

Intradural minimally invasive spine techniques play emerging role for patients

by Adam S. Kanter, MD

Assistant Professor of Neurological Surgery
Director, Minimally Invasive Spine Program

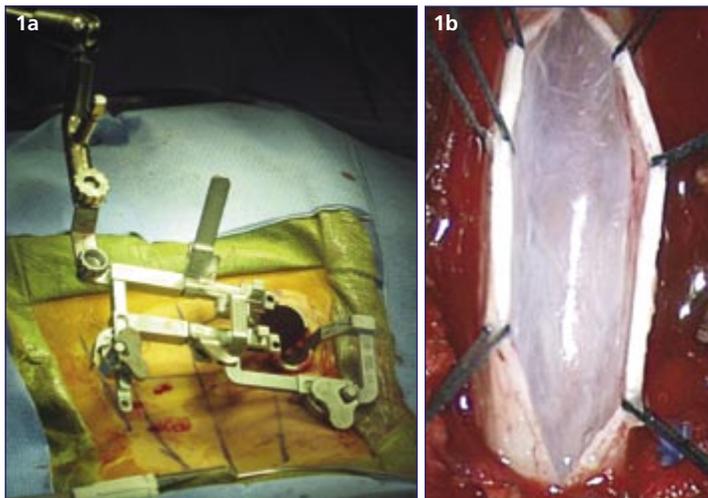
Since its inception in the early 1990's, minimally invasive spine surgery (MISS) has been a field in evolution. Lack of clinical evidence, device limitations and a steep learning curve have limited MISS applications for spinal disorder treatments. The recent modernization of MISS tools and techniques has rejuvenated the field, thus allowing for expanded patient selection and candidacy. MISS treatment modalities now exist for such diverse spinal disorders as herniated discs, traumatic fractures, tumors, degenerative stenosis, infection, instability and deformity.

MISS procedures are now being performed at UPMC using smaller visualization apertures with increased surgical accuracy and efficiency. This achievement is in part due to the adaptation of advanced neuroendoscopy principles and techniques that have been developed over the past decade by Amin Kassam, MD, chairman of the Department of Neurological Surgery, and colleagues for the endonasal treatment of cranial based pathologies.

Intraspinal lesions are particularly challenging to manage with MISS due to limited instrumentation flexibility and the necessity to open and close the enveloping dura mater. Uniting the cranial minimally invasive experience with the resources afforded by an institution intent on leading the future in minimally invasive spine surgery, we now have in our armamentarium an array of technologies to deal with challenging spinal disorders through minimally invasive means. A compilation of recent intradural MISS interventions are illustrated in the following cases:

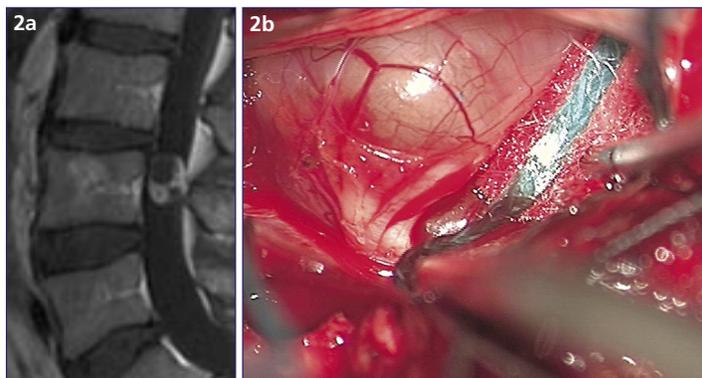
Case 1:

Axial MRI reveals an intradural thoracic arachnoid cyst compressing the spinal cord in a woman presenting with focal thoracic back pain and gait imbalance. Rigid endoscope affixed to a 2.5 cm MISS expandable endoport (1a) is used to expose the cyst (1b) for fenestration. The patient remains without neurological deficit.



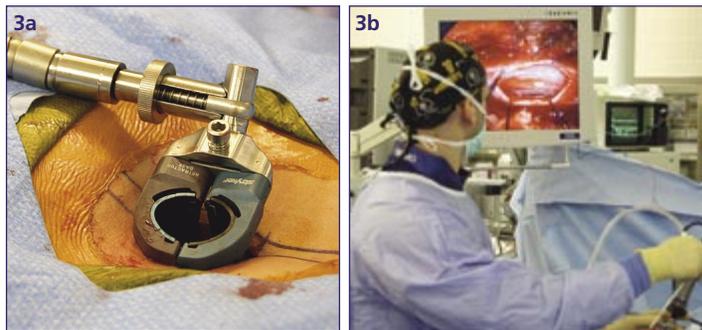
Case 2:

Sagittal MRI reveals a 2 cm intradural mass lesion posterior to the L4 vertebral body in a patient presenting with right lower extremity radiculopathy (2a). A 2.5 cm expandable MISS port is used to expose and micro-surgically excise (2b) a nerve sheath tumor with delicate dissection and preservation of adjacent neural structures. The patient awoke with complete symptom relief and remains without neurological deficit.



