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Neurosurgical Associates, Ltd.

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By Marian Deegan

The central nervous system is one of the last frontiers in medicine. Navigating the brain, spinal cord, peripheral nerves and their supporting structures is the challenging arena of the neurosurgeon. Guiding a patient with a nervous system disorder through treatment options is a complex task. Multiple subspecialty options are available, patient consequences can be profound, and diagnosis does not always point to a straightforward treatment plan.

The neurosurgeons at Neurosurgical Associates, Ltd. approach these challenges with a commitment to thoughtful diagnosis, a multidimensional emphasis on teaching and research, and a touching tenderness for their patients. The practice offers extensive experience treating adults and children in the areas of complex traumatic and degenerative spine conditions, neuro-oncology, stereotactic surgery, peripheral nerve surgery and deep brain stimulation (DBS). This group of nine respected neurosurgeons is one of the largest active neurosurgical practices in the five-state area. Neurosurgical Associates, Ltd. serves Abbott Northwestern Hospital, Fairview Southdale Hospital, Fairview Ridges Hospital, Fairview University Hospital, Hennepin County Medical Center (HCMC) and Minneapolis Children's Hospital. Group neurosurgeon Dr. Jon McIver also performs DBS surgery at Methodist Hospital.

Founded in 1963, this comprehensive private practice is recognized for its leadership with innovative brain and spinal treatments, commitment to teaching and resident training through the University of Minnesota and groundbreaking brain injury research in conjunction with HCMC. It is not surprising to learn that some of the group's neurosurgeons were drawn toward medicine from an early age.

"According to my mom, I decided that I was going to medical school when I was 4 years old," chuckles Dr. Thomas Bergman,

Dr. Mahmoud Nagib, President of Neurosurgical Associates, Ltd.

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Dr. Thomas Bergman and Dr. John Mullan discussing a patient's MRI images.

partner at Neurosurgical Associates, Ltd. and Assistant Chief of Neurosurgery at HCMC. "The nervous system has always fascinated me." After doing research in neurophysiology as a Princeton undergraduate, Dr. Bergman attended medical school at the University of Minnesota. A fortuitous meeting during his first week of medical school charted the course of his career.

"Some fellow students and I had an opportunity to tour Hennepin County Medical Center," Dr. Bergman recalls. "To this day, I vividly remember Dr. Gaylan Rockswold, the Chief of Neurosurgery, walking into the ICU in his white coat. He was treating a patient with severe head injury. As he explained his approach, I thought, 'Wow. This is what I want to do.'" Within months, Dr. Bergman began head injury research with Dr. Rockswold. A neurosurgery residency under Rockswold's mentorship followed. The mentor-student relationship evolved into a partnership between colleagues. Their collaboration has continued through the present. Joined by Dr. Walter Galicich of Neurosurgical Associates, Ltd., Drs. Rockswold and Bergman are currently directing research at HCMC to study the use of hyperbaric medicine in the treatment of traumatic brain injury.

The HCMC hyperbaric program for brain injury is the largest program of its kind in the country. "Hyperbaric oxygen improves the brain's ability to metabolize oxygen and seems to improve outcomes after trauma," Dr. Bergman explains. "We are finishing a three-year NIH grant that has tracked outcomes for patients receiving hyperbaric treatment once a day for approximately a week. Oxygen metabolism seems to improve mitochondrial function, allowing it to utilize oxygen more effectively. We've proven that hyperbaric treatment decreases mortality by 50%. It is one of the few treatments in head injury research that has ever dropped mortality this significantly. However, not everybody does well. Some patients survive without improving greatly. We are working on funding for the next phase of the study, a multicenter grant in which 10 national centers will participate. By expanding our research, we are hoping to find that hyperbaric treatment improves outcome in large numbers across the country."

