

Northwestern Memorial First Hospital in Region to Perform New Frameless Technique for Brain Surgery

Technique makes bulky head frame unnecessary, increases patient comfort

Patients undergoing deep brain stimulation (DBS) surgery for Parkinson's disease and other movement disorders have traditionally faced a lengthy and uncomfortable procedure. Historically, the procedure has required the application of a stereotactic head-frame: a cumbersome halo-like device that is secured—before surgery, under local anesthesia—with four pins to the patient's skull. The frame guides surgeons in a procedure where accuracy is paramount; but the frame is bulky, uncomfortable, and restrictive for patients who must undergo surgery while awake and off medications.

Northwestern Memorial Hospital has helped to pioneer a new frameless technique to perform deep brain stimulation and other functional neurosurgical procedures. NMH was the first hospital in the Chicago area, and one of a handful nationwide, to offer the procedure. The frameless technique allows the patient's head and neck to be mobile during the surgery, allowing for greater comfort and less anxiety. The frameless technique also decreases operating room time and permits imaging and planning to be done prior to the surgical procedure itself.

Joshua M. Rosenow, MD, the director of Functional Neurosurgery at Northwestern Memorial and assistant professor of Neurosurgery at Northwestern University's Feinberg School of Medicine, helped design the frameless technique.

Deep brain stimulation is used to treat patients with movement disorders such as Parkinson's disease, essential tremor, and dystonia where medication has failed to adequately control symptoms. DBS involves targeting a specific area of the brain with electrical impulses to affect the patient's movement. The targeting is accomplished with the use of three-dimensional scanning techniques including computed tomography (CT) and/or magnetic resonance imaging (MRI) coupled with sophisticated brain mapping using microelectrode recording of neuronal signals.

For patients suffering from movement disorders who must forgo their medications that day, the experience can be unpleasant, as patients must remain perfectly still for hours with the frame attached to their heads. This can be difficult and can lead to back and neck pain. In addition, some patients who are perfect candidates for deep brain stimulation simply cannot tolerate the procedure due to claustrophobia induced by the frame. All of these problems are almost completely avoided with the frameless technique.

In the frameless technique, and under local anesthesia, a plastic trajectory guide that Dr. Rosenow helped develop is attached to the skull using small screws through the same incision for placing the stimulating electrode. The head is unrestrained and the patient can adjust himself/herself for comfort throughout the procedure. The frameless technique has proven to be just as accurate as frame-based stereotaxy.

In deep brain stimulation, permanent stimulation electrodes are implanted in the brain and are connected to a stimulator or pulse generator resembling a pacemaker. Implanted underneath the skin of the chest, the stimulators are programmed by physicians using handheld computers. The physician can increase or decrease the stimulus as needed.

Dr. Rosenow came to Northwestern Memorial Hospital in 2003 from the Cleveland Clinic Foundation. He specializes in deep brain stimulation for the treatment of Parkinson's disease and other conditions, surgery for epilepsy, surgery for chronic pain and spasticity, stereotactic surgery, and functional brain mapping.