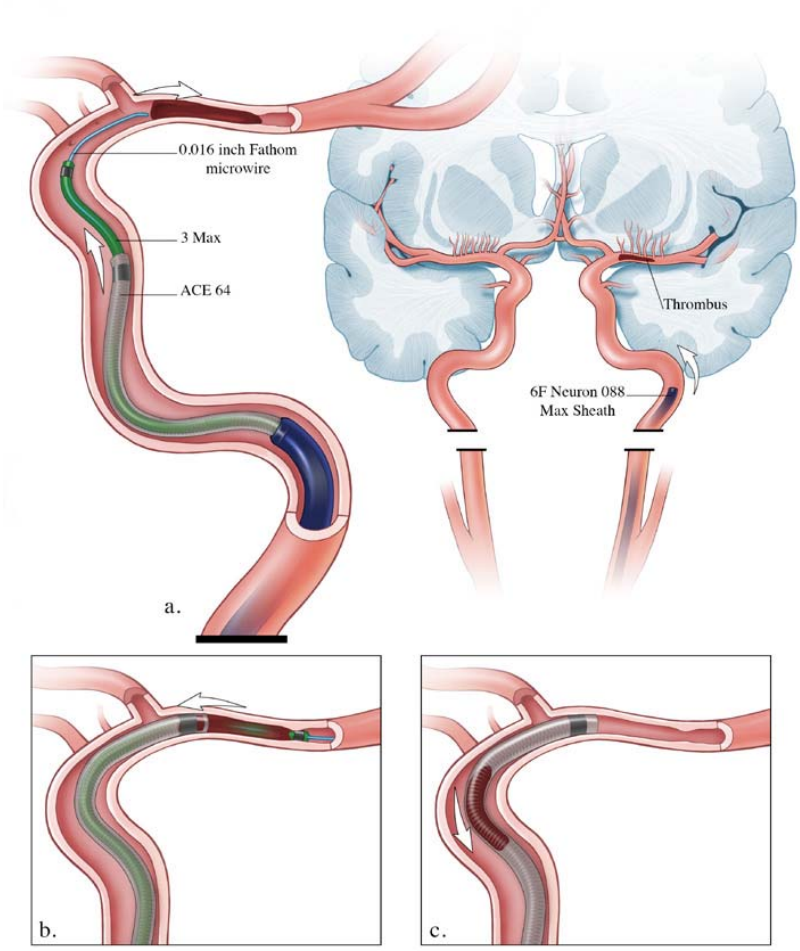

Illustration by Emma Vought

a) Neuron Max is placed in the distal cervical internal carotid artery. The ACE 68 catheter is advanced over the 3 Max catheter telescoped with a Fathom 16 wire to the clot occluding the middle cerebral artery (MCA).
b) The ACE 68 catheter is advanced to the face of the clot in the MCA and the 3 MAX and wire are removed.
c) The clot is ingested through the ACE 68 catheter under aspiration.

In 2015, five landmark clinical trials provided the evidence that mechanical thrombectomy using stent retrievers was safe and effective for certain patients with acute ischemic stroke. On the basis of that evidence, the American Heart Association (AHA) revised its guidelines for acute stroke to recommend that stent retrieval devices be used to remove blood clots in large arteries for patients with acute ischemic stroke. As that news has traveled worldwide, the volume of endovascular surgery for stroke has increased dramatically. The AHA noted that other mechanical thrombectomy techniques may be used at the discretion of the physician.

One of the most popular of these is the direct aspiration, first-pass technique (ADAPT), developed by MUSC Health neuroendovascular surgeons M. Imran Chaudry, M.D., Alejandro M. Spiotta, M.D., Aquilla S. Turk, D.O., and Raymond D. Turner, M.D. ADAPT aims to remove a large-vessel clot in its entirety with a large-diameter aspiration catheter. This large catheter is inserted via the femoral artery and advanced to the site of the clot, where suction is applied to remove it and restore blood flow to the brain. If the first-pass attempt is unsuccessful, stent retrievers can then be used. The team reported their initial findings in a seminal 2014 article in the *Journal of Neurointerventional Surgery* (doi: 10.1136/neurintsurg-2013-010713) and in 2016 reported longer-term results from

a single center (MUSC Health) in an article published online ahead of print on April 18, 2016 in the same journal (doi:10.1136/neurintsurg-2015-012211). In the 2016 article, the MUSC Health team reported the results of a retrospective analysis, showing that blood vessels were successfully reopened in 180 (94.2%) of 191 consecutive patients with acute ischemic stroke who underwent thrombectomy using ADAPT at MUSC Health.

Turk is one of the national principal investigators for the COMPASS trial (NCT02466893), which is comparing direct aspiration (ADAPT) vs. the use of a stent retriever as the first approach to thrombectomy. The other principal co-investigators are J. Mocco, M.D. of Mount Sinai and Adnan Siddiqui, M.D., Ph.D. of the University at Buffalo. The trial has already enrolled 150 patients and will likely meet its goal enrollment of 270 patients within the next year. The results of this trial, expected by the end of 2017, could reshape the field in terms of best practice for the removal of a blood clot in stroke by showing definitively whether ADAPT or stent retrievers are more safe and effective.

Developing an Individualized Approach to Aphasia Care

More than a third of stroke patients experience aphasia, a disorder that interferes with patients' ability to speak, listen, read, and/or write. In some patients, symptoms resolve, but in others the effects on quality of life are devastating. Currently, physicians cannot reliably predict which patients will recover or which therapies will help them to do so.

A new collaborative initiative by MUSC, the University of South Carolina, Johns Hopkins University, and the University of California Irvine is attempting to change that. They comprise the Center for the Study of Aphasia Recovery, which was launched in 2016 by Julius Fridriksson, Ph.D., of the University of South Carolina with $11.1 million in funding (over five years) from the National Institutes of Health.

The center aims to lay the foundation for individualized aphasia care, in which patients will receive the most appropriate treatment to address their specific stroke signature. Together, the four research sites will be able to recruit hundreds of patients with aphasia for the study. "Once finished, this is going to be the largest study of aphasia recovery in the past couple of decades," said Fridriksson.

A long-time collaborator of Fridriksson, MUSC Health neurologist Leonardo Bonilha, M.D., Ph.D., one of the principal investigators of the MUSC research site, is exploring whether disruptions to white matter connectivity after stroke affect language abilities. White matter fiber tracts are the insulated wires that connect one area of the brain to others. Currently, structural MRI is used after stroke to assess lesions in the cortical tissue—the brain's grey matter. However, the extent of cortical damage often does not correlate with the severity of language deficits.

In the June 22, 2016 *Journal of Neuroscience*, Bonilha and his MUSC and USC collaborators reported findings suggesting that imaging all of the brain's connections (i.e., the connectome) in addition to imaging only the areas of cortical damage can help determine which patients will have language deficits, how severe those deficits will be, and how much potential there will be for recovery. This information could then be used to direct rehabilitative therapy to improve outcomes.

MUSC Health speech pathologist Katie Murphy works with stroke patients.