



# University of Utah Neurosurgery News

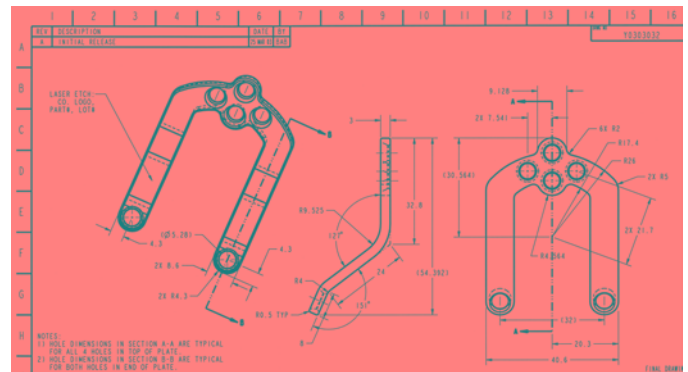
Volume 2, number 1

## Pediatric Neurosurgeons Develop New Occipitocervical Fixation Device

Over the past five years, Dr. Douglas Brockmeyer, Professor of Neurosurgery, and Dr. Nathan Avery, former Pediatric Neurosurgical Fellow, have worked closely with several manufacturers to develop a new occipital cervical fixation device for use in pediatric patients. In 2001, a 22-month-old boy presented to Primary Children's Medical Center with severe occipitotlantal dislocation after a motor vehicle accident. Children this young are poor candidates for treatment with other occipital/cervical instrumentation devices, because they do not stabilize the craniovertebral junction without a halo. Dr. Avery, who has a background in drafting, worked with Dr.



Brockmeyer to design and create an occipital/cervical plate that could be used in children of this age. The plate was designed to fit between the occiput and C2 and was meant to be incorporated with C1-2 transarticular screws. After the final draft was completed, the doctors approached ATK Thiokol Corporation to see if they would be willing to manufacture the loop. Thiokol agreed and produced the first three loops. The first occipitocervical loop was implanted successfully on May 18, 2001. The patient went on to successful fusion without the use of an



external halo orthosis. The device was named the "ABT Loop," which stands for Avery-Brockmeyer-Thiokol.

Since the first case, fourteen more ABT loops have been implanted in patients with occipitocervical instability. After the initial three cases, Dr. Brockmeyer and Dr. Avery approached Medtronic-Sofamor Danek (Memphis, Tennessee) to manufacture and market the product. The doctors have also worked through the

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University Health Care

## Clinical Trials in Pediatric Neurosurgery

The Pediatric Division continues to lead the nation in the development of clinical trials<sup>1</sup> for the investigation of hydrocephalus. Having completed three multi-center trials of different shunt valves,<sup>3</sup> endoscopic shunt placement,<sup>2</sup> and adjustable shunt valves,<sup>5</sup> the pediatric neurosurgeons in the department have accumulated a detailed database of approximately 1,000 patients from centers around the country and around the world. These data continue to be extremely valuable in the investigation of hydrocephalus problems and in the planning of future studies.

At present, Dr. John Kestle is investigating infection of ventriculo-peritoneal shunts. A recently completed multi-center pilot study<sup>4</sup> has demonstrated marked variation between centers in the management of patients with this difficult problem. The duration of therapy, and therefore the duration of hospital stay, are extremely variable and do not appear to be related to the incidence of recurrent infection. Based on this pilot study, planning is underway for a trial to investigate the duration of antibiotic therapy and the role of antibiotic-impregnated equipment in these children. In addition, antibiotic-impregnated shunt equipment is being used for the prevention of shunt infection. The recent experience at Primary Children's Medical Center suggests that there might be a benefit to this, but a randomized trial is required and is being planned.

Dr. Marion Walker and Dr. Kestle recently participated in a consensus conference sponsored by the National Institutes of Health to help develop an agenda for research priorities in hydrocephalus. This conference was the first of its kind and was an exciting opportunity for the promotion of collaborative hydrocephalus research. It is hoped that this will stimulate continued hydrocephalus research and provide funding for future clinical trials.

1. Kestle J: Clinical Trials. **World J Surg** **23**:1205-1209, 1999

## Chairman's Message

In this issue of *Neurosurgery News*, we highlight some of the recent significant contributions from our Pediatric Division, comprised by Drs. Walker, Brockmeyer, and Kestle.



