Epilepsia article advocates for replacing Wada test, and awake craniotomy with non-invasive methods

In the recent issue of Epilepsia, Le Bonheur’s Neuroscience team asks if it is time to replace the Wada test and put the awake craniotomy to sleep. The authors suggest that non-invasive functional neuroimaging methods including Magnetoencephalography (MEG), functional Magnetic Resonance Imaging (fMRI) and Transcranial Magnetic Stimulation (TMS) can replace what long has been the gold standard in neuroimaging.

The invasive pre-surgical brain mapping approaches of direct cortical stimulation and the Wada procedure have been used in surgical planning to prevent or reduce morbidity and optimize the therapeutic effects of surgery. The advent of non-invasive functional imaging has provided equally trustworthy results. Further, the team writes, if non-invasive methods are available, there are no longer compelling reasons to use the more invasive methods in most cases.

At Le Bonheur, the combination of technology used in patient care and research is unmatched by any other children's hospital. MEG, fMRI and TMS are routinely used in brain tumor and epilepsy surgical planning.


Neurosurgery vs. pharmacotherapy in TSC treatment

A new article in the Journal of Child Neurology reviews the timing and use of neurosurgery versus pharmacotherapy for the treatment of subependymal giant cell astrocytomas (SEGAs) in patients with tuberous sclerosis complex (TSC). Co-Director for both Le Bonheur Children’s Hospital Tuberous Sclerosis Center of Excellence and the Neuroscience Institute James W. Wheless, MD, and Chief of Pediatric Neurosurgery Paul Klimo Jr, MD, MPH, review the literature and combine it with their experience to provide the first algorithm to aid the clinician in the decision-making process for treating these patients.

Tuberous sclerosis complex, a genetic disorder caused by mutations in either the TSC1 or TSC2 gene, can result in the growth of hamartomas in multiple organ systems. SEGAs are slow-growing brain tumors associated primarily with tuberous sclerosis complex. The tumors are usually located in the ventricles, often near the foramen of Monro, where they can cause an obstruction if they grow too large, leading to increased intracranial pressure.

Surgery to remove a tumor has been the mainstay of treatment but can be associated with postoperative morbidity and mortality. Not all tumors and/or patients are suitable for surgery. Although complete surgical resection can be curative, partial resection will usually lead to tumor regrowth.

The recent development of mammalian target of rapamycin inhibitor everolimus that targets the pathway affected by TSC1/TSC2 mutations offers a novel pharmacotherapeutic option for these patients. Everolimus is approved in the United States and Europe for treating SEGAs when surgery is not an option and is the only systematic agent approved for this indication to date.

“We have seen many patients in our clinic who have had significant reduction in tumor size with mTOR inhibitors and have not experienced side effects from the medicine,” said Wheless.

Wheless and Klimo provide an algorithm to aid in the decision-making process for those treating these patients.

Wheless J, Klimo P. Subependymal giant cell astrocytomas in patients with tuberous sclerosis complex: Considerations for surgical or pharmacotherapeutic intervention. J Child Neurol. Published online at jcn.sagepub.com.

Response of a subependymal giant cell astrocytoma tumor to treatment with everolimus. Patient has well-controlled partial seizures and normal intelligence. Initial magnetic resonance imaging (MRI) was done as routine surveillance study. (A) Coronal T1 fluid attenuated inversion recovery plus contrast MRI demonstrating right-side subependymal giant cell astrocytoma (longest diameter 11.34 mm) in a 5-year-old male patient. (B) Coronal T1 contrast MRI showing decreased tumor size (longest diameter 6.16 mm) after treatment with everolimus, taken nearly 12 months after the first MRI.
Le Bonheur’s Neuroscience Institute has recently opened a new outpatient headache clinic. Led by Pediatric Neurologist Diana Lebron, MD, the clinic will see patients with primary and secondary type headaches, including migraines, cluster headaches and tension headaches.

