Somatosensory Evoked Potentials (SSEP) aid in placement of spinal cord stimulator

by Jeffrey Balzer, PhD

Epidural spinal cord stimulation (SCS) has emerged as a successful treatment for chronic pain disorders such as failed back syndrome, complex regional pain syndrome (CRPS) and peripheral vascular disease.

Cervical SCS is less commonly utilized but also has proven effective for pain syndromes such as upper extremity CRPS, intractable facial pain, angina pectoris and post-amputation limb pain.

While thoracolumbar epidural electrodes are commonly placed with local anesthesia and conscious sedation so the patient may communicate with the surgical team and confirm that regions of pain are satisfactorily treated, placement of surgical cervical epidural leads requires general anesthesia for reasons of safety, patient comfort, and the need for head immobilization. Although modern multi-contact electrodes have expanded our capability for manipulating the distribution of stimulation current postoperatively, the initial location of the electrode lead is the predominant factor which determines whether stimulation will be effective for treatment of painful regions. Moreover, stimulation of regions not involved in the pain syndrome may cause patient discomfort and therefore limit the therapeutic efficacy of the ultimate treatment by altering the tolerance threshold of stimulation parameters.

Since paddle type electrodes are placed in the epidural space via a partial laminectomy or hemilaminectomy, it can be difficult to control their medial-lateral trajectory. Intraoperative fluoroscopy is helpful for estimating lead laterality but will not ultimately confirm if one or both sides of the spinal cord will receive clinically significant stimulation. Consequently, after the surgeon’s best efforts to position a paddle electrode, there has been a need to develop a methodology to objectively confirm the location of cervical epidural electrodes without patient cooperation.

Somatosensory evoked potentials (SSEP’s) have become a mainstay of neurophysiologic monitoring in spine surgery due to their high sensitivity and specificity for identifying spinal cord injury and proven ability to reduce new postoperative neurological deficits. The potential of SSEPs to assist with localization in the nervous system has been shown by their ability to identify functional regions of the human cortex during brain surgery. Several studies have demonstrated that SCS reduces the amplitudes of short and mid-latency SSEPs, and this decrease of primary somatosensory cortical activity may contribute to the analgesic effect of SCS. We have taken further advantage of our routine SSEP monitoring to correctly lateralize and optimize electrode position during cervical and cervicomedullary SCS surgery.

Data from 44 patients undergoing SSEP monitoring during cervical laminectomy or hemilaminectomy for placement or replacement of dorsal column stimulators were reviewed. Leads were positioned laterally or just off midline and parallel to the axis of the cervical spinal cord to effectively treat what was most commonly a predominant unilateral pain syndrome. During SSEP recording, the spinal cord stimulator lead was activated and intensity increased in increments of 1.0 V to a maximum of 6.0 V. A unilateral reduction or abolition of SSEP amplitude was regarded as an indicator of lateralized placement of the stimulator. A bilateral diminutive effect on SSEPs was interpreted as a midline or near midline lead placement. Epidural stimulation abolished or significantly reduced SSEP amplitudes in all patients undergoing placement for a unilateral pain syndrome. In 15 patients, electrodes were repositioned intraoperatively to achieve the most robust SSEP amplitude suppression using the lowest epidural stimulation intensity. In all cases where a significant unilateral reduction in SSEP was observed, patient reported postoperative sensory alterations in target locations predicted by intraoperative SSEP changes. Placement of cervical spinal cord stimulators for bilateral pain syndromes often resulted in bilateral, although asymmetric SSEP changes. In no cases were significant changes, other than those induced using the device to directly stimulate the dorsal surface of the spinal cord, observed. No case of new postoperative neurological deficit was observed.