Our pediatric neurosurgery group represents a center of excellence for pediatric neurosurgery for multiple states in the Intermountain West and beyond. Highlighted here is some of clinical trials work of Drs. Kestle and Walker. The development of randomized clinical trials has helped define best (and now standard) practice for ventricular shunting technique and hardware choices in pediatric patients. Also in this issue is the story of the development and implementation of the ABT plate, an ingenious design of occipitocervical fixation device specifically meant for use in pediatric patients. Finally, don't miss Doug Brockmeyer's tale of ascending Mt. Everest—an enormous feat by any standards, and particularly when accomplished by a practicing neurosurgeon—to our knowledge the first ascent by a neurosurgeon. Congratulations, Doug.

2. Kestle J, Drake J, Cochrane D, et al: Lack of benefit of endoscopic ventriculoperitoneal shunt insertion: A multicenter randomized trial. **J Neurosurg** **98**:284-290, 2003

3. Kestle J, Drake J, Milner R, et al: Long-term follow-up data from the Shunt Design Trial. **Ped Neurosurg** **33**:230-236, 2000

4. Kestle J, Garton H, Whitehead W, et al: The management of shunt infection: a multicenter pilot study, in **Pediatric Section of the American Association of Neurological Surgeons/Congress of Neurological Surgeons**. San Francisco, CA, 2004

5. Kestle JRW, Walker ML, for the Strata Investigators: A multicenter prospective cohort study of the Strata valve for the management of hydrocephalus in pediatric patients. **J Neurosurg: Pediatrics** **2** **102**:141-145, 2005

## Welcome Kenneth S. Yonemura, M.D.

The Department of Neurosurgery is pleased to welcome Dr. Ken Yonemura to the University of Utah. Dr. Yonemura joined the Neurospine section, with an emphasis on minimally invasive surgical techniques and interbody fusion, as an Assistant Professor in mid-July.

Dr. Yonemura was born and raised in Southern California. He graduated from the University of Southern California with a B.S. degree in psychobiology in 1980. His medical school training was completed at Jefferson Medical College in Philadelphia, PA in 1984. He completed his internship and neurosurgery training at the University of California, Irvine Medical Center (UCIMC) in 1990 and was then selected for a spinal surgical fellowship at the Barrow Neurological Institute in Phoenix, Arizona.



Following his return to UCIMC as an assistant professor in 1991, he developed a strong interest in interbody fusion techniques and became one of the original surgeons involved in the FDA evaluation of threaded fusion cages.

Dr. Yonemura was then invited to join his prior chairman in private practice in Seattle at the Northwest Neuroscience Institute in 1993. During his private practice experience, he helped pioneer minimally invasive surgical techniques for both the cervical and lumbar spine. He has been asked to lecture and teach workshops both in the United States and abroad on various aspects of spinal surgery.

He returned to academic medicine at the State University of New York Upstate Medical University in Syracuse, New York, in September 1999. He was granted a dual appointment in the Departments of Neurosurgery and Orthopedics and was an integral part of the Institute for Spine Care at the University Hospital. In addition to complex spinal disorders and minimally

invasive spine surgery, he developed a strong interest in the diagnosis and treatment of peripheral nerve disorders.

Because of a desire to return to the western United States, Dr. Yonemura has now accepted a position in the Department of Neurosurgery at the University of Utah.

His current research interests include the development of new interbody fusion and minimally invasive surgical techniques, as well as motion preservation techniques and frameless navigation for spinal surgery.

As a result of his active involvement in United States Cycling Federation bicycle racing, Dr. Yonemura has been a staunch supporter of the national ThinkFirst brain and spinal cord injury prevention program and had previously been the medical director for the chapter in upstate New York.

Consultations with Dr. Yonemura can be arranged by contacting his assistant at (801) 585-2453. He is also amenable to reviewing diagnostic studies and, with adequate notice, may be available to travel for assistance in difficult or complex cases.

## Department News

### New Staff

Debra Fisher has joined the department as the assistant to Dr. Ken Yonemura.

Virany Hillard, M.D., has joined the department as the Spine Fellow for the year.

### Congratulations!

Congratulations to resident Oren Gottfried, who was married to Jill in June!

### A New Addition

Resident Todd McCall and his wife, Yvonne, welcomed daughter Shannon Elizabeth on August 12. She was 7 lbs., 4 oz. and 19 in.