Case 3:

A young woman presenting with tethered cord syndrome is found to have a low lying conus with a tethered fatty filum terminale. An expandable 2.5 cm MISS endoport is utilized to perform a partial L4 laminotomy (3a). The endoscope is used to visualize the dural opening below the level of the conus (3b). Intra-operative direct nerve stimulation is performed to discern the fatty filum from normal nervous structures. Laser lysis is used to section the filum and release the tethered cord. The patient remains without neurological deficit.



The benefits of minimally invasive spine surgery have yet to be fully appreciated, but potentially include: reduced hospital stay and costs, limited blood loss, decreased post-operative narcotic usage, and a quicker return to work and daily activities. MISS procedures are most commonly employed at UPMC to perform lumbar microdiscectomies and decompressions, transforaminal and posterior lumbar interbody fusions, posterior cervical foraminotomies, thoraco-lumbar stabilization procedures, and now—excision of intradural lesions. A prominent role has emerged for MISS techniques as a mainstay in the modern day treatment of spinal disorders. •

Department demonstrates continued strong growth

The spring edition of the University of Pittsburgh Department of Neurological Surgery newsletter marks the ending of another gratifying academic year. Clinically, the department has grown significantly. This year we project over 8,000 procedures will be performed and we expect more than 9,500 to be performed in the coming year.

Over this period we have added nine neurosurgeons to the department roster bringing our total current complement to 35. This has allowed for regional consolidation across multiple service lines including the community network, image-guided surgery, cerebrovascular/skull base surgery, and spine surgery. The net result has been an ability to provide consistent and predictable standardized care to the patients by subspecialists that represent experts within specific aspects of neurosurgery.

Growth has meant greater regional coverage such that we now provide care throughout most of western Pennsylvania and parts of West Virginia. At a time when it is becoming increasingly difficult to attract surgeons to high-risk subspecialties in Pennsylvania due to the malpractice environment, we feel that our ability to bring in four new surgeons to the area speaks volumes about the attractive work environment offered by the UPMC and the University of Pittsburgh. The dynamic environment created by the health system and the university has allowed for stabilization of existing service lines while fostering new areas of innovation, providing substrates for the future.

This environment has fostered and nourished academics with over 70 articles published in refereed journals over the last 12 months as well as numerous book chapters. Department faculty and residents presented at all major meetings with over 150 oral presentations given to national and

international audiences. Over 20 invited visiting professorships to outside institutions and over 20 courses were provided by department faculty

At a time when research funding is more difficult to obtain, the environment allowed the faculty to be successful in securing support for important investigative initiatives in the fields of adult and pediatric oncology, adult and pediatric trauma, neurovascular disease, and neurophysiologic monitoring. Specifically, highlights of new grant awards this year included Dr. P. David Adelson's pediatric trauma grant (U01, total award \$16,453,589) and Dr. Ian Pollack's P01 oncology program award of \$6,240,198. Current annual support from competitive sources exceeds \$6.1 million making us one of the top three most highly funded departments of neurosurgery in the nation.

But most of all, I would like to thank each and every member of the department and community for their support and hard work over the past 366 days (leap year). These accomplishments in an era of declining NIH appropriations, declining reimbursements, and a shrinking economy represent merits of a collaborative team effort. This effort involves our colleagues from other departments creating efficient multidisciplinary service lines, as well as the rich and supportive environment of both the health system providing the resources and the University for creating nurturing academic venues. Despite one less day in the 2008-09 academic year we hope to continue our growth so as to provide the national and international medicosurgical and educational support that has come to define our institution. •



Amin Kassam, MD

*Professor and Chairman
Department of Neurological Surgery
Director
Minimally Invasive endoNeurosurgery Center (MINC)*

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Visiting Research Associate

Easter P. Jane, PhD

Chief Residents

Dave Atteberry, MD
Johnathan Engh, MD
Paul Gardner, MD

Gamma Knife Perfexion™ expands management of maxillary sinus cancer

by Hideyuki Kano, MD, PhD
Clinical Instructor

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Associate Professor of Neurological Surgery