This technique, which utilizes well-established routine SSEP recording, does not require additional training nor does it add significant time to the procedure. We are aware of continued advancements in SCS lead technology and that our efforts in lateralization could potentially be obviated by placing multiple parallel leads or wider paddle leads with multiple rows of embedded electrode contacts. However, in the cervical spine, where the

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Towards better clinical outcomes

Every neurosurgeon does their utmost to perform a surgical procedure without complication. Though this outcome is always desirable, it is not always achievable. Surgical training and techniques as well as new technologies have significantly improved the quality of patient care. However, a limitation in achieving lower neurological deficits is our inability to continuously evaluate the function of the central and peripheral nervous system during these procedures. This is an important concept, as damage to the nervous system cannot be reversed if it is not contemporaneously detected.

The answer to our inability to dynamically assay the neural axis during these procedures lies in the utilization of intraoperative neurophysiological monitoring (IONM). Multimodality IONM provides continuous monitoring of central and peripheral nervous system function during a variety of surgical procedures. Any change in responses allows for real time feedback to the surgical team and subsequent intraoperative interventions thereby preventing neurological deficits and improving outcomes.

The Center for Clinical Neurophysiology (CCN), part of the Department of Neurological Surgery—organized 32 years ago—provides multimodality IONM services and is an integrated part of our surgical team. We are able to extend this valuable service to other surgical disciplines as well including orthopedic surgery, cardiothoracic surgery, otolaryngology, and vascular surgery.

CCN has also made significant strides in using cutting edge telemedicine advancements to make IONM available in real time to smaller community and rural hospitals—facilities that may otherwise not be able to offer IONM, helping reduce health care costs while improving quality care access.

In addition to providing a distributed clinical service, the staff at CCN has also advanced the field of neurophysiology at the national and international levels through teaching and published clinical research.

I’m proud of the clinical and academic productivity of the CCN. We will constantly innovate and improve our quality of care. With the energy and enthusiasm shown by the faculty of CCN, I’m confident that the best is yet to come.
Intraoperative neurophysiological monitoring (IONM) can reduce the incidence of complications during complex neurosurgical, orthopedic, spinal, cardiothoracic, vascular, otorhinolaryngology, interventional neurology, and interventional cardiology in adult and pediatric surgeries. Somatosensory evoked potentials (SSEPs), transcranial motor evoked potentials (TcMEPs), electromyography (EMGs), electroencephalography (EEG) are the common modalities used to perform IONM.

Specifically, IONM with SSEPs and TcMEPs during idiopathic scoliosis fusion (ISF) has been shown to decrease the incidence of paraplegia during surgery. In addition, IONM with SSEPs and EEG can be used during carotid endartectomies to inform the surgeon about the need for shunting to improve cerebral perfusion and decrease the risk of stroke.

IONM data interpretation can be performed by a board certified neurophysiologist both in the operating room (in-house), as well as via remote connection (telemedicine) using a secure internet connection. Approximately 750,000 surgical procedures use IONM nationally, of which the majority are performed via telemedicine.

Telemedicine—where a professional medical service is delivered via the internet—is a rapidly growing specialty of medicine. Studies have shown that telemedicine can increase access to care at a significantly lower cost.

Some hospitals, especially rural and small community hospitals, have difficulty in providing similar services as a large university hospital usually due to a lack of board certified neurophysiologist. These facilities rely on telemedicine to provide high quality care.

Typically during IONM, a certified technologist connects the patients to machine by the use of electrodes. Once connected to the machine in the operating room, data can be interpreted by the neurophysiologist in-house or remotely where the data is transmitted using a secure HIPAA compliant internet connection.

In our practice the number of procedures performed using telemedicine services has grown significantly over the last six years (figure 1). However, the question sometimes is can a professional medical service be performed in an effective manner using telemedicine.

At UPMC, we evaluated whether IONM can be effectively performed using telemedicine. We evaluated patients who underwent carotid endarterectomy (CEA) both at our main UPMC Presbyterian and community hospitals within and outside the system. We collected their preoperative comorbid conditions, their IONM data and post operative neurological outcomes. UPMC Presbyterian patients had more complex medical problems and many of them were admitted to the hospital for an unrelated medical condition. Our results indicate we identified similar number of changes in IONM data during the procedure irrespective of the setting. However, the post operative neurological complications were higher for the in-house group, secondary to their more in-complex medical problems.

