Summer 2006 • Volume 7, Number 3
UNIVERSITY of PITTSBURGH
neurosurgery news
Published by the University of Pittsburgh Department of Neurological Surgery • www.neurosurgery.pitt.edu
Patient Care • Teaching • Research

Providing state-of-the-art spine trauma care, research and outcomes

by Richard Spiro, MD
Assistant Professor of Neurological Surgery

Traumatic injury to the spinal cord remains a devastating public health problem in the United States. Over 10,000 new cases are diagnosed every year. Sixty percent of these patients are between the ages of 16-30. It is estimated that at present there are 300,000 to 500,000 people in the United States living with spinal cord injuries.

Spinal cord injury is a life changing experience. The inability to walk or use your hands can make even the simplest daily tasks difficult. Many of our patients spend months relearning tasks that were previously done without any forethought.

Economic ramifications are also staggering. The estimated annual cost to the US government for spinal cord injury is four to five billion dollars. Estimated direct hospital cost for spinal cord injury is $100,000 per patient. A 25-year-old patient who sustains a cervical spinal cord injury will incur $1,000,000 of medical costs over their lifetime. Psycho-social costs are also staggering. As many as 50% of patients get separated or divorced from their current spouse.

The University of Pittsburgh Department of Neurological Surgery is involved with directing care of spine trauma and spinal cord injured patients. Acute care is delivered mainly at UPMC Presbyterian hospital. UPMC Presbyterian is a level 1 trauma center providing tertiary care trauma services in conjunction with the University of Pittsburgh School of Medicine.

The section of spine surgery directs the care of all spinal cord injured patients referred to the department. Neurosurgeons with special expertise in treating disorders of the spine are available 24 hours a day/365 days a year for emergency evaluation and care of spinal trauma. Spine surgeons perform the initial evaluation and triage, perform emergency and reconstructive operations, and provide postoperative care. Many patients with spinal trauma require life-long care which is also managed by the spine surgeons.

State of the art spinal surgery is being performed and new technology is being developed every year. Currently, we use stainless steel and titanium screws and rods to stabilize the spinal column. This allows surgeons to completely decompress the spinal cord and spinal nerves and allows the bony spinal column to be properly reconstructed.

(*left*) Burst fracture of L2 after spinal column decompression and repair of spinal column with titanium pedicle screws (intra-operative x-ray); (*top right*) complex anterior–posterior repair of burst fracture and misaligned spinal column; (*bottom right*) repair of C2 fracture using screw and rod construct.

New technologies will allow surgeons to more effectively fix these injuries. Resorbable implants are currently being developed within the department. These implants may one day replace traditional metallic implants. These devices would dissolve once the bony injury has healed meaning that foreign bodies would no longer need to be left implanted. A new biomechanical research laboratory has also been established. The lab consists of sophisticated materials testing equipment which will be used to evaluate these new technologies. William Welch, MD, and Boyle Cheng, PhD, ScD, are the co-directors of this laboratory.

The section of spine surgery is also actively involved with outcomes research for spinal trauma. This group consists of 40 spine surgeons with expertise in treating spinal trauma. The group collects data on spinal trauma from centers across North America. This data is analyzed to help improve patient care and hopefully outcomes from these devastating injuries.

The ultimate goal of all of the activities within the department of neurological surgery is improvements in patient care through teaching and research. The spine section is actively involved in the care of spine trauma and patients with spinal cord injuries. Consultants are available around the clock to care for patients, and new technologies are constantly being evaluated which could potentially change the way spine injuries are managed and improve outcomes for these life changing injuries. •

A message from the Univ. of Pittsburgh School of Medicine dean

I write to inform you that L. Dade Lunsford, MD, chairman of the Department of Neurological Surgery, has arrived at a point in his career whereby he now feels it appropriate to return to his first loves—patient care, education, innovation, and investigation—and to relinquish the daunting administrative responsibilities of a department chair. Therefore, Dade has submitted his resignation as chair of the Department of Neurological Surgery, effective July 1, 2006. We are fortunate indeed that we will continue to benefit from Dade's extraordinary skills, achievements, and recognition as a clinician, educator, and researcher. Our Department of Neurological Surgery is certainly at the very top-tier of such departments nationally, assessed by any objective metric, and during Dade's ten years of chairmanship, this fine department has continued its ascendancy.

Dr. Levine

Dr. Kassam

I have asked Dr. Amin Kassam to serve as interim chair, effective July 1. Amin received his MD degree from the University of Toronto and had his residency in neurosurgery at the University of Ottawa. While at the University of Ottawa, he also completed the course work for a masters degree in clinical epidemiology. He was appointed as an assistant professor in our Department of Neurological Surgery in 1998, and he was promoted to associate professor in 2004. He holds a secondary appointment in the Department of Otolaryngology. He is a member of the clinical attending staffs at Presbyterian, Montefiore, Shadyside and Children's Hospital. Dr. Kassam holds specialty certification from the Royal College of Physicians and Surgeons of Canada, and he has completed the written examinations of the American Board of Neurological Surgery.

