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Cutting-Edge Interventions for the Acute Stroke Patient

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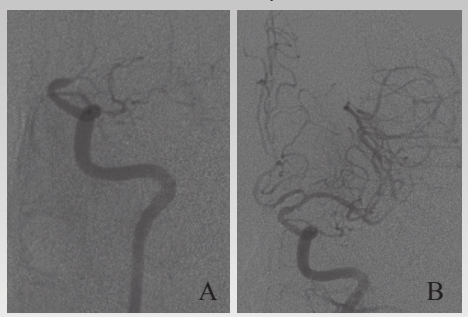
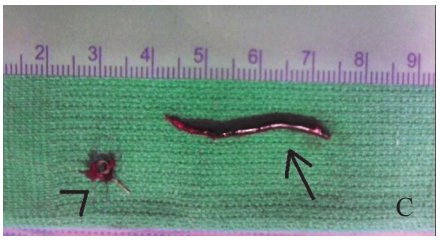
Stroke is the third leading cause of death in the United States after heart disease and cancer, resulting in an astounding 700,000 people suffering from a stroke each year (1). Approximately 87% of these strokes are ischemic infarcts with a reduction in cerebral blood flow to the brain. Studies suggest that early recanalization correlates with better outcomes (2) as a result of saving the ischemic, but not yet infarcted, penumbra. Although IV-tPA therapy has shown some benefit compared to placebo treated patients up to 3 hours after onset of symptoms (3), there remain a large number of patients that are either not candidates for such treatment or do not improve after IV tPA.

New Jersey Medical School-UMDNJ Comprehensive Stoke Center is one of the few hospitals in the state that can offer a variety of interventional options for these acute stroke patients. The intra-arterial infusion of tPA is one commonly utilized first step in interventional stroke treatment and has proven to be effective in cases up to 6 hours after symptoms onset. However, because of the risk of intracranial hemorrhage associated with thrombolytic therapy (both IV and IA) and hopes of expanding the treatment time-window, newer mechanical devices for embolectomy are increasingly favored. The two FDA approved devices that are used most commonly at our institution are the Penumbra Stroke System (Penumbra, CA) and the MERCI clot retrieval device (Concentric Medical, CA), which have rates of recanalization ranging from 67-100% in published studies (4,5). Depending on the location of the occlusion, mechanical embolectomy allows for the treatment of patients for 8-12 hours after the onset of stroke symptoms with superior results in selected cases.





As a tertiary and quaternary academic referral center, and in an attempt to offer more evidence-based treatments for our patients, we are now one of the few institutions in the country participating in the Penumbra Imaging Collaborative Study (PICS). This prospective, multi-institutional clinical trial attempts to objectively define the relationship between the pre-treatment ischemic penumbra and outcomes in patients treated with mechanical embolectomy. The hope is to be able to understand subtle imaging characteristics predictive of recanalization success, offer this treatment to a wider range of patients and thus improve the outcomes from this devastating disease. ■

Drs. Gandhi and Prestigiacomo specialize in Cerebrovascular and Endovascular Neurosurgery. In collaboration with Stroke Neurology they provide comprehensive care for a wide range of neurologic conditions and support the Stroke Centers at University Hospital and Jersey City Medical Center. They can be reached at 973-972-9626

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Figure Legend: Angiogram showing occlusion of intracranial internal carotid artery (A), and recannalization after Prenumbra treatment (B). Typical clot retrieved with MERCI (C). Model of Prenumbra device aspirating a clot (D).

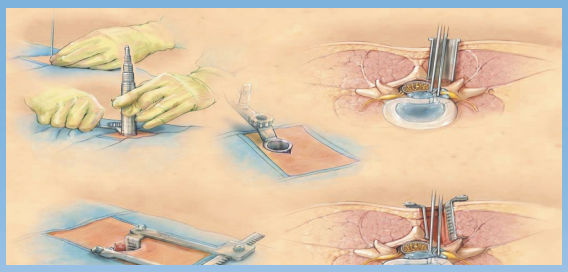

Figure 1. Illustration of microendoscopic diskectomy. From Arts MP, et al. Tubular Diskectomy vs Conventional Microdiskectomy for Sciatica: A Randomized Controlled Trial. JAMA, July 8, 2009; 302: 149 - 158.