L. Dade Lunsford, MD
Professor of Neurological Surgery

Douglas Kondziolka, MD
Professor of Neurological Surgery

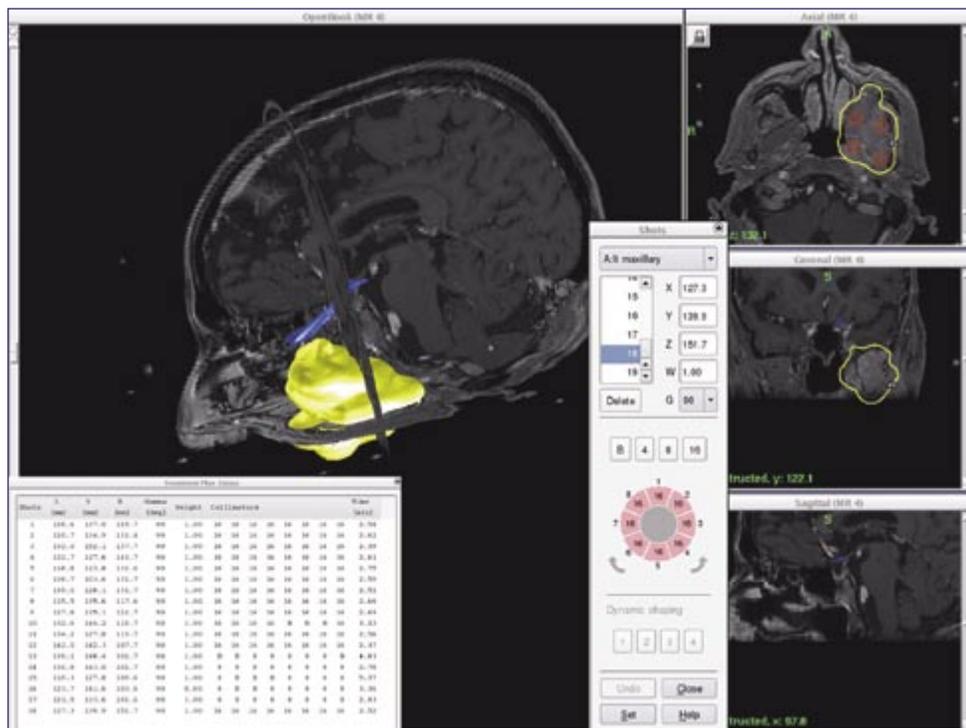
Over the past two decades, Gamma Knife® radiosurgery has been successfully used for management of intracranial tumors. Extra-cranial tumor extensions were not considered candidates for Gamma Knife because of limited reach of previous models. The new Gamma Knife Perfexion™ with its unlimited cranial reach, and ability to treat extracranial tumors, offers an opportunity to treat patients previously not considered candidates. We present a patient with left maxillary sinus squamous cell carcinoma who was treated using the Perfexion unit.

Case Report

A 67-year-old male was diagnosed with poorly differentiated squamous cell carcinoma of the left sphenoid sinus in 2003. After surgery following chemotherapy, he underwent external beam radiation therapy (70.2 Gy) in November 2003. The tumor recurred in the left cavernous sinus and petrous bone. This recurrence was associated with decreased hearing, left facial weakness, and left facial numbness.

In April 2006, he underwent stereotactic radiosurgery using the gamma knife 4C for tumor involving left cavernous sinus, petrous bone, and the cerebello-pontine angle. A margin dose of 13 Gy was prescribed to a treatment volume of 4.8 cc. Tumor progressed again and he underwent second radiosurgery for a new petrous bone segment of tumor progression in August 2007 with a dose of 14 Gy to a 3.3 cc 50% isodose treatment.

The areas treated by radiosurgery regressed, however, the tumor progressed in the left maxillary sinus. This patient developed mild proptosis of the left eye due to tumor extension into the floor of the orbit. His management options included additional XRT or radiosurgery boost. Because he had already received XRT (70 Gy), additional XRT was not deemed safe. He was suitable for boost radiosurgery using the Perfexion.



A three-dimensional dose plan of Gamma Knife® Perfexion™ for invasive maxillary sinus squamous cell carcinoma. A margin dose of 18 Gy was delivered using multiple composite isocenters.