Dr. Kassam and his colleague, Dr. Carl Snyderman, have pioneered endoscopic transnasal surgical techniques such that they are able to access lesions at the base of the skull through the nostril. This has revolutionized the surgical treatment of skull base tumors, arteriovenous malformations, aneurysms, and other lesions in a part of the brain that heretofore was accessible only through craniotomy. These surgical techniques have yielded a substantial reduction in morbidity and mortality, reflecting the far less invasive approach to lesions in this site. More recently, Dr. Kassam has also been focused on the molecular pathogenesis of cerebral aneurysms, thereby adding an interest in molecular genetics to his research repertoire.

Although these are still early days in his career, Amin is already recognized for his achievements nationally and internationally. He delivered the President's Invited Lecture at the Annual Meeting of the International Society of Pediatric Neurosurgeons in 2005 and in that same year, he co-chaired the First World Congress for Endoscopic Surgery of the Brain, Skull-Base, and Spine. In 2004, he delivered the Hitselberger Lecture at the Annual Meeting of the American Academy of Otolaryngology and the M.T. Richard Lecture at the University of Ottawa. In the past two years also, he has lectured at the Universities of Rochester, Washington, Virginia, Toronto, and Illinois as well as at the Memorial Sloan-Kettering Cancer Center. Dr. Kassam is the co-investigator of two NIH- R01 grants and site investigator for a third. He is a member of the executive board of the North American Skull Base Society.

Dr. Steven DeKosky will serve as chair of a search committee to help to identify, and have in place, a permanent chair as rapidly as is possible. Importantly, I want to stress here that this search will be aggressive, broad, and unconstrained. I will choose for the permanent chairmanship the very best person who makes himself or herself available for this very important position. •

Sincerely,

Arthur S. Levine, MD
Senior Vice Chancellor for the Health Sciences
Dean, School of Medicine

FROM L. DADE LUNSFORD, MD

After my recent trip to Asia, I returned to the USA with a new personal plan. Having served as chair of the academic Department of Neurological Surgery for almost 10 years, and for almost two years prior to that as acting chair, I have decided to step down as of July 1, 2006. Change at periodic intervals is often desirable even if it is challenging for all affected. I believe that our department is recognized as being a powerhouse regionally, nationally and abroad. Our department has remarkable depth in its faculty, staff, trainees, and has had great success in achieving the mission of patient care, education, research and innovation. Collaboration and mutual respect are critical. As we move to a new chapter, I want to thank my many colleagues who have provided support and assistance during my time as chair. •

L. Dade Lunsford, MD
Lars Leksell Professor

Improving the informed consent process for surgery

by Douglas Kondziolka, MD
Professor of Neurological Surgery

Informed consent is a topic of vital importance to the physicians and surgeons. However, it has been argued that most surgeons do not devote appropriate importance to it in their daily duties. It must be understood that informed consent is not a document, but rather a process. A signed informed consent does not shelter the surgeon from litigation; it is merely a historical record of the discussion between the surgeon and patient.

The principal aspect of informed consent is the discussion between surgeon and patient, establishing the risks and benefits of the procedure along with the expectations of the final result. This discussion is vital to building a proper surgeon-patient relationship and the outcome of care can be improved by efforts made to secure consent.

Appropriate physician conduct in medicolegal matters begins with the informed consent process. This process leads to an understanding of the patient's diagnosis, the planned procedure, the therapeutic alternatives (both medical and surgical), and the inherent procedural risks. This must be followed by written documentation of the patient's understanding and agreement. Unfortunately, both the process and documentation of consent can be inadequate, and in numerous studies, have been shown to be lacking. We developed a method to enhance this process and validated short and longer-term patient recall.

One hundred and twenty consecutive patients presenting to one neurosurgical outpatient office were asked to participate. Surgeries included gamma knife radiosurgery (n=94), glycerol rhizotomy for trigeminal neuralgia (n=1), stereotactic brain biopsy (n=8), craniotomy for tumor (n=15), insertion of Ommaya reservoir (n=1), and insertion of bilateral subthalamic deep brain stimulating electrodes. Each patient underwent informed consent obtained by the attending neurosurgeon. In addition to the hospital consent form, we created a specialized form for the surgeons' practice. This consent form listed specific diagnoses, procedures, alternatives (eight listed), and risks (22 listed), and each point discussed was checked off by the surgeon. The form then was signed by both the patient and the surgeon. Ten to twenty minutes later, each element of the consent form checked off by the surgeon was questioned by one lay-member of the office staff. A randomly selected group of 20 patients not at risk for cognitive decline were then resurveyed months later to test late recall. The patients were not given the consent form again when they were retested.