## Reaching New Heights: Summitting Mt. Everest

*Editor's Note: Dr. Douglas Brockmeyer is a pediatric neurosurgeon at the University of Utah and Primary Children's Medical Center. The Department of Neurosurgery congratulates him on achieving his goal of climbing Mt. Everest.*

At 9:30 a.m. on May 30, 2005, I stood on the summit of Mt. Everest. That moment in time was a culmination of many years of personal preparation, combined with a tremendous amount of support from my colleagues. The only way I could indulge in this level of mountain climbing would be if my partners, Dr. John Kestle and Dr. Jack Walker, as well as other members of the Department, were fully supportive of my efforts. Luckily for me, that was the case.



On the trip, I made many new friends, learned a great deal about the strength and dignity of the Sherpa people and, of course, enjoyed spectacular climbing on an historic route. By all accounts, it was a “difficult” year on Mt. Everest, with high winds and late summit



dates. But, we were able to overcome the obstacles and “top out” in safety and good style.

Looking back, I know my time on top of the world was fleeting, but my appreciation and gratitude for my coworkers, my family, and my friends lives on forever.

## Pediatric Epilepsy Surgery

The Department of Neurosurgery, through the affiliation with Primary Children's Medical Center, offers a comprehensive epilepsy surgery program for the Intermountain region for patients up to 21 years old. Dr. John Kestle and Dr. Colin Van Orman (from the Department of Neurology) coordinate this very successful program. Patients are evaluated in a combined clinic and potential surgical candidates undergo video EEG monitoring in the Primary Children's Medical Center Epilepsy Monitoring Unit. MRI, SPECT, and PET scanning are all obtained as required.

At the recent International Society for Pediatric Neurosurgery meeting, Dr. Kestle reported the PCMC experience over the past five years for children with focal epilepsy. Fifty-seven craniotomies were performed with intraoperative seizure mapping and/or subdural grid implantation. Overall, 78% of patients were seizure-free one year after surgery. There was an 86% seizure-free rate for patients with pathology in the temporal lobe and a 67% seizure-free rate after surgery for patients with pathology outside the temporal lobe. In addition, hemispherectomy is performed when appropriate<sup>1,2</sup> and vagal nerve stimulation for nonlocalized intractable epilepsy (80 patients in the last 5 years) has added to the surgical options. The recent addition of a 3T MRI at PCMC and an MEG facility will further enhance the Pediatric Epilepsy Surgery program and help treat this devastating disorder.

### Bibliography

1. Kestle J, Connolly R, Cochrane D: Pediatric peri-insular hemispherotomy. **Pediatr Neurosurg** 32:44-47, 2000
2. Kestle J, Van Orman C: Surgery for localized epilepsy in children, in **International Society for Pediatric Neurosurgery**. Vancouver, British Columbia, 2005

## Venous Thromboembolism in Neurosurgery: Natural History & Algorithm for Prophylaxis

The Department of Neurosurgery at the University of Utah is currently conducting a large prospective randomized trial comparing the efficacy of heparin and low-molecular-weight heparin in preventing the development of deep vein thrombosis (DVT). The obvious concern is the development of a DVT that propagates and becomes a mobile clot that can travel to the lung (pulmonary embolism). Pulmonary embolisms have the potential to be fatal events.

DVT episodes are common among neurosurgery patients, occurring in >50% of those who receive no therapy. The use of mechanical compression devices, or leg squeezers, reduces the risk to 32%, and administration of heparin further reduces the risk to ~10%. The current standard of care in neurosurgery is the administration of heparin dosed subcutaneously two or three times per day. A newer medication, Lovenox, which is in a group of medications referred to as low-molecular-weight heparin, is thought to be more effective in reducing the risk of forming a DVT.

Under the direction of senior resident Samuel R. Browd, M.D., Ph.D., and with the collaboration of the Departments of Pharmacy and Hematology, this trial will be the largest trial to date in neurosurgical patients comparing heparin versus Lovenox in the prevention of DVTs. The study began in late January and more than 225 patients have been enrolled.

Initial data suggest that heparin and Lovenox have similar safety profiles, and patients treated with Lovenox have developed fewer DVTs than patients taking heparin. The results are preliminary, however, and not yet statistically significant. The overall enrollment goal to complete the study is approximately 2000 patients. Thus, the study will be ongoing over the next two or three years. The preliminary data were presented at the annual Congress of Neurological Surgeons meeting in Boston, October 8–13, 2005.