In addition we collected similar information in patients who underwent idiopathic scoliosis fusion at Children’s Hospital of Pittsburgh (CHP). CHP moved from a building attached to the main Presbyterian building a few years ago, to a new building approximately five miles away. After the move, our team provided IONM services for the scoliosis patients via telemedicine. The mean age and their scoliosis curvature were not significantly different in children when IONM was performed in-house as compared to remote. Our results indicate we identified similar number of changes in IONM data during the procedure irrespective of the setting. There was no difference in the incidence of paraplegia after the procedure.

Results at UPMC indicate that IONM during CEA and ISF can be reliably performed via telemedicine by a board certified neurophysiologist, improving access to care and reducing the cost of coverage to community hospitals.
Micro-Electrode Recording (MER) proves effective in targeting DBS devices

by Donald Crammond, PhD

Deep Brain Stimulation (DBS) has been approved for the treatment of Parkinson’s Disease (PD), Essential Tremor and Dystonia for a decade in the United States and more recently to treat Obsessive Compulsive Disorders (OCD). The movement disorder program at UPMC now has an experience of treating over one hundred PD patients all of whom have optimally placed DBS electrodes and all of whom have benefited from DBS therapy.

We have reported several factors that are associated with good clinical outcomes in DBS therapy including the DBS electrode being well-placed as well as patient age at the time of DBS implantation. For example, younger patients with a dominant symptom of rigidity have significantly improved rigidity at one year after surgery compared to older PD patients. In contrast, older PD patients with dominant dyskinesia symptoms have more improvement with DBS therapy compared to younger PD patients with dyskinesia.

There is yet little long-term follow-up data looking at outcomes of DBS therapy in dystonia although the data to date shows considerable promise of DBS therapy, especially in children where the target structures are smaller than in adults and require very precise DBS electrode placement. We also previously reported on implanting the youngest known patient to receive DBS implants for the treatment of dystonia.

The DBS device is comprised of two components, a DBS electrode that is permanently implanted into the target structure in the brain and a battery pack or Implanted Pulse Generator (IPG) that is inserted like a pacemaker into the chest.

Typically, DBS surgeries are performed in two stages, one to implant each component. In Stage I, the DBS electrode is implanted into the target structure which depends on the clinical condition being treated. The two deepest targets are in the basal ganglia, which lie at the base of the brain. In Dystonia, the focus is on the Globus Pallidus (GP), and in PD the target is the Sub Thalamic Nucleus (STN).

In most patients, the DBS electrode is implanted on both sides in a surgical procedure in which the patient remains awake treated with local anesthesia of the scalp. Altered levels of activity in the basal ganglia structures that comprise the motor system are the hallmark characteristic of all movement disorders. Implantation of DBS into the target structure and subsequent application of trains of electrical stimulation significantly reduce patient symptoms and augment the ongoing medical management of these disorders.

Although the mechanisms underlying DBS treatment remain poorly understood, DBS is known to act by reducing the high levels of inhibitory neuronal discharge signals that occur in the deep motor nuclei of movement disorder patients, an inhibitory signal that is associated with delayed movement initiation and with slow and shuffling gait.

Additionally, DBS also functions to restore the normal patterns of neuronal discharge arising from these structures that left untreated result in unbalanced motor signals that are evident as tremors and shaking.

One key to successful DBS surgery is to place the DBS electrode within the target structure (GP or STN) in a location where the DBS electrical pulses activate the intended target structure alone without spreading electrical current to adjacent neural structures which would result in adverse effects being recorded. For example, a misplaced DBS electrode could cause increased motor contractions or cause altered sensations to occur such as somatosensory parasthesia or visual field phosphenes, etc.

Although initial DBS targeting always uses brain imaging in order to determine the three-dimensional stereotactic coordinates of the target structure in the brain, there are several issues that require perfect targeting to be a requirement for successful DBS therapy.