Table 1

Immediate Recall of Surgical Alternatives

Alternative Treatment	Patients	%
Observation w/serial imaging	114	97%
Gamma Knife radiosurgery	97	100%
Chemotherapy	7	100%
Medical treatment	18	100%
Radiation therapy	73	97%
Surgical resection	89	97%
Brain biopsy	13	100%
Other	8	100%

Immediate Post-Consent Evaluation

One hundred and twenty out of 120 patients correctly recalled their diagnosis and the procedure they were going to receive (100%). The diagnoses included brain tumor (109), vascular malformation (3), brain lesion (1), trigeminal neuralgia (7), sphenopalatine neuralgia (1), or Parkinson's disease (1). Of 428 treatment alternatives discussed with patients before surgery, 420 were recalled subsequently (98.19%). Specifically, patients recalled the options of observation with periodic imaging (114/117), use of radiation therapy (73/75), and surgical resection (89/92). A listing of responses is shown in Table 1. Of 1,207 risks discussed with patients before surgery, 1,176 were recalled subsequently (97.4%). Specific examples are listed in Table 2.

Open surgical procedures were performed in 26 patients, and 94 had radiosurgery. For patients undergoing an open procedure, all 26 correctly recalled their diagnosis and the planned surgery (100%). Eighty-one of 82 alternatives were recalled (99%), and 257 of 267 risks were recalled (96%). There was no difference between the rates for recall of management alternatives or risks, between patients undergoing open surgeries or radiosurgery (alternatives; p=.234, risks; p=.168).

Later Evaluation

We reevaluated a subset of 20 randomly chosen patients with benign brain tumors (n=19) or vascular malformations (n=1) who were not at risk for any cognitive changes after their surgery. All of these patients underwent stereotactic radiosurgery. These patients were surveyed at a mean of 4.5 months after surgery (range, 1-7 months). Of 79 treatment alternatives discussed with patients before surgery, 73 were recalled subsequently (92.4%). Specifically, patients recalled the options of observation with periodic imaging (18/20), use of radiation therapy (16/19), and surgical resection (19/20). Of 217 risks discussed with patients before surgery, 199 were recalled subsequently (91.7%).

What does the law require? The surgeon should provide a description of the proposed procedure, the associated material risks and the medically viable alternatives to the procedure or treatment (including the risks and benefits of such alternatives) that a reasonably prudent patient would require to make an informed decision as to that procedure or treatment. A patient has a right to know about and decline a procedure based upon any risk, including a risk that most other people would be willing to accept.

For example, a fashion model may decide to forego a procedure because he or she does not want a scar on a visible part of their body. It is also important that the patient identify the specific person, persons or class of persons authorized to perform the treatment or procedure. What kinds of treatment require informed consent? Performing surgery without appropriate informed consent can be considered a battery. Pennsylvania was one state that developed the legal theory that a surgeon's "cutting" of a patient in the absence of the patient's "informed" consent is an unauthorized assault of the patient, or "battery." In view of this concept, for many years Pennsylvania courts required only a patient's informed consent for surgery (where there was an actual physical invasion of the patient's body). However, In 1997, the state legislature broadened the law of

*(see **Consent** on page 8)*

Table 2

Immediate Recall of Surgical Risks

Surgical Risks	Patients	%
Headache	115	98%
Stroke	32	97%
Visual loss	41	95%
Limb weakness	93	98%
Limb numbness	82	95%
Seizures	61	98%
Facial weakness	64	99%
Facial numbness or pain	66	99%
Hearing loss	28	100%
Double vision	25	96%
Incomplete AVM obliteration	3	100%
Brain bleeding	27	93%
Coma	10	91%
Imbalance/incoordination	85	97%
Memory or thinking problems	39	98%
Language problems	2	100%
Brain swelling, need for steroids	92	97%
Tumor growth	89	98%
More treatment/surgery	112	99%
Death	22	96%

Magnetoencephalography:
Studying brain function non-invasively

by Anto Bagic, MD, MSc
Director, Center for Advanced Brain Magnetic Source Imaging (CABMSI)

Magnetoencephalography (MEG) is the most modern and powerful technique for studying brain function non-invasively based on corresponding magnetic fields reflected outside of the skull and measured using supersensitive sensors known as SQUIDs (Superconducting QUantum Interference Device). Since all clinical and the vast majority of research applications of MEG include co-registration of MEG data with a 3D MRI image of the same subject, this method is also known as Magnetic Source Imaging (MSI). A short review of MEG technical aspects was presented in the winter issue of this newsletter.

By acquiring a cutting-edge Elekta-Neuromag Vectorview 306 MEG system and establishing the Center for Advanced Brain Magnetic Source Imaging (CABMSI) UPMC Presbyterian has made a long step in the future of medical imaging, and laid a foundation for remaining at the forefront of medical technology, service and research.

As temporally and spatially most accurate direct non-invasive reading of brain activity, MEG represents the best functional imaging method for studying human brain function and dysfunction. As such, it is a powerful tool for demarcating critical anatomical relationships between a lesion and vital brain centers in cases of brain tumors and vascular malformations, as well as revealing the underlying physiology and anatomical relationship in pathophysiologically complex clinical entities such as epilepsy. This should improve our understanding of brain function in health and disease. Its current technological level, with further perfection of analytical methods and integration of its results into neuro-navigational systems, represents a very promising basis for improved surgical approaches for treating epilepsy, brain tumors, malformations, etc. Currently, MEG is clinically approved for localization and better characterization of epileptic foci when other means are inadequate and for pre-surgical brain mapping in preparation for brain surgery (tumors, epilepsy, malformations, etc).