For further information regarding the use of heparin and low-molecular weight heparins in

neurosurgery, a recent publication by Dr. Browd and colleagues reviews the topic in detail. The article, entitled “Prophylaxis for deep venous thrombosis in neurosurgery: a review of the literature” can be downloaded at <http://www.aans.org/education/journal/neurosurgical/oct04/17-4-1.pdf>.

Patients or physicians are encouraged to contact Dr. Browd or members of the DVT research team regarding questions at 801-581-6908.

## Kudos

### Board Certification

Dr. Meic Schmidt was Board Certified by the American Board of Neurological Surgeons.

### Honors

Dr. James Liu received the Dandy Clinical Fellowship awarded by the Congress of Neurological Surgeons. He will be working at Oregon Health Sciences University in 2006-07, studying complex skull base surgery and cerebrovascular diseases.

### Funding Awarded

Dr. Randy Jensen received funding from the Huntsman Cancer Foundation. The grant is to address his study "Towards an Understanding of Hypoxia Inducible Factor 1 in Human Brain Tumors."

Dr. Dan Fults was awarded an NIH RO1 research grant from the National Cancer Institute for \$900,000 for the funding period from June 01, 2005 through May 31, 2009. The project title is “Somatic Cell Transfer to Model Medulloblastoma in Mice.”

Drs. William Couldwell and Joel MacDonald received a Catalyst grant from the School of Engineering to develop a computer-aided machine tool for automating skull base drilling and craniotomy.

### Fellowships Awarded

Dr. Oren Gottfried will begin a complex spine fellowship at Johns Hopkins University Medical School.

Dr. Dan Fassett will be performing his complex spine fellowship at the Rothman Institute at Jefferson Medical College.

# Neurosurgery News

## Congress of Neurological Surgeons Annual Meeting, October 8-13, 2005

At the Congress of Neurological Surgeons annual meeting in Boston, MA, presentations by department members offered insight into the theme of “Quo Vadis? Topics, theories, tools, therapies.” Among the most notable, in the Section for the Council of State Neurosurgical Societies, the CSNS Resident Award was given to the paper on “Neurosurgery Work Hour Restrictions: Impact on Resident Training” by Drs. Todd McCall, John Kestle, and Ganesh Rao. Dr. James Liu was also presented with his Dandy Clinical Fellowship award (see *Kudos* section).



Faculty members from the department served various roles in the practical courses that preceded the general sessions and in the special sections. Dr. Douglas Brockmeyer participated in two practical courses. Dr. Jack Walker's expertise in hydrocephalus therapies was recognized in his position as the moderator of the a session on emerging therapies, and Dr. Ronald Apfelbaum moderated a session on spinal fusion.

Faculty also shared their expertise as speakers in various sessions. Dr. Apfelbaum, Dr. Randy Jensen, Dr. Dan Fults, Dr. Brockmeyer, and Dr. William Couldwell all served on faculty panels.

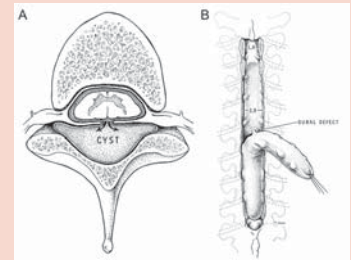
Dr. Walker was also on the faculty of the “Digital Masters Video Symposium,” in which recognized authorities presented brief video demonstrations of the surgical management of various conditions. This Video Symposium was moderated by current University of Utah resident Dr. Brian Ragel and former resident Dr. Ganesh Rao.

Other posters and oral presentations, on topics as diverse as neurosurgical history, pituitary apoplexy, and spondylolisthesis, by faculty and residents rounded out the presentations by the department.

## Covering Neurosurgery (so to speak)

Several papers written recently by individuals in the Department have been honored by having artwork selected to be on the cover of the journal issue in which they were published. The article “Non-Communicating Spinal Extradural Arachnoid Cyst Causing Spinal Cord Compression in a Child” by Drs. Liu, Cole, Kestle, and Walker was featured on the cover of the September issue of the *Journal of*

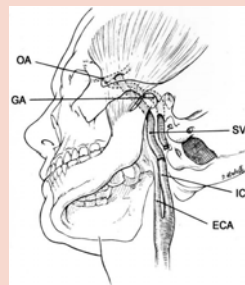
*Neurosurgery: Pediatrics* (see picture at right). (J Neurosurg (Pediatrics 3) 103:266–269, 2005)



The cover on the upcoming December issue of the *Journal of Neurosurgery* will be from a paper by Drs. Liu, Cohen-Gadol, Cole, Kan, and Couldwell on “Harvey Cushing and Oskar Hirsch: Early Forefathers of Modern Transsphenoidal Surgery.”