The first issue is that both the GP and STN are relatively small anatomic structures of about 5 mm x 10 mm x 5mm that lie 120 mm below the skull. In surgical planning, a trajectory is determined that starts at a point outside of the head and ends within the estimated center of the target structure. This trajectory can be thought of as having a cone shape where the cone base is the width of the target of about five mm. Any trajectory through the brain that remains within the cone will place the DBS electrode inside the target. However, for a tract to completely miss the target, the angular deviation (error) from the cone-shaped path need only be 2.4°. This is a small error that can easily be accounted for by small compounding errors in radiology imaging, stereotactic registration and anatomical factors that will vary from patient to patient that could result in a planned trajectory missing the target structure.

A second issue is that the four-contact DBS electrode is a few mm longer than the target structure so that some part of the DBS electrode cannot be placed inside the target structure. These anatomical and electrode scale factors combine so that accurate DBS placement requires direct confirmation of the electrode tip being placed centrally within the target so that the electrode tip is at the base of the target which means that a portion of the electrode remains above and outside of the target. The neurophysiological technique of microelectrode recording (MER) of single neuron (continued on next page)
Observation: Intraoperative neurophysiological monitoring of MVD for GPN

by Miguel Habeych, MD, MPH; Donald Crammond, PhD; Patha Thirumala, MD, MS; Jeffrey Balzer, PhD

Glossopharyngeal neuralgia (GPN), a disorder starting in the 5th decade of life, consists of the sudden onset of unilateral, paroxysmal, neuropathic pain at the throat, tonsillar fossa, tongue and inner-ear areas, lasting seconds to minutes. Triggered by swallowing cold liquids, yawning or sneezing, it can be accompanied by syncope with bradycardia and/or hypotension in 20% the cases.

Rare—0.7/100,000 in the general population—GPN has been shown to develop concomitantly to a vessel compressing the IXth cranial nerve (CN). Demyelination of subjacent axons leads to ectopic excitation/epileptic transmission, similar to the one observed in hemifacial spasm, that could represent the origin and perpetuation factor of this disorder’s symptoms.

First surgically treated by Walter Dandy in 1927, GPN’s microvascular decompression (MVD) was popularized in the 1970’s by our department.

GPN was the cause of only 2% of the total MVDS carried out in the U.S. between 1996 and 2000. However, the procedure has evolved from 5% mortality, 8% of lower CN’s permanent complications, and 79% of immediate success rates, to no mortality, more than 90% of primary success rates, and, a similar number of complications. GPN’s MVD decompressive effects have been demonstrated to persist beyond 10 years after surgery, and also work for recurrences, even those occurring after rizhottomies.

Intraoperative neurophysiological monitoring (IONM) of brainstem function using scalp based montages became available in the 1980s. This new technique was rapidly applied to posterior fossa surgery, as a means to reduce hearing loss complications after MVDs. Thus, a 6.6% reduction of the hearing loss rate of this complication was achieved with the addition of brainstem auditory evoked potentials (BAEPs) monitoring during these cases.

Electromyography (EMG) had been used since the 1960s for facial nerve IONM, but it was not applied in conjunction with BAEPs until the 1980s, for anatomical and functional preservation of CNs V, VII and VIII during acoustic neuroma cases.

Furthermore, the application of this technique to monitor the indemnity of other motor CNs was only a natural expansion of the field. Thus, oculomotor CNs (III, IV and VI) started to be monitored with EMG for skull base surgery at the cavernous sinus by Sekhar and Moller, also at UPMC in those same years, and, for lower CNs (IX to XII) for skull base surgery in and around the foramen magnum and clivus over the next decade.

Thus, recently we retrospectively evaluated twenty-seven (N=27) patients who received an MVD for GPN between January of 2008 and August of 2012. All received upper extremity somatosensory evoked potentials, BAEPs, and, free-running electromyography (f-EMG) of muscles innervated by CNs VII, IX and X ipsilateral to GPN symptoms. The sample was divided into those who received additional monitoring of CNs V or VI, and those who did not.