The Center for Advanced Brain Magnetic Source Imaging (CABMSI) is the newest UPMC extra-departmental entity focused on clinical and research applications of MEG. It is envisioned as a self-sustained module that "fits and feeds" the UPMC system: a resource center that provides a logistical framework for all clinical applications of MEG as well as the widest spectrum of research applications spanning from basic and applied research to clinical research. Clinical operations will be focused on the currently approved clinical indications for MEG: localization and better characterization of epileptic foci when other means are inadequate and pre-surgical brain mapping. Due to its anticipated more frequent clinical use, pre-surgical brain mapping may be performed more frequently, and includes using somatosensory, motor, auditory and visual evoked fields to map locations of the corresponding brain centers in reference to a lesion that will be removed surgically. While studies of language are not being performed currently, we plan to adopt this expertise by organizing a sponsored workshop in the fall that would include a renounced expert experienced in using MEG in studying various aspects of language: from elementary sound processing, over language lateralization and localization to cognitive aspects of language processing.

Article author and director of the Center for Advanced Brain Magnetic Source Imaging, Anto Bagic (*right*) adjusts MEG censors for patient with help of MEG coordinator and technologist Anna Haridis (*left*).

The establishment of CABMSI already prompted several University of Pittsburgh and Carnegie Mellon University research groups to work on their research proposals based on sole use of MEG or combining it with other imaging modalities, most frequently with functional MRI (fMRI). Many other upcoming pilot proposals are expected to yield preliminary data as the basis for subsequent fundable grants that will be performed at CABMSI.

The UPMC CABMSI is one of Elekta-Neuromag's five centers on the continent. It is designated to become Elekta's premier MEG site and training center for this part of the world.

Multimodal Imaging Training Grant

It has been realized long ago that no single imaging method provides sufficient understanding of brain's network complexity. Thus, improvements of each imaging modality, as well as combining the data from different modalities have been used increasingly. Having a sufficient number of adequately trained researchers capable of assimilating and applying increased complexity of each individual modality and the additional difficulty of combining the complex multimodal data is a critical precondition for increasing readiness of the neuroscience community to address the current and future scientific challenges.

American Clinical MEG Society (ACMEGS)

While whole head MEG systems became available in the 90s, MEG is still considered a young technology in the medical field. Even though it is drawing many of its techniques and methods from EEG, it has its specificities that should be recognized and addressed appropriately. Currently, the USA is approaching having approximately 20 MEG systems of the latest generation from all three brand names, and there are pressing issues not addressed adequately: promotion and affirmation in the medical field, standardization, certification, education and training, etc. •

