Endovascular treatment for acute ischemic stroke: an update  

Introducing Palmetto Health's “4-BRAIN” phone line for emergent neurosurgical transfers
As physician co-leaders of Palmetto Health’s neuroscience service, we share a vision to provide the most advanced neurology and neurological surgery treatments available to the residents of South Carolina. Through recruitment of the best and brightest neurologists and neurosurgeons, investment in the most advanced equipment and technology, participation in cutting edge research, and education of the next generation of neuroscience physicians, Palmetto Health and the University of South Carolina School of Medicine are committed to offering the area’s premier neuroscience services. We are excited to introduce our neuroscience journal to share the latest information in neuroscience care and research with our physician colleagues. Each quarter we will bring you new information from our team of neurology and neurological surgery subspecialists so, that together, we can improve the lives of the patients we serve.

Roham Moftakhar, MD, Chief of Neurosurgery, Palmetto Health Richland, and Associate Professor, Clinical Surgery, USC School of Medicine, is a board certified neurosurgeon with subspecialization in neuroendovascular, cerebrovascular and neuro-oncological surgery. Dr. Moftakhar received his medical degree from George Washington University School of Medicine in Washington, DC, and completed his neurological surgery residency at the University of Wisconsin Hospital and Clinics, Madison, Wisconsin. He went on to complete fellowships in endovascular and cerebrovascular neurosurgery, as well as skull-base and complex brain tumor surgery at the University of Miami/Jackson Memorial Hospital. Dr. Moftakhar is among only a few dual-trained neurosurgeons in South Carolina who can treat vascular diseases of the brain with either endovascular techniques or open surgery. He also has expertise in the treatment of brain tumors, as well as complex skull-base tumors, with the latest minimally invasive endoscopic techniques.

Dr. Moftakhar’s research and laboratory interests include surgical treatment of intracerebral and intraventricular hemorrhages with minimally invasive techniques. In addition, he has patented novel endovascular devices for treatment of cerebral aneurysms, which are undergoing laboratory investigation.

To refer a patient, call Palmetto Health Neurosurgery Associates at 803-434-8323.

Souvik Sen, MD, MPH, Chair, USC School of Medicine Neurology Department, is an internationally known stroke neurology professor and has published in peer-reviewed journals including Circulation, Stroke and the New England Journal of Medicine. He has received research funding from the American Heart Association and the National Institutes of Health and was nominated as a Fellow of the American Heart Association. He serves on several national and international committees. His specific research interests include acute stroke treatment, stroke and TIA pathophysiology, stroke prevention and epidemiology.

Dr. Sen received his medical degree from University of Calcutta R. G. Kar Medical College, Calcutta, India, and completed a Masters in Science in Cardiovascular Pharmacology at Wayne State University in Detroit, Michigan. He then completed a medical internship at Henry Ford Hospital, Detroit, Michigan. He completed a neurology residency at Temple University Health Science Center, Philadelphia, Pennsylvania, and a vascular neurology fellowship at Johns Hopkins University Hospital, Baltimore, Maryland. After his fellowship he served as the co-director and subsequently as the director of the stroke center at the New Jersey Neuroscience Institute in Edison, New Jersey. He then served as the founding director of the UNC Stroke Center in Chapel Hill, North Carolina. While there he completed a Masters in Public Health with Epidemiology major. He is board certified in neurology, and subspecialty board certified in vascular neurology.

To refer a patient, call the USC School of Medicine Department of Neurology at 803-545-6050.
Meet our team

Palmetto Health Neurosurgery Associates

Burke H. Dial, MD, FACS
Medical School: Medical University of South Carolina
Residencies: Montreal Neurological Hospital and Institute, Montreal Children's Hospital, University of London Institute of Neurology
Specialty: Gamma Knife
Board Certified: American Board of Neurological Surgery

Roham Moftakhar, MD
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Residencies: Medical College of Virginia Hospitals
Fellowship: Neuroradiology, Mallinckrodt Institute of Radiology at Washington University School of Medicine; Interventional Neuroradiology, University of Miami School of Medicine
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Medical School: Xiang Ya School of Medicine
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Specialty: Neurology, Neurophysiology, Movement Disorders
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Introducing Palmetto Health’s “4-BRAIN” phone line for emergent neurosurgical transfers.

Providers now can call 844-64-BRAIN to transfer urgent and emergent neurosurgical and neurological patients easily and efficiently.

Studies have shown that one of the challenges faced by emergency room providers and referring physicians is fast and efficient access to neurological and neurosurgical physicians in tertiary medical centers. Palmetto Health’s 4-BRAIN line allows emergency room providers and referring physicians to speak directly with a neurosurgeon or neurologist without going through an operator or long waits on the phone. Neurological problems that the 4-BRAIN line may be used for include intracerebral hemorrhages, subarachnoid hemorrhage, aneurysms, vascular malformations and brain tumors. The 4-BRAIN line is answered 24 hours a day, seven days a week.