No differences were found of BAEP’s maximum delay (standard IONM vs. additional CNs IONM; p=0.101), or minimum amplitude of wave-V during MVD (p=0.593), between groups. In addition, no difference in the number of patients with EMG activity on CN V (p=0.423), CN VII (p=0.973), CN IX (p=0.683), or CN X (p=0.701) were also found.

Recently new techniques have been proposed to monitor lower CNs function; first, the use of a surface electrode on the cuff of a laryngeal airway mask to accurately monitor the function of the stylopharyngeus, only muscle innervated by the Glossopharyngeal CN in the pharynx, and responsible for the elevation of the larynx and pharynx during swallowing and speech. Also, the use of pharyngeal, transcranial motor evoked potentials recorded with a modified endotracheal tube with separated, surface electrodes along it. Although we welcome the introduction of new technologies and application of new techniques to the IONM field, we think that from the above mentioned, the first device needs to be more extensively tested, and the second technique improved.

With this study we demonstrate that monitoring additional EMG of CNs V or VI does not improve the efficacy of IONM to detect impending damage of the brainstem than traditionally monitored CNs (VII and VIII) during MVDs carried out to treat GPN.

MER allows for optimal post-operative programming of DBS implants

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activity is used as an adjunct approach to ensure that the DBS electrode is correctly placed within the target structure. MER involves the placement of a fine micro-electrode wire along the planned trajectory to the target. The micro-electrode is advanced using a fine resolution microdrive until it enters the target structure where neuronal activity is recorded. MER records the discharge patterns of single neurons that identify and confirm the location(s) of neurons within target structures. Characteristic patterns of neural activity produced by single target neurons have been associated with GP and STN as well as other adjacent neural structures such as the thalamus and Substantia Nigra. For example in PD, characteristic patterns of “burst” activity are recorded from STN neurons while in Dystonia, characteristic sustained high frequency neuronal discharge is recorded from GP neurons. By repeatedly recording from neurons and advancing the micro-electrode, the neurophysiology is used to identify each structure and to map its dimensions. Finally, the DBS is placed at specific coordinates revealed from the neurophysiology using the same positioning microdrive.

MER is done with the patient awake and interacting by performing various motor and speech tasks so that the neurophysiological mapping of the target is enhanced by functional mapping to better localize DBS placement within the target. By following up with patients undergoing DBS programming and evaluating their benefits from DBS therapy some correlations have been made between the location of the most effective of the four DBS electrode contacts used for stimulation to achieve the best treatment outcomes. Several reports have indicated that stimulation through contacts placed in the dorsal and posterior quadrant of the STN achieve the most optimal therapeutic results. Additionally, neurophysiological mapping has identified that electrodes placed within STN in locations with identified “kinesthetic” cells, are associated with good clinical outcomes. Kinesthetic cells are neurons whose activity can be modulated through active and passive joint manipulations as identified through functional testing in awake patients.

Through the use of advanced imaging and MER, UPMC movement disorder patients can be assured of receiving DBS implants that are well placed and that provide for optimal post-operative programming of the DBS.
A look at high-frequency hearing loss (HFHL) after MVD for hemifacial spasm

by Partha Thirumala, MD, MS

Hemifacial spasm (HFS) is a disabling condition which involves involuntary twitching of one side of the face. It usually starts around the eye and slowly progresses to involve the lower face. This condition is secondary to a pulsating blood vessel near the facial nerve at the level of the brainstem. Microvascular decompression (MVD) through a retromastoid craniotomy is curative in more than 90% of the patients. However the auditory nerve is at risk during MVD for hemifacial spasm (HFS) resulting in hearing loss (HL). The use of brainstem auditory evoked potentials has significantly decreased the incidence of HL after MVD. Although hearing loss (HL) has been reported, there are no studies focused on high frequency hearing loss (HFHL) in patients who underwent MVD. For the purposes of this article, we defined high frequencies as 4 kHz and 8 kHz, and an increase > 10dB in the pure tone audiometry within 1-2 weeks after MVD to constitute HFHL. Patients with significant HFHL may have deficiencies in high-frequency components of speech, such as consonant sounds, and can have difficulties understanding speech in the presence of background noise. The primary aim of this article is to report the incidence and discuss the causes of immediate post operative HFHL after MVD for HFS.