A closer look at Gamma Knife radiosurgery for brain melanoma metastases

by David Mathieu, MD
Gamma Knife Fellow

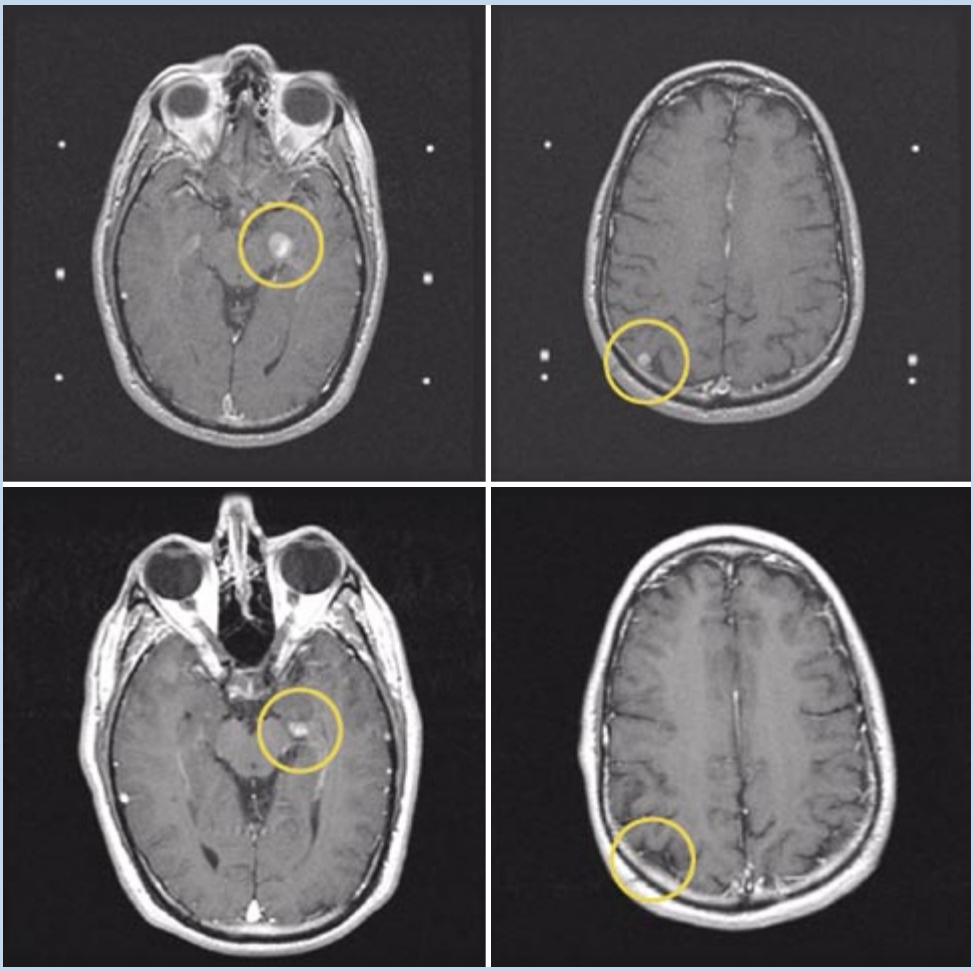
Melanoma is the third most common primary tumor associated with central nervous system metastases, after lung and breast cancer. Cerebral metastases occur in 10 to 40% of patients diagnosed with stage IV melanoma. Survival usually varies from 2.75 to four months and up to 95% of patients die from complications of central nervous system disease. For years, the management of melanoma brain metastases consisted of resection of symptomatic surgically-accessible lesions followed by whole-brain radiation therapy (WBRT), or WBRT alone. Stereotactic radiosurgery (SRS) has emerged as a minimally-invasive adjunct or alternative to microsurgical resection and fractionated WBRT for metastatic cancer. SRS provides high local tumor control rates in cancers often considered radioresistant, such as sarcomas, renal cell carcinomas and melanoma. At UPMC, we have a special interest in melanoma clinical care and research. Methods to improve the care of patients with melanoma in the brain using different approaches are ongoing. Gamma knife radiosurgery has been an important component of this multidisciplinary program.

Over an 18 year period, 244 patients had gamma knife radiosurgery for melanoma brain metastases. Ninety-eight patients (40.2%) had single metastasis and 146 (59.8%) had multiple metastases (range, 2-14). The mean interval from primary diagnosis to brain metastases diagnosis was 49.4 months (range, 0-49.8 years). In 119 patients (48.8%), the metastases were asymptomatic but were revealed on staging imaging studies.

The median survival was 7.8 months (mean, 13.4 months) from the diagnosis of brain metastases and 44.9 months (mean, 69 months) from the diagnosis of the primary tumor. The median survival after radiosurgery was 5.3 months (mean, 10 months; range, 0.2-114.3 months), reflecting the high incidence of patients with cancer in other organ sites at the time of radiosurgery. In multivariate analysis, only active extracranial disease ($p<0.0005$), KPS 80% or below ($p<0.0005$), multiple metastases ($p=0.005$), tumor volume over 8 cc ($p=0.041$) and cerebellar metastases ($p=0.021$) remained predictors of decreased survival. However, on Kaplan-Meier analysis, patients who had WBRT before radiosurgery had poorer survival than patients without WBRT (4.7 months with and 5.7 months without WBRT, $p=0.01$, log-rank test), although this may reflect patient selection. Median survival for patients with controlled extracranial disease was 12.7 months whereas it was only 3.9 months for patients with active disease ($p<0.0005$, log-rank test). Patients with a KPS of 90% or 100% at radiosurgery survived a median of 6.3 months compared with 2.9 months for patients with scores of 80% or below ($p<0.0005$, log-rank test).

The best response obtained was complete disappearance of 31 tumors (6.1%), significant regression of 162 tumors (32%) and no change in 268 tumors (52.8%). Early progression occurred in 46 tumors (9.1%). Delayed progression after prior regression or stabilization was noted in 24 tumors. Thus, a total of 70 tumors (13.8% of all metastases) eventually progressed. Sixteen patients (6.6%) had symptomatic radiation effects demonstrated by increased contrast uptake with signal changes around the lesion on long relaxation time (TR) MRI. These imaging changes as well as symptoms were completely reversed with a temporary course of corticosteroids in 12 patients.

Average patient survivals are related strongly to the extracranial cancer burden. Early on, we offered radiosurgery preferentially to patients in good clinical condition with limited intracranial disease (most had solitary tumors), as a boost to WBRT, and with limited active cancer. Increased evidence of the efficacy of SRS led us to offer this approach as palliative management to patients with more extensive CNS disease and more active extracranial disease. We are now participating in the care of increasingly challenging patients. In the present study, 59.8% of patients had multiple metastases, and this was found to negatively impact survival. When further analyzing survival in multiple metastases patients, it was difficult to establish a cutoff number of tumors over which patients did not benefit from radiosurgery. Because of the grim prognosis of patients with extensive cerebral disease, many centers only offer radiosurgery to patients presenting with three metastases or less. However, we have shown how it benefits patients with up to eight tumors, if overall tumor volumes were small. Progress has been made with the use of immunotherapy. Temozolomide-based chemotherapy is being used in melanoma patients, in an attempt translate gains made in the care of patients with malignant glial neoplasms. •



Before (*top*) and three months after (*bottom*) gamma knife radiosurgery in a man with two brain metastases from melanoma.