Minimally Invasive Spine Surgery: Smaller Incisions and Faster Recovery from Complex Spinal Surgery

Low back pain may occur following an accident, following heavy activity, or arise spontaneously. In many cases this discomfort will resolve spontaneously or be treated successfully in a conservative manner – with noninvasive treatment, such as physical therapy, analgesics, or chiropractic manipulation. For pain associated with deformity, nerve dysfunction, or that which is disabling and has not responded to nonsurgical care, spinal surgery is often the answer.

Innovations to improve intraoperative visualization, dissection techniques, and means to stabilize the spine have changed the face of spine surgery. The operating microscope permitted the lumbar diskectomy to be performed through smaller corridors, leading to the microdiskectomy. Pedicle screw instrumentation enabled surgeons to treat spinal deformities and attain solid bony fusions to an extent not possible prior to its advent.

Minimally invasive spine surgery represents another evolutionary step forward. Many surgical disciplines have embraced endoscopic- and portal-based techniques to enhance visualization and perform operations without the large incisions, muscle injury, and pain

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associated with traditional open surgery. The laparoscopic cholecystectomy (endoscopic gallbladder removal) is performed through three incisions, each only ½ inch in length, compared to the open operation with a foot-long incision across the torso. It is of no surprise that the length of stay associated with the endoscopic procedure is less than one third that of the open operation and that within 4 years of its introduction, endoscopic surgery was performed more than 3 times as often as the open procedure.

Microendoscopic surgery has been gaining popularity among both surgeons and patients. The microendoscopic portal is a 12 to 24 mm tubular retractor through which standard operating instruments may be used to perform standard spinal surgical procedures without the need to create the long incisions or perform the muscle-stripping steps required of open surgery (Figure 1).

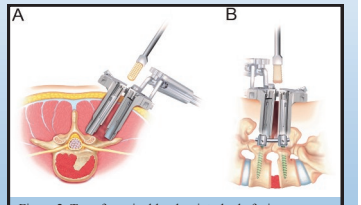

Figure 2. Transforaminal lumbar interbody fusion performed through tubular retractor. From: Dhall SS, Wang MY, Mummaneni PV. Clinical and radiographic comparison of mini-open transforaminal lumbar interbody fusion with open transforaminal lumbar interbody fusion in 42 patients with long-term follow-up. J Neurosurg Spine. 2008 Dec;9(6):560-5.

The minimally invasive transforaminal lumbar interbody fusion (MIS TLIF) utilizes the microendoscopic portal as well as percutaneous pedicle screw fixation to perform spinal decompression and circumferential fusion through an incision 90% smaller than that used for the comparable open operation (Figure 2). Utilizing a posterolateral approach, this procedure traverses the paraspinal muscles, rather than stripping the muscles from the spine and retracting them to the lateral borders of the spine. With this approach, far less exposure is required, far less retraction distance and retraction pressure on the muscles is required, and the same goals of surgery – decompression and instrumented fusion – are accomplished. ■

Ira M. Goldstein, MD
Dr. Goldstein is fellowship trained in spinal surgery. He specializes in minimally invasive spine surgery. He may be reached for consultation at 973-972-8211.

Meet Dr. James K. Liu

Dr. James K. Liu is the Director of Skull Base and Pituitary Surgery at the Neurological Institute of New Jersey. He is renowned for his treatment of complex brain tumors and skull base lesions, including pituitary tumors, acoustic neuromas, meningiomas, and chordomas. Dr. Liu performs the most innovative surgical techniques, including in minimally invasive endonasal endoscopic surgery, image-guided keyhole microsurgery, and laser-assisted tumor surgery to achieve the best results for his patients. He also specializes in cerebrovascular bypass procedures for carotid occlusion, complex aneurysms and skull base tumors, as well as microvascular decompression for trigeminal neuralgia and hemifacial spasm.

Dr. Liu has published extensively with over 85 peer-reviewed publications, over 100 abstracts, and 13 book chapters. He has taught many hands-on courses in skull base surgery and lectured nationally. He is active in numerous professional societies and recently served as one of the Scientific Program Co-Directors for the Annual Meeting of the North American Skull Base Society.

Dr. Liu completed his undergraduate degree at UCLA and received his MD from New York Medical College. After completing his residency in Neurological Surgery at the University of Utah, Dr. Liu pursued advanced fellowship training in skull base and cerebrovascular surgery, and neuro-oncology at Oregon Health & Science University. Prior to joining UMDNJ and NINJ, Dr. Liu was Assistant Professor of Neurological Surgery and Co-Director of Skull Base Surgery and the Microneurosurgcial Simulation Laboratory at Northwestern University Feinberg School of Medicine. ■

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