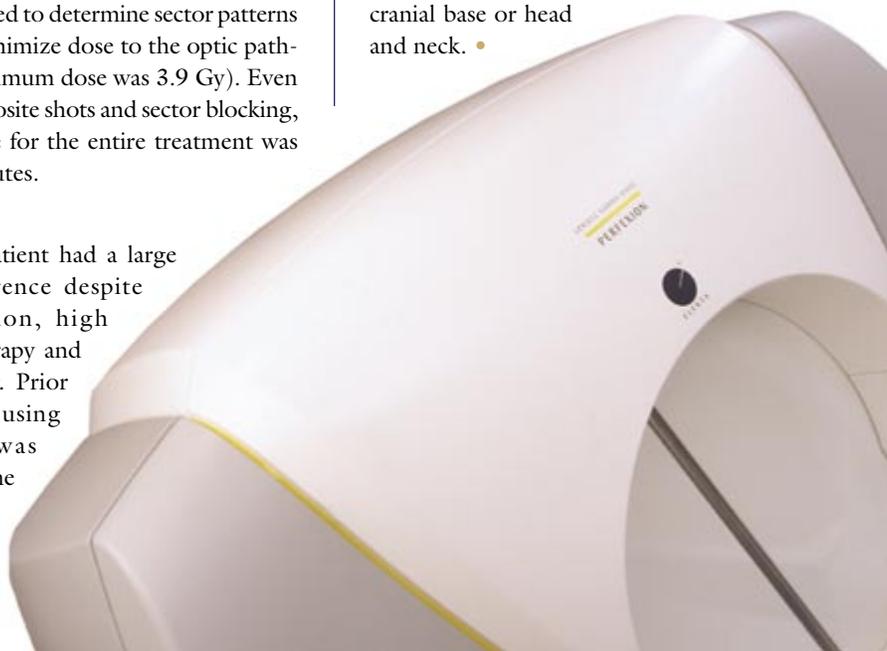
Treatment

This patient underwent Leksell head frame placement under conscious sedation and local anesthesia. High resolution stereotactic MR images were acquired next. MRI showed a large tumor involving left maxillary sinus with extension into the floor of the orbit. A conformal radiosurgery plan using 18 isocenters (with 4 composite isocenters) was designed. The radiosurgery target volume was 64.9 cc. A marginal dose of 10 Gy at 45% isodose was prescribed. Dynamic shaping was used to determine sector patterns in order to minimize dose to the optic pathways (the maximum dose was 3.9 Gy). Even with the composite shots and sector blocking, the beam-time for the entire treatment was under 60 minutes.

Conclusion

This patient had a large tumor recurrence despite prior resection, high dose radiotherapy and chemotherapy. Prior radiosurgery using Model 4C was effective for the petrous and cavernous

sinus region tumors. Perfexion unit facilitated treatment of the recurrent maxillary sinus cancer. The new Perfexion provides excellent dosimetry performance, unlimited cranial reach, better radiation protection for patient and staff, full automation of the treatment process and better patient and staff comfort compared to previous models. The Perfexion system certainly has the potential to increase spectrum of treatable indications including multiple brain metastasis, upper cervical spine, pathologies of the cranial base or head and neck. •



Stereotactic biopsy developed without rigid head fixation in awake patients

Arlan Mintz, MD

*Associate Professor of Neurological Surgery
Director, Adult Surgical Oncology*

Karl Lozanne, MD

PGY-6 Resident

Traditional methods to obtain a tissue biopsy from within the brain require the rigid fixation of a stereotactic frame, followed by imaging with a CT or MRI and then the target location can be calculated.

Frameless stereotactic techniques have provided a useful alternative to rigid head frame fixation. These techniques make use of a pointer-based referencing system that utilizes anatomical landmarks or self-adhesive fiducial markers on the skin. A computer image guidance system stores the pre-operative imaging that is co-registered to the fiducials by a registration probe and camera. To maintain accurate localization throughout the procedure they require invasive rigid head fixation in the form of a Mayfield head holder. Rigid head fixation can be painful and the head movement limitation intolerable to some awake patients. If the patient moves, they risk lacerating the scalp. Furthermore, there is risk of cranial fracture, epidural hematoma, and cerebrospinal fluid (CSF) leak following the application of head pins, especially in young children. From the surgeon's perspective, rigid head fixation can also be problematic since they are bulky and



Figure 1, (left), autoregistration mask adhered to face; Figure 2, (right), baseplate with swiveling cannula attached.

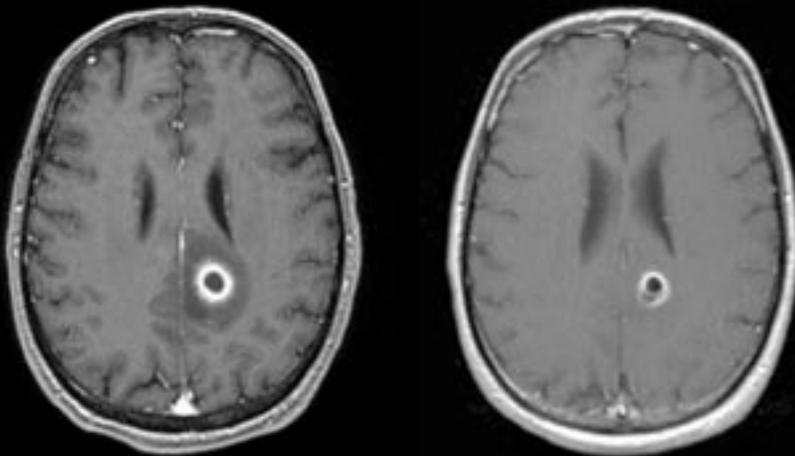
limit intraoperative flexibility as well as free movement of surgical instruments. If the patient's head moves relative to the reference arc, the accuracy of the system is reduced, potentially compromising successful execution of the procedure.

We have developed a technique for obtaining a biopsy of intra-axial tumors in awake patients using a frameless, fiducial-less technique without the use of head fixation (pinless). Prior to the procedure a contrast enhanced MRI or CT scan of the brain using thin 1.5 mm slices obtained. The image set is imported into the Stryker iNtellect Cranial Navigation computer work station via computer network.