Hearing loss after MVD may occur for the following reasons: (1) stretching of the auditory nerve when retracting the cerebelum, (2) manipulation of the labyrinthine artery and/or the antero-inferior cerebellar artery, (3) direct trauma to the nerve by instruments or nearby coagulation and (4) neo-compression of the nerve by the prosthesis interposed between the offending vessel and the auditory nerve complex at the end of surgery. However, drill-generated noise can also cause or aggravate HL by a mechanism of acoustic trauma and deteriorating bone-conduction thresholds. Noise levels ranging from 120 to 122 dB-SPL (sound pressure level) during drilling in cortical bone and from 117 to 121 dB-SPL during drilling in the mastoid cavity have been reported. These sound levels are equivalent to an amplified rock concert in front of speakers, or a nearby airplane engine. The exposure to high intensity noise damages the hair cells of the cochlear structures. At the sub-cellular level, the tip links of a hair cell, which are thought to gate mechano-electrical transduction channels, are broken secondary to high intensity noise.

Audiometric testing in our study showed that most subjects had normal hearing levels at lower and middle frequencies (0.5-2kHz) after surgery. However, an increasing percentage of patients experienced significant post-operative pure-tone threshold changes in both ears characteristic of HFHL at higher tone frequencies. Studies found that drill-generated noise during craniotomy significantly affected high but not low frequency hearing. It has been shown that the short outer hair cells of the high-frequency region in the inner ear were found to be more vulnerable to sound stimulation than the taller receptor cells in the low-frequency area. It has also been proposed that higher hearing frequency may be more sensitive than lower frequencies to noise, acoustic trauma or ototoxic substances. HFHL might not be detected without an audiometric evaluation and importantly early diagnosis of HFHL may predict HL in lower frequencies. Studies have suggested that HFHL can be caused by drill noise conducted to the ear by vibration of the intact cranium.

Fortunately, studies performed on hair cells in animal models have reported evidence of re-established signal transduction upon regeneration of the tip links of hair cells in cultured explants. The time course of hair cell tip link regeneration suggests that this process might underlie recovery from temporary threshold shift induced by noise exposure. Unfortunately in our case we do not have long term follow up audiograms to evaluate hearing improvement.

HFHL is a significant under-recognized and under-reported problem in both the ears immediately after MVD for HFS. We believe that drill-induced noise, transient loss of CSF during MVD may impair hearing in the high frequency ranges both ears, with the side of the surgery affected the most. Since this is an interesting and early observation, long term follow up and prospective studies will establish causation and allow the team to intervene appropriately to decrease the risk of HFHL.

SSEP/spinal cord stimulator

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potential for post-laminectomy instability is greater than in the thoracic spine, we feel that a minimal exposure with small laminotomy and limited ligamentous disruption is prudent. Added cost and risk of infection aside, placing more hardware into the cervical epidural space to treat predominantly unilateral pain syndromes arguably exposes the patient to added neurologic risk. SSEPs can safely, easily, and successfully predict the lateralization of an epidural electrode and corresponding stimulation-induced paresthesias in patients undergoing cervical or cervico-medullary spinal cord stimulation. Continuous SSEP monitoring can be used to provide neurophysiologic surveillance of final electrode position by alerting the surgical team to an unintended movement of the electrode during anchoring and closing steps.
Pardini, Amankulor Join Faculty

Jamie Pardini, PhD, a specialist in the evaluation of neuropsychological functioning of patients with neurological disorders and Nduka Amankulor, MD, a specialist in the surgical treatment of complex brain and spine tumors, joined the Department of Neurological Surgery faculty recently.