Call 844-64-BRAIN (27246) for emergent neurosurgical transfers.
In the last few years, a revolution has been coming in the world of acute stroke care. In the past few months, this came to a head as we received results from several pivotal large international randomized controlled trials (RCT) evaluating the safety and efficacy of intra-arterial (endovascular) treatment of acute ischemic stroke (AIS) caused by large vessel occlusions (LVO). In some studies, LVOs affecting the internal carotid artery (ICA), middle cerebral artery (MCA), vertebral and basilar arteries have been estimated to be responsible for up to 50 percent of all ischemic strokes.1 Historically, these have been associated with a poor prognosis, as well as poor rates of vessel recanalization with intravenous recombinant tissue-type plasminogen activator (r-tPA) which, since its FDA approval almost two decades ago, has been the only available treatment option for AIS.

While the trials discussed in this article are new and significantly likely to alter the practice of managing AIS due to LVO, endovascular treatment itself is not an entirely new approach. A pivotal RCT to evaluate the efficacy of intrarterial (IA) thrombolysis was PROACT 2, published in 1999, showing a trend towards benefit, but not a statistically significant result.2 The use of IA thrombolysis was not approved by the FDA, but still was adopted by several large centers as rescue treatment for LVOs. This subsequently led to further modifications in techniques for recanalizing occluded intracranial vessels with the first generation thrombectomy devices, the MERCI and Penumbra.3,4 The MERCI device was a corkscrew-shaped device used to retrieve thrombus, whereas the Penumbra system used a suction catheter to aspirate the clot and recanalize the occluded vessel. Both of these showed promising results and were widely used, even in the absence of a RCT evaluating their clinical efficacy to achieve good functional outcomes.

To answer that issue, several RCTs were conducted and, much to the dismay of the vascular neurology community, showed little or no benefit of IA treatment compared with IV r-tPA alone.5,6,7 In the interim, however, there had been tremendous improvements in the technology and tools available to the neurointerventionalist, as two new devices had been tested and approved by the FDA. These second
A concurrent trial, the EXTEND-IA,11 was conducted in endovascular treatment in addition to IV r-tPA versus showed a statistically significant result in favor of using these trials have been published, and they have all then evaluate the efficacy of the stent-riever in AIS Several new RCTs were planned and conducted to engage it and then retrieved with the delivery wire stents which are deployed within the clot in order to “stent-retrievers” or “stent-rievers” – self-expanding generation devices, the Solitaire and the Trevo, were “stent-retrievers” or “stent-rievers” – self-expanding four to achieve one independent functional outcome. The last in this series of trials evaluating endovascular therapy for AIS to be reported was the REVASCAT,14 which was conducted in Catalonia, Spain. This trial also was stopped early after the other thrombectomy trials reported their positive results resulting in a loss of equipoise. REVASCAT found 43.7 percent of patients in the endovascular group to be functionally independent compared to just 28.2 percent in the IV r-tPA group, which was statistically significant. It is important to note that the vast majority of patients in both arms of all these trials did receive thrombolytic therapy in the form of IV r-tPA, and these positive results suggest that the role of endovascular therapy would be adjunctive to rather than as an alternative to intravenous treatment. However, in patients ineligible for IV thrombolysis, endovascular treatment still remains a viable alternative. It also is important to note that in addition to efficacy, all the above trials found endovascular thrombectomy to be safe, without any significant increase in intracerebral hemorrhage or mortality.

The results of these trials have been received with great enthusiasm amongst those of us who care for these complex and critically ill patients. From the perspective of a vascular and interventional neuroradiologist especially, it is extremely heartening to know that we have another very efficacious option in our arsenal. This will not only help reduce morbidity and mortality due to AIS, but also shorten hospital stays, hasten recovery and allow these patients to return to work, thereby reducing the cost burden on the health care system and economy.

These trials do leave a few unanswered questions, which further studies and analyses will hope to answer. What is the best way to select patients who will likely benefit most from endovascular treatment? How can we offer these treatments to as many patients as possible, in the most efficient way possible? What, if any, is the time window for endovascular treatment since the time windows in these trials varied from 6-12 hours? These trials are certain to impact systems of care as well as influence the way stroke centers triage and treat these patients. There may now be a more urgent need to identify patients with LVOs either by clinical examination or vascular imaging and then triage them to a center offering these procedures. It is estimated that at large referral centers, 5-10 percent of all ischemic stroke patients may be candidates for these procedures.16

We at Palmetto Health and the University of South Carolina School of Medicine are proud to be at the forefront of providing stroke care in the Midlands. We are uniquely placed in our ability to offer 24/7 coverage with neurology, a young neurology residency program, three fellowship-trained neurointerventionalists and leaders of both neurology and neurosurgery departments who have special interest and training in cerebrovascular disease. Over the years, we have been performing these procedures as they have evolved and are constantly working to optimize our protocols to offer these treatments to as many eligible patients in as timely a fashion as possible (Figure 2). We look forward to what promises to be a bright future in the treatment of cerebrovascular disease. •

**Bibliography:**

Contact us for more information or to refer a patient

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Our Vision: To be remembered by each patient as providing the care and compassion we want for our families and ourselves.