The patient is placed supine on the operating room table with the head comfortably resting on a horseshoe headrest. The patient receives intravenous neuroleptic sedation and an autoregistration mask with multiple light emitting diodes (LEDs) is adhered to the patient's face covering the bridge and both sides of the nose, the left and right periorbital and malar eminence (Figure 1). The area of the face covered by the mask contains sufficient unique geometric features allowing for accurate fiducial-less registration of the entire skull. An image guidance probe with LED technology is registered to the Stryker neuronavigation system using a handheld tracking device visible by the camera. The accuracy of the registration is then assessed with the registered image guidance probe by correlating several surface anatomical landmarks to the patient's imported MRI images.

Keeping the mask affixed to the patient throughout the procedure provides dynamic reference LED tracking points for the neuronavigation system. This allows for the maintenance of accurate localization despite the potential for head movement. Furthermore, should the mask be displaced from the patient's face, this is detected and the software either corrects the change or temporarily stops navigation until appropriate registration tracker geometry is recovered. Once registration accuracy is confirmed, the registered probe is utilized in navigation software to choose the target and entry site. The patient's hair is then minimally clipped, prepped and then covered with a sterile transparent drape. The transparency allows visualization of the autoregistration mask

Illustrative Case



A 54-year-old male with diabetes mellitus presented after his first seizure. MRI revealed a deep posterior frontal rim enhancing lesion with edema concerning for brain abscess (left). To provide diagnosis and drainage of the lesion, an image guided frameless pinless stereotactic fine needle biopsy and aspiration was performed. 4 cc of purulent fluid was drained without complication (right). Culture of the fluid grew *Listeria* and the patient was subsequently discharged on a six week course of the antibiotics.

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throughout the procedure by the surgeons as well as line-of-sight for the neuronavigation system camera.

A sterile image guidance biopsy probe is registered and the location of the entry point, planned trajectory, and target is confirmed. An incision measuring approximately 3 cm in diameter is then opened over the planned entry site following local infiltration with lidocaine. A 10mm burr hole, centered at the entry site, is made in the direction of the planned trajectory with a perforator bit. A baseplate is rigidly secured onto the skull over the burr hole with three 8 mm screws. The swiveling cannula is attached to the baseplate and a plastic set screw is engaged but not tightened to allow free swiveling of the cannula (Figure 2). The biopsy navigation probe with LEDs is registered and inserted into the swiveling cannula. The trajectory for the biopsy is established by aligning the pointer of the navigation probe to the pre-calculated trajectory. This trajectory is maintained by tightening the plastic set screw on the swiveling cannula. The distance from the tip of the pointer to the target is measured by using a virtual tip advancement feature. The depth from the end of cannula to the target is then calculated by adding the length of the swiveling cannula to the distance from the tip of the pointer to the target. A disposable biopsy needle is then prepared by setting a stopper at the calculated depth of insertion from the midpoint of the opening of the biopsy needle (Figure 3).

(see *Biopsy* on page 6)



Figure 3. Biopsy needle with stopper set at calculated depth of insertion.

Study to evaluate relationship between hip problems, low back pain in older adults

by Peter C. Gerszten, MD, MPH, FACS
Associate Professor of Neurological Surgery

A significant proportion of patients cared for by members of the Spine Services Division of the Department of Neurological Surgery include older adult patients over the age of 60 years. Approximately 42% of older adults report having had at least one episode of low back pain during the past year, and an estimated 20% of these individuals have chronic low back pain (CLBP). Medicare spent nearly \$1 billion for the treatment of low back pain for hospital-based outpatient costs during 2002 alone, a 387% increase compared to 1992.

The first line treatment of CLBP and symptomatic lumbar spinal stenosis includes physical therapy and non-opioid analgesics. Spinal injection procedures are also commonly performed, despite the absence of supportive efficacy data. When first line treatments fail, more aggressive treatments are sought such as opioid analgesics and/or spinal surgery. Risks associated with opioids may be life threatening, including hip fractures, delirium and obstipation. Surgery is commonly directed by the results of advanced imaging of the lumbar spine (e.g., magnetic resonance imaging) when spinal stenosis is documented.

Although osteoarthritis is typically generalized in older adults, CLBP associated with degenerative disease of the spine is often treated by specialists focused on spinal pathology alone. Hip osteoarthritis (OA) associated with compromised hip function may lead to altered spinal biomechanics and subsequent low back pain. Preliminary data from researchers at UPMC indicate that the prevalence of comorbid hip OA (limited motion and pain with passive movement, but hip pain less severe than low back pain) in older adults with a chief complaint of CLBP is on the order of one in five patients. Comorbid hip OA also strongly predicts poor outcomes in response to treatments directed toward the lumbar spine alone and may be key contributor to CLBP in older adults.