Dr. Pardini received her PhD in clinical psychology with a subspecialization in psychology-law from the University of Alabama. She completed a pre-doctoral neuropsychology internship at the VA Pittsburgh Healthcare system.

In addition to her clinical practice, Dr. Pardini is also a researcher, lecturer, and educator in the field of mild traumatic brain injury and sports-related concussions.

Dr. Amankulor received his medical degree and neurosurgical training from the Yale University School of Medicine. He then completed a clinical fellowship in neurosurgical oncology at Memorial Sloan-Kettering Cancer Center in New York.

Dr. Amankulor is also a cancer biologist studying the biological underpinnings of gliomas and metastatic brain tumors.

Friedlander Installed as Endowed Chair in Neurosurgery

Robert M. Friedlander, MD, was formally installed as the Endowed Chair of Neurological Surgery at the University of Pittsburgh, January 14, in a formal ceremony presided over by Arthur S. Levine, MD, University Senior Vice Chancellor for the Health Sciences and Dean of the School of Medicine.

Dr. Friedlander is a renown expert in the operative management of complex cerebrovascular disorders and brain tumors. His research work in the evaluation of treatment strategies for neurodegenerative diseases (Huntington’s and ALS) is widely acclaimed, receiving significant media attention including major work published in Nature, Science, and Nature Medicine.

Brain Vascular Malformations Book Published

Ajay Niranjan, MD, Hideyuki Kano, MD, and L. Dade Lunsford, MD, are co-editors of a newly released book volume Gamma Knife Radiosurgery for Brain Vascular Malformations, describing the outcome of radiosurgery for arteriovenous malformations, cavernous malformations and dural arteriovenous fistulas.

The book, published by Karger, is volume 27 in the publisher’s popular Progress in Neurological Surgery series. Dr. Lunsford is editor of the series.

Grandhi Takes Top Award at Rowe Day

PGY-6 resident Ramesh Grandhi, MD, received the best presentation award at the eighth annual University of Pittsburgh Department of Neurological Surgery Stuart Rowe Society Lecture ship held on December 12.

Grandhi’s presentation “The Influence of Suturing the Surgical Approach in Age-Related Peridural Hyperemia in Craniosynostotic Rabbits” was one of ten research lectures presented by department residents during the day honoring Stuart Niles Rowe, the department’s first chairman and an early advocate of broad neurosurgical training.

PGY-5 resident Kimberly A. Foster, MD, received a runner-up award for her presentation, “Factors Associated with Hemispheric Hypodensity after Subdural Hematoma following Abusive Head Trauma in Children.”

In the News

• Elizabeth Tyler-Kabarra, MD, PhD, was noted in several media outlets in December regarding a study published in the online version of The Lancet detailing how a brain interface device allowed a quadriplegic patient to control a robotic arm.

• Peter C. Gerszten, MD, was featured in Prevention Magazine’s ‘Expert Center’ this past fall, answering a question on vertebral compression fractures.

• Michael Collins, MD, Mark Lovell, MD, and the UPMC Concussion Program were featured in a Wall Street Journal article November 19 dealing with the program’s efforts to improve the diagnosis and care of concussions in teens and children.

• David O. Okonkwo, MD, PhD, and Donald Kreiger, PhD, were featured in a December 2012 Open Science Grid Newsletter entitled “Harnessing OSG resources to realize the full potential of functional brain mapping.”

New Research Projects

• “Biomimetic Self-Adhesive Dry EEG Electrodes.” PI: Mingui Sun, PhD, $1,103,928, National Institutes of Health.

• “Wearable eButton for Evaluation of Energy Balance with Environmental Context and Behavior.” PI: Mingui Sun, PhD, $1,054,945, National Institutes of Health.

Congratulations

• Ian Pollack, MD, was named a director of the American Board of Pediatric Neurosurgery.