UPMC participating in multi-center, FDA-approved trial of cervical artificial disc

Jeff Bost, PA-C
Clinical Instructor

Joseph Maroon, MD, vice chairman at the Department of Neurological Surgery, has been selected to participate in a multi-center FDA-approved trial of a new artificial cervical disc—CerviCore™—developed by Stryker Spine. Dr. Maroon is primary investigator in the study. Adnan Abla, MD, Matt El Kadi, MD, PhD, and Daniel Wecht, MD, are co-investigators.

What are Discs for?

Spinal discs are flexible spacers that couple the vertebrae together, permit relative mobility of the bones, and provide axial shock absorption. These intervertebral discs are made of elastic material comprising a fibrous shell (annulus fibrosus) that surrounds a hydrophilic jelly-like core (nucleus pulposus). In conjunction with the joints, the cervical disc allows for flexibility and mobility of the spinal column at each segmental level. This flexibility, including coupled distraction during axial rotation, ensures that the exiting nerve roots are not compressed during the bending and rotation movements of the head.

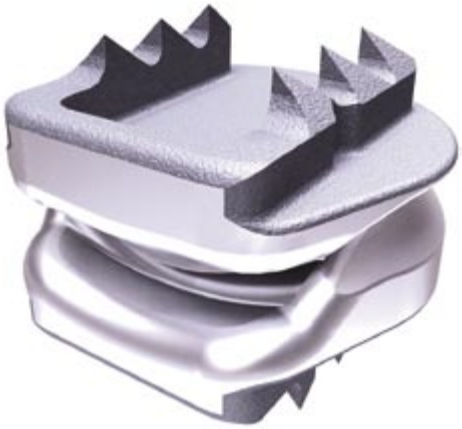
As we age, disc degeneration occurs with loss of water content of the nucleus pulposus and/or breakdown of the annular fibers that contain the nucleus, often resulting in loss of disc height, disc/osteophyte formation, disc herniation and spondylosis, and concomitant nerve root compression with radicular symptoms. The cervical spine is particularly prone to degeneration due to its wide range of motion, relative vulnerability to injury, and complex anatomy. Radicular symptoms may manifest as upper extremity pain and/or neurologic deficit in a pattern or distribution consistent with the specific nerve roots being compressed.

Treatments

For patients in whom segmental instability (pathological motion), neurological impairment, and chronic inflammation cause debilitating radicular symptoms that severely limit daily activity, or who experience a sudden and major neurological deficit where nerve root compression is confirmed radiographically, the current treatment recommendation is generally fusion of the pathologic motion segment.

Spinal fusion is a technique that is almost 100 years old. Fusion surgery typically involves immobilizing the targeted segment and creating a bridge of bone between two vertebral bones to eliminate motion. Usually, a plate and screw system is used to secure the bone segments to allow the bones to grow (fuse) together.

The goal of fusion surgery is to immobilize the unstable segment, and thereby reduce pain. Although this is successful for many patients, spinal fusion may present problems. Early problems include unsatisfactory functional recovery, voice or swallowing problems, potentially long recuperation time, donor site pain, and pseudoarthrosis, or failure to fuse properly. Fusion success rates using both bone and plates in the cervical spine, based on radiographics, may be greater than 90%. Long-term clinical satisfaction rates have been reported as low as 72% for the currently marketed devices.



CerviCore™ artificial spine disc from Stryker Spine. *(Caution: Investigational device. Limited by United States law to investigational use.)*

Latest Treatment- Artificial Discs

Because fusion changes the mobility of the spine, it can cause pathological forces and abnormal motion in the adjacent spinal segments. This pathological articulation has been implicated in adjacent level disease. It is possible that the short-term benefits of higher fusion rates afforded by modern rigid fixation constructs may result in higher-than-expected long-term incidences of adjacent level disease. There are now a number of reports that show a significant long-term adverse clinical outcome for cervical fusion surgery can be adjacent level disease. This phenomenon has been reported as high as 2.9% per year, over a 10 year period. In another report, 48 out of 50 patients followed for 21 years showed adjacent level degenerative changes, eight of whom (16%) went on to have additional disc surgery.

Current total disc replacement implants, or artificial discs, have been designed for use in cases of disc degeneration to act as dynamic mechanical intervertebral discs. These devices are designed to restore and maintain disc height, and permit normal motion and load bearing at the degenerated and adjacent motion segment(s). These design features are hoped to increase functional recovery, reduce recuperation time, and lower rates of adjacent level disc degeneration, as compared with fusion procedures.