Over 50% of patients with radiographic evidence of hip OA are asymptomatic; thus no treatment is required. For patients with hip OA and hip pain, treatment is

guided by evidence. Randomized controlled clinical trial data have demonstrated the efficacy of manual manipulation of the hip for reducing pain and improving function in patients with hip OA. An estimated 24% of patients ultimately undergo total hip replacement that is associated with pain elimination and improved function in 90% of cases.

The contribution of hip OA to CLBP is supported by the following more recent data: 1) total hip replacement surgery for patients with severe hip pain and advanced OA on x-ray reduces low back pain and improves overall spine function, 2) hip OA in older adults with a chief complaint of CLBP is a strong predictor of poor outcomes associated with non-surgical treatment of the low back, and 3) in patients with low back pain, diminished hip range of motion predicts poor outcomes following spinal manipulation. The “Hip-Spine Syndrome” refers to symptoms that exist in the setting of concurrent degenerative pathology in both the hip and the spine. If hip OA causes CLBP, failure to appropriately examine and treat the hips in older adults with CLBP is a significant oversight. This oversight could lead to both unnecessary open surgical intervention as well as poorer outcomes after surgery. Despite the relationship between the hip and the lumbar spine, integrated treatment strategies across specialties that simultaneously take into account the hip and low back have often been lacking in the past.

In an effort to better understand the impact that hip problems have on the patients that are being evaluated and treated for spinal problems, members of the Spine Services Division of the Department of Neurological Surgery have teamed up with experts in hip osteoarthritis from a variety of disciplines across UPMC, including Debra K. Weiner, MD, from Geriatric Medicine, Michael Craig Munin, MD, from Physical Medicine and Rehabilitation, and Chester V. Oddis, MD, from Rheumatology.

For more information regarding this study, please contact the study’s nurse coordinator, Carol Kennedy, RN, at (412) 647-9786. •

Stereotactic biopsy developed without rigid head fixation in awake patients

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Initial biopsy specimens are sent to pathology for frozen section evaluation. Additional specimens are obtained for subsequent microscopic evaluation of fixed slice preparations. Following microscopic confirmation of specimens adequate for diagnosis and confirmation of appropriate hemostasis, the biopsy needle, swiveling cannula, and baseplate are removed. The craniotomy is covered with a burr hole cover and the skin incision is closed. A post-operative CT of the head is obtained to evaluate for hemorrhage.

We have used this technique in more than 20 patients. The indications for surgery

include previously undiagnosed brain lesions and one brain abscess. The volume of the lesions ranged from 0.9 to 75.4 cm³. The pathologies included gliomas of low and high grade, two lymphomas, an oligodendroglioma, a cerebral abscess and a case of atypical glial cells.

This method of frameless surgical navigation using fiducial-less mask registration without rigid head fixation enhances patient comfort and eliminates the risk of complications from head clamp placement. Patients can obtain their pre-operative MRI prior to admission without concern of displacement of adhesive skin markers. The lack of head fixation precludes the as-

sociated risk of skull injury, intracranial injury, or scalp laceration. In addition, we believe this fiducial-less, frameless, pinless biopsy technique allows greater surgical flexibility than frame based systems. A larger area of the skull is accessible without interference of pins or frames and intraoperative planning of additional target sites can be undertaken without need for complex calculations.

Furthermore, should there be a need to convert to an open craniotomy, image guidance would remain available without a frame or skull fiducial limiting the surgical approach. Considering that no additional steps are required, we expect reduced operative time. •

Mark your 2009 calendars for 4th World Endoscopic Congress

The 4th World Congress for Endoscopic Surgery of the Brain, Skull Base and Spine has been scheduled for Pittsburgh on September 9-11, 2009 at the David L. Lawrence Convention Center.

The three-day event will feature an international faculty of experts in neurosurgery, otolaryngology, plastic surgery and ophthalmology covering a wide variety of intracranial and spinal topics, as well as endoneurosurgery principles.

The congress is sponsored by the University of Pittsburgh's School of Medicine, Department of Neurological Surgery, and Department of Otolaryngology and the UPMC Center for Continuing Education in the Health Sciences.

Chairmen for the event include Ricardo Carrau, MD, Amin Kassam, MD, and Carl Snyderman, MD.

The hugely successful original congress was held in Pittsburgh in 2005. Paris, France was the venue in 2007 and Sao Paulo, Brazil in 2008.