Although Dr. Bergman's research involves brain injury, the lion's share of his private practice focuses on the treatment of spine disorders. "Over 60% of our practice is spine," notes Dr. Mahmoud Nagib, President of Neurosurgical Associates, Ltd. "All of our neurosurgeons do spine work. Drs. Bergman, Galicich, Hames and Watts do outstanding work in complex spine aspects of neurosurgery. Dr. Michael McCue treats spine and brain tumors in adults and children.

"Many people don't realize that 70% of neurosurgical practice involves the spine," Dr. Nagib continues. "Some neurosurgical

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Dr. Charles Watts and Dr. Sabrina Walski-Easton reviewing a surgical approach on a brain model used for educating patients.

practices do only spine procedures. We feel that there is an advantage in working with both brain and spine. Our analysis is informed by a larger picture of affect between the brain and spine than if we specialized in one area alone."

An estimated 75-80% of people suffer a back problem at some point in their lifetime. Although 90% of these cases improve through nonsurgical treatments, patients who do not improve with conservative therapies are referred for surgery.

Dr. Bergman emphasizes a thoughtful, conservative approach to diagnosing spine issues. "Patients have a difficult time navigating conflicting medical opinions," he explains. "I see a lot of patients after they've solicited three opinions or more, and they are still confused about their surgical options. It's very difficult, because often there's not a single approach. I spend a lot of time with each patient. I want to understand their life so that I can teach them about their disease and their options. Then, we can make a decision together about the best approach for their particular circumstances."

Dr. Sabrina Walski-Easton agrees, noting that patients should try some conservative therapy like physical therapy or analgesic treatment before considering surgery. "The patients who benefit the most from surgery are those who have tried conservative therapy, but find that it isn't working," she explains. "These are the people we want to see, to explore other options that might speed along their recovery. I'm always happy to talk to referring physicians if they are not sure whether it's time to consider surgery, or to determine whether there are other options they might want to try first."

I'm proud of the way our neurosurgeons work with our patients," says Dr. Bergman. "Our No. 1 priority is to meet our patients at their level of understanding."

Dr. Bergman recalls a young mother he treated for a congenital spinal dislocation. "She lived in a small town and had three young children," he remembers. "She had been struggling with a degenerating condition for more than five years. Simply caring for her children had become almost more than she could manage. She was unable to exercise; simply walking hurt her. Everyone she'd consulted felt that her condition was unfixable. Her alignment was so severe that it was starting to swing her pelvis out. Through an eight-hour procedure, we rebuilt her lower lumbar spine. Today she is six months out of surgery and completely pain free. She even gained 2 inches in height. This woman was such a trooper. Being able to help her was special."

Dr. Jon McIver is the most recent neurosurgeon to join Neurosurgical Associates, Ltd. His clinical focus emphasizes DBS for movement disorders, dorsal column stimulation for failed back syndrome, minimally invasive treatment of spinal disorders and radiosurgery. "DBS is a well-accepted protocol for the movement disorders like essential tremor," he explains. "These diseases are treated first with medication. With every year of medication, however, there's about a 10% chance of developing side effects. Over time, medications gradually become less effective. At the 10-year mark, almost everyone on medication experiences side effects. DBS treatment can continue to achieve the results that medication originally provided."

A full DBS procedure can take up to six hours, with the patient awake for the first two-thirds of the process. A frame or helmet is attached to the patient's head via two screws in front and two in back. MRI or CT scans help to define different structures in the brain, and then probes are passed to listen to the cells. "You can actually hear cells firing," Dr. McIver affirms. "They sound like static. Some are louder, some faster, some regular and others sound irregular. We listen for characteristic cell sounds, which guide us in placing a final electrode and stimulating the appropriate area.

"No one really knows how DBS works," Dr. McIver says reflectively. "Theories suggest that it may cause increased or decreased neurotransmitter release or simply stimulate different parts of the nerve. What we do know is that DBS helps decrease required medication amounts as well as disease fluctuations. It improves patient quality of life, and works particularly well

with patients who have a combination of symptoms like tremor, stiffness and slowness of movement. DBS is a proven protocol for Parkinson's disease and other movement disorders like dystonia. We are still in the experimental stage in considering DBS treatment for pain, disorders of mood and thought and compulsive conditions like obsessive-compulsive disorder and epilepsy.