Other recent cover features have included the following papers:

Fassett DR, Couldwell WT. Metastases to the pituitary gland. *Neurosurg Focus* 16 (4):Article 8, 2004



Liu JK, Gottfried ON, Amini A, Couldwell WT. Aneurysms of the petrous internal carotid artery: anatomy, etiology and treatment. *Neurosurg Focus* 17 (5):E13, 2004

Couldwell WT, Gottfried ON, Weiss MH,

Popp AJ. Trends in the neurosurgical workforce. *AANS Bulletin* 2004 Winter;12(4):7-9

Walker ML, Browd S. Craniopagus twins: embryology, classification, surgical anatomy, and separation. *Childs Nerv Syst* 20:554-566, 2004

### **ABT Plate** (continued from page 1)

University of Utah Office of Technology Transfer to secure a patent. A preliminary patent was granted in 2004, and the final touches on the permanent patent are presently being worked out. In the meantime, Medtronic-Sofamor Danek has officially agreed to market and manufacture the device.

The ABT plate is available in a variety of sizes. Ten different-sized plates are available to fit patients from eighteen months to adulthood. The device is rigid, precontoured, and low profile. As mentioned above, the device is meant to be coupled with either C1-2 transarticular screws or C2 pars screws bilaterally. To fixate the loop to the occiput, three 10-mm screws are placed into the suboccipital region. In the vast majority of cases, the bone for the occipital/cervical arthrodesis is taken from the posterior iliac crest and then fashioned to fit between C2 and the suboccipital region. The bone is held in place with a multi-stranded titanium cable on the lower part and a screw passed through the graft into the occiput.

The device is intended for use in patients with occipital/cervical instability and otherwise normal anatomy. All patients with normal anatomy who have undergone implantation of this device have gone on to

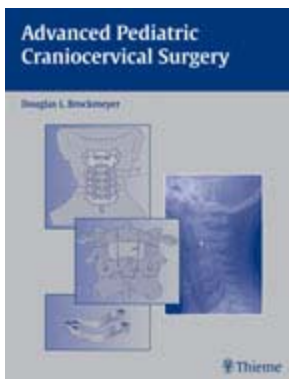
successful fusion. The device cannot be used in patients who have had previous Chiari I decompressions because the upper part of the device is secured in the suboccipital region. Other instrumentation constructs are used in that circumstance.

A new refinement of the device is a coupling of headless C1-2 transarticular screws with the loop to ease the placement of the loop into the patient. In this scenario, headless C1-2 transarticular screws are placed and then the bottom holes on the device are dropped over the headless screws. The screw heads are tightened down over the top of the device when the proper size is found.

This device is the only one of its kind available for use in children. Dr. Brockmeyer has been encouraged with the results obtained in the 15 implanted ABT loops. Once a Humanitarian Device Exemption (HDE) is obtained by Medtronic-Sofamor Danek, the device will be available on a mass-market basis rather than as a custom product.

For inquiries regarding the use of the device, please contact Dr. Brockmeyer at (801) 588-3400.

## **New Book on Advanced Pediatric Craniocervical Surgery**



A new book by Dr. Douglas Brockmeyer entitled "Advanced Pediatric Craniocervical Surgery" has just been published by Thieme Medical Publishers. This book brings together all aspects of pediatric craniovertebral surgery in one source. It describes state-of-the-art techniques for surgery of the craniovertebral junction and cervical spine and provides a solid foundation in surgical concepts from which to make clinical decisions.

Dr. Brockmeyer has recruited leading experts in the field to discuss specific areas that are important in managing children with craniocervical disorders and drew on his own experience developing techniques for use in pediatric cases. The result is a book that presents the most relevant and current information available in the field of pediatric craniocervical surgery. Topics include the anatomy and development of the craniovertebral junction and cervical spine, a discussion of the biomechanics of

the region, concise descriptions of common pathological conditions, considerations of traumatic injuries of the pediatric craniovertebral junctions, and chapters on advanced atlantoaxial, occipitocervical, and subaxial cervical spine surgery in children.

## Department of Neurosurgery Faculty

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