For more information and updates, please visit www.skullbasecongress.com. •



David L. Lawrence Convention Center

Recent donations to the Department of Neurological Surgery

Faculty: P. David Adelson

• \$1,000 - \$5,000:

David P. Carrier

Gamma Knife

• \$1,000 - \$5,000:

Gonul Yasar

• Up to \$1,000:

Mr. & Mrs. Gary Abraham

Mr. & Mrs. Antonio L. Aquino

Samuel T. Bacica

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Roland Lee Dobos

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Andy Vaill

Image-Guided Neurosurgery

• Up to \$1,000:

Constantine Demetral

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• \$1,000 - \$5,000:

The R. P. Simmons Family Charitable Trust

• Up to \$1,000:

Dr. C. B. Gambrell

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• Up to \$1,000:

Mr. & Mrs. Gerhard H. Gross

MINC: Dr. Jovin

• Up to \$1,000:

Mr. & Mrs. Thomas R. George

MINC Research/Education Endowment Fund

• \$10,000 - \$25,000:

Gayle Louise Tissue

MINC Research Development Fund

• \$1,000 - \$5,000:

Cass M. Laux

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• Up to \$1,000:

Terence K. Cuddyre

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Jacob Rissman

Kathryn G. Snyder

Mr. & Mrs. Jeffrey R. Tate

Former Neurosurgery Chief Passes Away

Anthony Frederick Susen, MD, a leading figure in neurosurgical training at the University of Pittsburgh and acting chief of the then-division of neurosurgery from 1966-1971, passed away March 20 at the age of 87.

Dr. Susen joined the department in 1953 as a clinical instructor after completing his training at Bowman Gray Medical School, Dartmouth College and Harvard Medical School. During his tenure at the University of Pittsburgh, Dr. Susen was directly responsible for the training of a couple of generations of neurosurgeons.

The Illinois native was recruited by, and worked closely with, Stuart Niles Rowe, MD, widely hailed as the founder of neurologic surgery in the city of Pittsburgh. Both believed that residency training programs should be designed to teach not only exceptional surgical technique, but also critical clinical decision-making skills.

Dr. Susen retired from practice in 1991. An online guest book is available for remembrances and condolences on the *Pittsburgh Post-Gazette* website at www.post-gazette.com.

Leadership Notes

• **P. David Adelson, MD**, was named director of the Center for Injury Research and Control (CIRCL). Also, **David Okonkwo, MD, PhD**, was named clinical director and **Anthony Fabio, PhD**, associate director.

• **Miguel E. Habeych, MD, MPH**, was named director of the Center for Clinical Neurophysiology.

Prominent Lectures

• **Joseph Maroon, MD**, was a visiting professor at Cornell University, November 26, 2007; University of Illinois, January 11-12, and the Barrow Neurological Institute, January 18. Dr. Maroon's topics included minimally invasive surgical approaches for the treatment of cervical and lumbar disc disease in elite athletes, endoscopic approaches to pituitary tumors, and a neurosurgeon's journal: successes, failures and lessons learned.

• **Amin Kassam, MD**, was a visiting professor at the University of California-Los Angeles division of neurosurgery, January 16. Dr. Kassam's lecture was titled, "The First Decade of Endoscopic Skull Base Surgery: Personal Experience in 800 Patients. Outcomes, Complications and Results." Dr. Kassam was also a visiting professor at Charing Cross/Imperial College Hospitals in London, March 25-26, where he lectured and taught a cadaveric prosection course "Endoscopic Surgery of the Cranial Base and Pituitary Fossa."

• **Douglas Kondziolka, MD**, was a visiting professor at the National Institutes of Health, in Bethesda, MD, March 25. His lecture topics included "Cell Transplantation for Neurodegenerative Disease" and "The Role of Radiosurgery for Solitary or NF-2 Related Vestibular Schwannomas."

Congratulations

• **Ryo Ueda, MD**, an assistant in the lab of Hideho Okada, MD, PhD, received the American Association for Cancer Research Scholar-in-Training Award from Bristol-Myers Squibb at the AACR annual meeting, April 12-16 in San Diego.

• **Pawel G. Ochalski, MD**, PGY-3 resident, was selected as a 2008 Neurosurgery Research and Education Foundation research fellow. His project, "The Effects of Modulating GABA Receptor

Activity on Neuronal Cellular Function and Behavioral Outcomes Following Controlled Cortical Impact in Rats," is being funded by the NREF with a two-year \$70,000 grant.

Media

• **Dr. Adelson** was featured on the WTAE-TV (Pittsburgh) *Evening News*, February 14, discussing the use of advanced brain mapping to help treat epilepsy in children.

• **Dr. Kassam** was spotlighted in UPMC's ongoing promotional campaign "UPMC Minute" this past February. He discussed innovations in brain surgery.

• **L. Dade Lunsford, MD**, was mentioned in a *Philadelphia Daily News* article, January 15, detailing a former patient's battle with an arteriovenous malformation (AVM) and how the Gamma Knife allowed him to go symptom-free.

• A trauma patient of **Dr. Adelson**, David Carrier, was featured in the *Tri-County Sunday* (Dubois, PA) newspaper this past winter discussing his case and the care he received while at Children's Hospital of Pittsburgh. Carrier, a senior at Redbank Valley High School, wrote and sold a cookbook as his senior class project and donated the proceeds to Children's Hospital as a way of expressing his appreciation to the hospital's medical staff.