The clinic is designed to help patients understand and manage their condition through a variety of medications and non-pharmacological treatment options.

“Pediatric headache is a chronic complaint, and for some children, the headaches are extremely debilitating and can worsen as the child ages,” said Lebron. “Through our clinic, we can diagnose the headache type and help families find strategies for reducing the frequency and severity of their child’s pain.”

Lebron is a certified headache specialist and board-certified pediatric neurologist. She is involved in novel treatments for children with chronic daily headaches, such as IV Magnesium, Coenqyme Q 10, Botox and nerve blocks. Lebron’s clinical interests also include secondary headache types such as post-traumatic headaches, headaches due to Ehlers Danlos Syndrome, headaches due to idiopathic intracranial hypertension and Cervicogenic headaches.

At Le Bonheur, pediatric neurosurgeons were the first to use a new neurosurgical horseshoe headrest with VISIUS® intraoperative MRI (iMRI) during two recent cases. The IMRIS headrest is the first MR-safe and CT-compatible horseshoe headrest patient positioning during neurosurgical procedures requiring intraoperative imaging in the VISIUS® Surgical Theatre. The headrest can work for neonatal to adult patients.

“The IMRIS horseshoe headrest worked well for providing the ideal prone positioning during this procedure,” said Frederick Boop, MD, chairman of the Department of Neurosurgery at the University of Tennessee Health Science Center and co-director of Le Bonheur’s Neuroscience Institute. Boop performed the first case of a tumor surgery on a 5-year-old child.

“In the past we would not have had an iMRI option for this child and now the surgery is completely gone. We have now advanced our treatment to a group of kids for whom it will really make a difference. Even our youngest and most fragile patients can benefit from intraoperative MR, which would not have been possible otherwise.”

The second neurosurgical case with the headrest involved a 4-month-old baby operated on by Paul Klimo, MD, chief of the Division of Pediatric Neurosurgery at Le Bonheur and UTHSC.

The device provides non-pinned (or non-rigid) head support in prone, lateral and supine positions during head, neck and cervical spine surgeries where use of a head fixation device (HFD) – a clamp-like device – is not desirable because the skull is too fragile for pinning. These patients may be babies whose skulls are still soft or older patients with weakened skull bones. This headrest may also be useful for other applications not requiring rigid fixation, such as those that access the skull through the nose.

Boop discussed his initial experiences using the IMRIS horseshoe headrest and the value of iMRI in pediatric neurosurgery in early April at the American Association of Neurological Surgeons (AANS) annual meeting in San Francisco. After two years with the imaging system in operation, Le Bonheur Children’s recently credited VISIUS iMRI use in reducing return surgical rates by 84 percent.
Boop collaborates on PNAS paper about cellular signals

Dr. Frederick Boop, chief of the Department of Neurosurgery, recently collaborated with a team from the University of Tennessee Health Science Center, Department of Physiology, on a study published in PNAS finding that cellular signals can alter the subunit composition of an important ion channel called BK that is present in arterial muscle cells. Ion channels are a family of proteins that transfer ions into and out of the surface of cells to influence vital cellular processes, including arterial contractility, which controls brain blood flow and pressure. Ion channels that were previously believed to associate with their regulatory subunits in a rigid manner that was not subject to modification.

The team found that contrary to expectations, a regulatory subunit of BK was located primarily inside arterial muscle cells rather than on the cell surface. Nitric oxide, a well-known anti-hypertensive agent produced within the body, stimulated rapid transfer of this subunit to the cell membrane, which then activated BK leading to vasodilation.

The collaboration with the Neuroscience Institute was vital in showing that this cellular mechanism also occurs in human cerebral arteries. The results of this paper are important in defining a novel mechanism of how ion channel proteins may function within cells and could potentially lead to design of better drugs for the treatment of stroke and hypertension.