"Patients feel a lot of fear facing these conditions," he says. "My first priority is to listen to what a patient is saying. You can make surgical recommendations based on imaging, but that doesn't mean that you should. I work closely with my patients and their referring physicians to make sure that the patient symptoms fit the imaging. In complex cases, our group of neurosurgeons frequently collaborates to provide patients with the benefit of multidisciplinary expertise. Dr. John Mullan and I have collaborated on a number of challenging cases. Dr. Mullan has expertise with a balloon microcompression procedure that complements my training in glycerol rhizotomy. By working together, we are able to pool our expertise to provide the best procedure for the patient."

Dr. Mullan is also known for his work with stereotactic radiosurgery. Radiosurgery delivers a single, high dose of radiation with focused precision to specific areas of the brain to treat abnormalities, tumors or functional disorders.

"Every member of our practice, from neurosurgeons to our excellent nurses, nurse practitioners and physician assistants shares a commitment to patient care," Dr. McIver concludes. "I find our team approach to be very valuable."

Neurosurgical Associates, Ltd. has pioneered evolving technologies to maximize surgical success and minimize recovery times. Last year, the Neuroscience Institute at Abbott Northwestern Hospital was the fifth in the world to install an intraoperative MRI (iMRI) suite. Neurosurgical Associates, Ltd. surgeons have since performed more

Dr. Mahmoud Nagib performing spine surgery

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Neurosurgical Associates, Ltd. from left to right: Dr. Michael McCue; Dr. Charles Watts; Dr. Thomas Bergman; Dr. Sabrina Walski-Easton; Dr. Walter Galicich; Dr. Edward Hames, III; Dr. John Mullan; Dr. Jon McIver; and Dr. Mahmoud Nagib

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than 140 iMRI-guided operations to treat epilepsy, movement disorders and brain tumors.

"Neural navigation and intraoperative MRI are landmarks of our practice which benefit both spine and brain surgery," says Dr. Nagib. "Brain imaging allows us to see the tracts, or motor nerve pathways, that carry the sensation from the body to the brain. When we treat tumors, we can see whether the tumor has invaded a tract, or whether the tumor has pushed the tract away. This is important information to know for both invasively malignant and benign tumors. Today, eight out of 10 patients with brain tumors are handled with iMRI. Intraoperative technology improves outcomes by enabling neurosurgeons to scan patients during operations, ensuring that all residual tumor tissue is removed and reducing the need for repeat surgeries. It has been a major accomplishment."

Group neurosurgeons also work with intraoperative CT scans during spinal surgery to explore parts of the spine prior to beginning a procedure, and to place instrumentation like metal rods and screws precisely. These guidance systems enable surgical accuracy within 1 or 2 millimeters and with three-dimensional direction.

"Another recent innovation is an artificial disk for the neck," notes Dr. Nagib. "The disk is an alternative to cervical fusion, and is able to preserve more neck mobility for certain patients."

"Sometimes," comments Dr. Walski-Easton, "I fear that we don't see patients who would benefit from surgery due to concerns that treatment means a week in the hospital and five months recovery. We want patients and referring physicians to know that today, minimally invasive surgery provides more options and opportunities for patients, with faster recovery."

"We work closely with referring primary care physicians, chiropractors and case managers to make sure that patients have tried all conservative treatment," says Dr. Bergman. "Choosing a surgical option has to be a thoughtful, conscious decision. Dr. Nagib regularly reviews MRI reports and scans in consultation with referring practitioners to help provide direction and guidance. I spend 45 minutes to an hour with each patient, because I really think it's important to meld the patient, his personality, his family and his life with his problem and his diagnosis. Listening is the key to treatment. There is so much gratification in being able to help patients fix what's wrong. I love operating, but if you ask me really, why we are so dedicated to research and emerging technology, it's because the knowledge and expertise we acquire enables us to make a difference in the lives of our patients." ■