• Joseph Maroon, MD, was selected to head the medical and scientific advisory board of StemCell Technologies, Inc.

• Hideho Okada, MD, PhD, was selected to serve on the editorial board of Cancer Research magazine.

Prominent Lectures and Appearances

• Dr Lunsford was a special guest of the Beijing Neurosurgical Institute, Huashan Hospital in Shanghai, China, and served as visiting lecturer at the Hong Kong Neurosurgical Society, November 4-10.

• Paul Gardner, MD, and Carl Snyderman, MD, taught a skull base surgery workshop at the Meenakshi Mission Hospital in Madurai, India, January 7-9.

• Dr. Maroon gave the keynote address to the International Council of Motorsports Sciences in Orlando, FL, on November 28.

Welcome

• Anita Fetzick, nurse coordinator for David Okonkwo, MD, PhD; Nicole Kellner, physician assistant; Esther Mattes, physician assistant; Svetlana Trofimova, physician assistant.

Personal Congratulations

• Paul Richard, MD, and his wife Viktoria, had a baby boy (Atticus) November 1, 2012.

• Phillip Parry, MD, and his wife Katarzyna, had a baby boy (Phillip Vaughn Parry, Jr.) October 22, 2012.

• Stephanie Henry graduated from Carlow University in December with a masters degree in nursing with a concentration in education and leadership. She also accepted a position with both The Center for Cranial Base Surgery as the clinical research manager, and with the Department of Otolaryngology as the manager of quality improvement.
When it was first organized over 30 years ago, the Center for Clinical Neurophysiology (CCN) was an interdepartmental resource composed of a few clinicians providing diagnostic testing and intraoperative neurophysiological monitoring (IONM) services for only very specific surgeries in the neurosurgical and orthopedic disciplines at then Presbyterian University Hospital, Montefiore Hospital and Children’s Hospital of Pittsburgh.

Today, the CCN is the largest and busiest academic IONM program in the country, providing some 7,000 IONM cases per year at all UPMC pavilions as well as supporting UPP surgeons at non-UPMC hospitals. In addition, the CCN provides professional and technical coverage at Mon Valley and Jameson Hospitals.

The use of IONM at UPMC reaches across many surgical disciplines and has proven to be an invaluable adjunct not only in adult and pediatric neurosurgical procedures but also in orthopedic, ENT, vascular and cardiothoracic surgical procedures.

Intraoperative multimodality monitoring at UPMC includes expertise in somatosensory evoked potentials (SSEP), brainstem auditory evoked potentials (BAEP), motor evoked potentials (MEP) and electromyography (EMG).

Direct peripheral nerve recordings also are performed as well as single unit microelectrode recordings performed during placement of DBS electrodes in various subcortical structures. Intraoperative EEG is also used to monitor cerebral function and ischemic risk during cerebral and peripheral vascular procedures including cerebral aneurysm treatment, carotid endarterectomy and a variety of cardiothoracic procedures.

EEG recorded directly from the pial surface of the brain, or electrocorticography (ECoG) is used to help determine resection margins in epilepsy surgery, and to monitor for seizures during direct electrical stimulation of the brain surface carried out while mapping eloquent cortex in awake patients.

In addition to providing IONM services, the CCN also performs diagnostic evoked potential testing as well as transcranial Doppler studies.

Through its research efforts and publications, CCN has shown that the application of multimodality intraoperative neurophysiological monitoring during a variety of peripheral and central nervous system operative procedures provides for an additional element of high-level care for patients, ultimately reducing morbidity thereby establishing a cost savings for the health system.

The Center for Clinical Neurophysiology, with its highly trained and nationally renowned faculty and technical staff and the tools and techniques they utilize, bring yet another component of exemplary patient care to the UPMC patient population.

The center is directed by Miguel Habeych, MD, MPH, and Partha Thirumala, MD, MS, and also includes Jeffrey Balzer, PhD, and Donald Crammond, PhD.