IN BRIEF

Neurology board prep book published

The second edition of Laughing your way to passing the neurology boards by Amy McGregor, MD, was recently published. The book helps students prepare for the Residency In-Service Training Exam (RITE) and the American Board of Psychiatry and Neurology certification exams.

Neurosurgeons present at ASPN, AANS/CNS meetings

Le Bonheur neurosurgeons presented two seminars at the American Society of Pediatric Neurosurgeons (ASPN) meeting in January in Costa Rica. Paul Klimo, MD, chief of Pediatric Neurosurgery at Le Bonheur Children’s, presented “Bibliometrics for pediatric neurosurgeons in North America.” Frederick Boop, MD, chairman of the Department of Neurosurgery and co-director of Le Bonheur’s Neuroscience Institute, presented “Should American neurosurgery embrace infolded fellowships?”

The team also gave three oral presentations and three poster presentations at the American Association of Neurological Surgeons and the Congress of Neurological Surgeons (AANS/ CNS) Joint Section on Pediatric Neurosurgery. Topics included:

- Surgery and adjuvant radiotherapy improve survival in a preclinical mouse model of ependymoma (Michael Decuyper, MD)
- Physical performance, social participation and medical utilization in childhood brain tumor survivors (Sara Boop)
- Presentation, management and outcome of intrinsic cervicomedullary tumors in children (Hiram McBee)
- Factors influencing delayed diagnosis of low grade gliomas in pediatric patients (Aska Arnautovic)
- Head injuries following TV-related accidents in the pediatric population (David Daniels, MD, PhD)

Klimo presented “Predictors of shunt revision: should the shunt revision rate be used as a quality metric?” at the American Association of Neurological Surgeons’ Annual Scientific Meeting, in April in San Francisco.

Neuroscience Institute adds two nurse practitioners

Davonna “Davi” Ledet, RN, MSN, MBA, DNPs, CNRN, CFNP, recently joined Le Bonheur’s Neuroscience Institute as a certified family nurse practitioner. Ledet comes to Le Bonheur from St. Jude Children’s Research Hospital. Ledet works closely with Pediatric Neurologist Diana Lebron, MD, in the hospital’s new pediatric headache clinic. Ledet received a Master of Science in Nursing from the University of Mississippi School of Nursing and will finish her Doctor of Nursing Practice in May from the University of Michigan-Flint. Ledet also serves as an instructor for the University of Tennessee College of Nursing.

Lauren Siebrase, MSN, FNP-C, who has worked in Le Bonheur’s Neuroscience Institute since 2011, recently received her Master of Science in Nursing degree from Union University and certification as a family nurse practitioner. She now works in the neurology clinic. In 2012, Siebrase was named a Rising Star in Clinical Neuroscience Nursing Practice by the American Association of Neuroscience Nurses.
Neurology Update

Le Bonheur Children’s Hospital and the University of Tennessee Health Science Center faculty will host the eighth annual Greater Mid-South Pediatric Neurology Update April 25-26 at The Westin Memphis, Beale Street.

The seminar encompasses state-of-the-art practices and trends in treating pediatric neurology patients. Clinically and academically oriented faculty will address relevant issues and provide valuable information and insight into common situations in pediatric neurology. The seminar uses case-based learning and didactic lectures with time for questions and answers.

The event will include the inaugural Kayden R. Vinson Distinguished Scholar Award and Lecture by Pediatric Neurologist Alex Paciorkowski, MD, from the University of Rochester Medical Center. Neuro-ophthalmologist Rod Foroozan, MD, from Texas Children’s Hospital and Baylor University will also serve as a guest lecturer.

Topics include:

- Neurogenetics
- Migraines
- Effects of anti-convulsant medication on vision
- Tuberous sclerosis complex, emphasis on renal disease
- Developmental disorders that present with polymicrogyria
- MRI case review
- Multimodal imaging and non-invasive brain stimulation
- Neurostimulation
- Congenital optic disc abnormality

For more information or to register, visit www.methodistmd.org or call 901-516-8933.