Welcome

• **Dyana Sloan**, administrative assistant to Adnan Abla, MD and Daniel Wecht, MD; **Tracy Shockey**, coder; **Suzanne Abla**, administrative assistant; **Maria Spanos**, nurse for Pedro Aguilar, MD; **Doug Clayton**, Shadyside physician assistant; **Mary Ellen Bratkowski**, Mercy group nurse; **Kathy Higgins**, research coordinator for Dr. Adelson.

• Welcome to the staff of J. William Bookwalter, III, MD: **Sally Tuite**, office coordinator; **Mary Alice Nemecek**, nurse; **Tamme Brooks**, patient information coordinator; **Samuel Verdi**,

physician assistant and **Jennifer Daugherty**, office manager.

Upcoming Events

• May 28: **Visiting Professor Lecture Series**. Bernard George, MD, Chief of Department of Neurosurgery, Hospital Lariboisière, Paris, France. (412) 647-6358.

• June 1-3: **Minimally Invasive Endoscopic Surgery of the Cranial Base and Pituitary Fossa Course**. Presentation of minimally invasive techniques for endoscopic surgery of the cranial base and pituitary fossa. (412) 647-6358. Also offered September 4-6.

• June 13: **CIRCL Webinar**. "Cellular Toxins." Charles A. McKay, MD, associate director, Connecticut Poison Control Center. 4:00 p.m. (www.circl.pitt.edu)

• June 14: **Emergent Management of Neurovascular Events Conference**. Covering cutting edge technologies in interventional neuroradiology and emergency medicine. (412) 647-8232.

• July 7-11: **Principles and Practice of Gamma Knife Radiosurgery**. For neurosurgeons, radiation oncologists, medical physicists and other physicians interested in Gamma Knife treatment certification. (412) 881-0602.

• July 17: **CIRCL Webinar**. "Evidence-Based Management of Sports-Related Concussions: What Have We Learned?" Michael W. Collins, PhD, assistant director, UPMC Sports Medicine Concussion Program. 2:00 p.m. (www.circl.pitt.edu) •



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SPRING 2008 • VOLUME 9, NUMBER 2

Emergent Management of Neurovascular Events

Saturday, June 14, 2008

Herberman Conference Center • UPMC Shadyside • Pittsburgh, Pennsylvania

Course Director

Michael Horowitz, MD

Professor of Neurological Surgery

University of Pittsburgh School of Medicine

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Medical Center

Sponsored by:

University of Pittsburgh School of Medicine

Center for Continuing Education in the Health Sciences

Department of Neurosurgery

UPMC Center for Endovascular and Intralesional Therapy

UPMC Minimally Invasive Endoneurology Center

Department presenting special conference on emergent management of neurovascular events

The University of Pittsburgh Department of Neurological Surgery in conjunction with UPMC's Center for Continuing Education in the Health Sciences (CCEHS) is presenting a special interactive forum on "Emergent Management of Neurovascular Events," Saturday, June 14 at the UPMC Shadyside Herberman Conference Center.

This one-day course will cover numerous issues having an impact on emergency care and is an excellent opportunity for medical personnel to learn about cutting edge technologies and applications on interventional neuroradiology in emergency medicine. Issues scheduled for discussion include endovascular management of emergent neurological conditions, subarachnoid hemorrhages, non-subarachnoid intracranial hemorrhages, life threatening epistaxis, carotid blowout syndrome, and medical aspects of the ER management of actual and potential hemorrhagic and ischemic stroke.

Michael Horowitz, MD, chief of neurosurgery at UPMC Presbyterian and director of the UPMC Center for Endovascular Therapy, and Tudor Jovin, MD, co-director of the UPMC Center for Endovascular Therapy and co-director of the UPMC Stroke Center, will serve as course faculty.

The University of Pittsburgh School of Medicine is designating this course for a maximum of 5.75 AMA PRA Category 1 Credits™. Cost of the course is \$10 per person and includes continuing education credit, registration and course materials and a continental breakfast, lunch and refreshments.

For registration information, please contact CCEHS at (412) 647-8232 or e-mail Tricina Cash at cashtr@upmc.edu. Online registration is available at ccehs.upmc.edu. •



Adult Neurosurgery

University of Pittsburgh Physicians Department of Neurological Surgery

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*See reverse for
location information.*

Adult Neurosurgery

Adult Care Locations

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Pittsburgh, PA 15213

Gamma Knife Suite
UPMC Presbyterian
Suite F-158
Pittsburgh, PA 15213

Hillman Cancer Center
5115 Centre Avenue
Pittsburgh, PA 15232

UPMC Monroeville *Oxford Drive*
600 Oxford Drive
Monroeville, PA 15146

Westmoreland Office
425 Frye Farm Road
Greensburg, PA 15601

Visit www.upmc.com or
www.neurosurgery.pitt.edu
for information about
our specialties.

Call us at **1-877-274-3862**
for additional locations.

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Children's Hospital of Pittsburgh of UPMC

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