To learn more about the study, including its inclusion and exclusion criteria, please contact Dr. Maroon or his associates at (412) 647-3604 or (888) 234-4357. •

Recent donations to the department

(All amounts up to $1,000, except as noted.)

Brain Trauma Research Center
Corpus Christi Parish
Barbara Ann Dively
Cheryl & Jeffrey Mitchell

Copeland Neurosurgery Research
• ***$10,000 - $25,000:***
The Pittsburgh Foundation

Sheptak Chair
Electra Agras
James R. Agras
Dr. & Mrs. Timothy F. Witham

Image-Guided Neurosurgery Fund
Stephanie Dobbins
Mr. & Mrs. Raymond A. Mitch
Mr. & Mrs. Dennis G. Smith

Lars Leksell Chair
Mary Davis Bebesi

Neuroimplantation Research Fund
• ***$1,000 - $5,000:***
Jean Hill Chisolm
Guita Neman
Shahriyar Neman

Neurosurgery Faculty Training
• ***$10,000 - $25,000:***
The Pittsburgh Foundation

Neurotransplantation Research
Donald G. Ferris
Charles Herbst
Kathryn E. Patterson

General Neurosurgery Fund
C. A. Baxer, DMD
Ruth T. Pollock

Welch Biomechanics Lab
IBM Corporation

Graduation Dinner Honors Chief Residents

A special black-tie reception and dinner was held June 25 at the Fox Chapel Golf Club honoring chief residents **Anand V. Germanwala, MD, Costas Hadjipanayis, MD, PhD,** and **Matthew Wetzel, MD,** on their successful completion of the University of Pittsburgh's seven-year neurological surgery residency program.

Dr. Germanwala has accepted a fellowship in vascular/skull base neurosurgery at Johns Hopkins Medical Center and later will take an academic neurosurgery staff position at the University of North Carolina at Chapel Hill. Before leaving for Johns Hopkins, Dr. Germanwala will spend an additional six months in our department studying catheter technology with Michael Horowitz, MD.

Dr. Hadjipanayis has accepted a position with the University of Pittsburgh Department of Neurological Surgery augmenting our general neurosurgery and brain tumor program at UPMC Shadyside. He also is establishing a brain tumor research laboratory in the Walter L. Copeland Research Suite. Dr. Wetzel will join Michael Rutigliano, MD, in our Westmoreland County Community Neurosurgery Center.

A highlight moment of the evening came when those in attendance paid tribute to **L. Dade Lunsford, MD**, with a lengthy standing ovation upon his closing remarks for the evening. Dr. Lunsford stepped down as department chairman, effective July 1, to devote more time to his clinical work as co-director of the Center for Image-Guided Neurosurgery.

Media

• **Kevin Walter, MD**, was interviewed on the WTAE-TV Evening News (Pittsburgh), May 17 about the use of hypothermia in treating brain trauma patients.

Prominent Lectures

• **Dr. Lunsford**, served as keynote lecturer at the Eighth Meeting of The Leksell Gamma Knife Society in Seoul Korea, May 24 and was visiting professor at Taipei Veterans Hospital in Taiwan, May 25-26. Dr. Lunsford also presented a lecture to the Taiwan Neurosurgical Meeting, May 26.

• **Amin Kassam, MD**, was visiting professor at the University of Toronto on February 24 and at the University of Illinois, Chicago, March 4.

• **Douglas Kondziolka, MD**, served as the keynote lecturer at the American Society of Stereotactic & Functional Neurosurgery meeting, June 3, in Boston, MA.

Awards

• **Dr. Walter's** poster *Tissue Brain Oxygenation Monitoring in Adult Traumatic Brain Injury: A Review of Placement Safety* was awarded second place at the 2006 American Association of Neurological Surgeons annual meeting in San Francisco this past April in the category 'Trauma & Critical Care.' The abstract will be printed in the August issue of *Journal of Neurosurgery*.

• **Dr. Kondziokla** received the Robert Florin Award from the American Association of Neurological Surgeons for socio-economic research at the organization's annual meeting in San Francisco.

Grant Award

• "HSV-Mediated Chemoradiosensitivity Human Glioma Model." **Dr. Hadjipanayis**, National Institute of Health (Mentored Clinical Scientist Development Award), $880,271.

Personal Congratulations

• Baby boy (Reese Marshall, July 16) to **Richard Spiro, MD**, and wife Paula; baby boy (Elias Costas, June 20) to **Dr. Hadjipanayis** and wife Lorraine; baby boy, (Michael, May 22) to **Louisa Urgo**, physician assistant, and husband David Chin; baby girl (Natalie, May 8) to **Johnathan Engh, MD**, resident, and wife Kelly.

Welcome

• **Emilie Ballard**, secretary to Matt El-Kadi, MD; **Kirsten Stalder**, Tri-State RN; **Kristen Thompsen**, physician assistant at Children's Hospital; **Kathryn Walter**, secretary to Adnan Abla, MD; **Lan Bao**, researcher for C. Edward Dixon, PhD; **Andrew John Kerrish**, OR nurse; **Jason Miller**, OR nurse; **Thomas Ventresca**, OR nurse; **Louis Belton**, OR tech.

• **Juan Martin, MD**, PGY-1 resident; **Edward Monaco, Jr.**, PGY-1 resident; **Matthew Tormanti, MD**, PGY-1 resident

• Special welcome to **David O. Okonkwo, MD, PhD**. Dr. Okonkwo, who joins the faculty from the University of Virginia, will lead the department's CNS injury program and continue his basic science efforts in traumatic brain and spinal cord injury.

Office Relocation

• The Center for Injury Research and Control (CIRCL) has relocated to the second floor of the Parkvale Bank Building at 3520 Forbes Avenue in Oakland. The center's main phone number has also changed to (412) 802-6500.

New Outpatient Offices

• **Dr. Spiro**, has established an outpatient office in Lower Burrell, PA, seeing patients presenting with any neurosurgical conditions including brain disorders, spinal disorders and peripheral nerve syndromes. Dr. Spiro will see patients on the first Wednesday of every month from 12:30 to 5:00 p.m in the Burrell Medical Center on Wildlife Lodge Road. To arrange an appointment or consultation, please call (412) 647-3920. For emergency, urgent consultations or after-hour referrals, please call (412) 647-7000.

Upcoming Events

• September 11-13: **Gamma Knife Radiosurgery Training for Nurses**. For nurses and other allied health care personnel interested in providing clinical care for patients undergoing Gamma Knife radiosurgery. Call (412) 647-7744 for more information.

• September 21-23: **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. Call (412) 647-6358 for more information.

• September 25-29: **Principles and Practice of Gamma Knife Radiosurgery.** For neurosurgeons, radiation oncologists and medical physicists interested in Gamma Knife radiosurgery certification. This course will also be offered November 13-17. Call (412) 647-7744 for more information.

Correction

• **P. David Adelson, MD**, was inadvertently omitted in our last newsletter in the list of doctors from our department selected to the national top doctors survey published in the May issue of *Pittsburgh Magazine*. •

UNIVERSITY of PITTSBURGH
neurosurgery news

Department of Neurological Surgery
University of Pittsburgh Medical Center
UPMC Presbyterian/Suite B-400
200 Lothrop Street
Pittsburgh, PA 15213
(412) 647-3685
neuroinfo@upmc.edu

Editor: Douglas Kondziolka, MD
Production Editor: Paul Stanick

www.neurosurgery.pitt.edu

Non-Profit
Organization
U.S. Postage
PAID
Permit #4166
Pittsburgh, PA

Patient Referrals
(412) 647-3685

University of Pittsburgh Medical Center
Recognized as an honor roll member of *U.S.News & World Report's* 'America's Best Hospitals' 2006.
(see www.neurosurgery.pitt.edu for more details)

SUMMER 2006 • VOLUME 7, NUMBER 3

Improving the patient, physician informed consent process for surgery

(continued from page 3)

informed consent to cover, in addition to surgery, administering anesthesia related to the performance of surgery; administering radiation or chemotherapy; administering a blood transfusion; inserting a surgical device or appliance; administering an experimental medication; using an experimental device; and using an approved medication or device in an experimental manner.

Is documentation required? In fact, the law does not require a physician to create any documentation. However, documentation of the informed consent dialogue and the patient's consent are critical to the physician's legal protection. Without documentation, other than the physician's statements based on memory or usual practices, the physician has no "evidence" that the patient was told what the law requires. Many believe that most patients do not remember very much of the information they are told about procedures or treatment because they are emotionally upset and the information is difficult for them to process. Documents reviewed later may serve to refresh patients' memories on points they believed were never discussed even though they were.

The practice-based consent form we developed is simple to use and modular. Because it is written in point form, it aids the surgeon in discussing each point in order so that the important topics are covered. Forms such as this have been challenged on the basis that a patient may propose litigation on a risk that was not listed or "signed off." However, if the list of risks includes those most significant for the procedure, it is believed that the patient would have a difficult time winning a lawsuit based on the lack of informed consent. In Pennsylvania, the law requires the patient to prove that receiving the information that was allegedly omitted would have been a substantial factor in the patient's decision whether to undergo the procedure.

There are many elements to informed consent. Consent is hardly ever fully informed because the patient cannot be expected to understand everything about the procedure as well as the senior clinician despite all efforts to provide an abundance of information. In most states, the duty is to disclose all information that a reasonable practitioner would provide.

The following points should be addressed during the informed discussion: [adapted from Scarrow (2002)]; (1) results of pertinent diagnostic studies; (2) probable outcome of surgery; (3) likely benefits of surgery; (4) explanation of what surgery will entail; (5) probable complications; (6) temporary complications, such as post-operative pain and infections, along with treatment for these temporary conditions; (7) permanent results and complications, such as nerve palsies, paresis, plegia, and scars; (8) other risks that are reasonably foreseeable, such as injury to surrounding nervous structures and their sequelae; (9) reasonable alternatives to the procedure along with the risks and benefits of the alternatives. •