Neurosciences Research Day Schedule

7:30 AM  Breakfast  Library, Room 107

8:00 - 11:30 AM  Presentation to the Judges
Neurosciences Research Day will be held on the first floor of the Colbert Center (the library) this year. Each presenter will have 10 minutes to present their work to the judges.

8:00 AM  Dr. Roland Hamilton
8:10 AM  Dr. Erin Ilkanich
8:20 AM  Dr. Aman Kalra
8:30 AM  Dr. Alison Smock
8:40 AM  Dr. Wenyu (Andy) Sun
8:50 AM  Dr. Avery Buchholz
9:00 AM  Dr. Jill Blandford
9:10 AM  Dr. Jeff Bodle
9:20 AM  Dr. Jay Madey
9:30 AM  Dr. Sam Taylon
9:40 AM  Dr. Jarom Hanson
9:50 AM  Dr. Sylvia Klineova
10:00 AM  Dr. Rup Sainju
10:10 AM  Dr. Nolan Williams
10:40 AM  Dr. Xiaoyan Sun
10:50 AM  Dr. Jonathan Lena
11:00 AM  Dr. Libby Kosnik Infinger
11:10 AM  Dr. Vibhor Krishna
11:20 AM  Dr. Steve Morgan
11:30 AM  Dr. Karen Sequeira

12 PM  Lunch  Library, Room 107
Presentation of Awards to Follow

12 - 4 PM  Posters Available for Open Viewing
ABSTRACTS
Abstract: Ictal asystole is seizure-induced activation of the autonomic nervous system, which adversely affects cardiac innervation, leading to bradycardia and potentially lethal asystole. It is believed to be a contributing factor for sudden unexpected death in epilepsy (SUDEP). Convulsive syncope occurs when an individual experiences loss of consciousness (not related to epilepsy) followed by brief convulsions. The most common etiologies of convulsive syncope are cardiac arrhythmias and neurally mediated reflex (i.e. vasovagal reflex). Distinguishing ictal asystole from convulsive syncope can be quite challenging for healthcare providers.

Described here is a patient with a history of complex partial seizures that started at the age of forty-two. The patient presents for medical evaluation of “syncope vs. seizure” after being seizure-free for ten years. His past medical history is also significant for hemochromatosis (excess absorption of iron leading to iron overload in organs), predisposing him to cardiac complications such as conduction abnormalities, which could be contributing to his symptoms. Patient had multiple episodes of asystole which ultimately resulted in trancutaneous pacing and consideration of a cardiac pacemaker. Video electroencephalogram recording revealed seizure activity preceding his asystole suggesting ictal asystole as a possible etiology. However, the patient also had syncope with convulsion with no epileptic correlation on electroencephalogram, supporting the diagnosis of convulsive syncope. The medical evaluation of ictal asystole vs convulsive syncope will be reviewed, as well as the importance of making a timely and accurate diagnosis, to ensure that patients receive appropriate treatment for these potentially life threatening conditions.
Abstract: Idiopathic intracranial hypertension is no more idiopathic all the times. Actually prevalence of venous sinus stenosis is underestimated.

Cause – Venous stenos is as a cause will lead to fixed stenosis. There will be no effect of therapeutic reduction of CSF pressure on sinus diameter. Reconstruction of venous lumen with endovascular stent would be effective in lowering CSF pressure.

Consequence – Narrowing of the sinus lumen secondary to Elevated CSF pressure. It can be reversed by Lumbar
Background: Epilepsy is one of the most commonly reported neurological conditions in ambulatory care setting. To our knowledge, there is very little information on the pattern of ambulatory health care visit among epilepsy patients in the United States.

Objective: The aim of this study was to characterize ambulatory health care visits for epilepsy in a large representative US sample and to compare epilepsy patients in office-based clinics and hospital-based clinics.

Methods: Epilepsy (both primary and secondary diagnoses) visits from the National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) from 2006 to 2008 were analyzed. The unit of analysis was the visit. All estimates have been adjusted using weights provided by the National Center for Health Statistics (NCHS) to account for the multi-stage sampling design of the NAMCS and the NHAMCS. In this study, Epilepsy patient visit was defined by ICD-9-CM coding of 345.

Results: There were an estimated 6.96 million epilepsy patient visits to the physicians’ offices and hospital outpatient departments during 2006 - 2008. Overall, 88% of epilepsy patients visited physicians’ offices, with 12% visiting hospital outpatient departments. Epilepsy was recorded as the primary diagnosis in 69% of all epilepsy visits. Epilepsy visits per 1000 persons during 2006-2008 were 23. Among the 6.1 million epilepsy visits to the physicians’ offices, the top 3 specialties being visited were neurology (54%), General/Family practice (21%), and Internal medicine (10%). 57% of all epilepsy visits were made by females. 14% of all epilepsy visits were made by African-Americans. Patients under 15 years and older than 65 years accounted for 15% and 13% of the epilepsy visits respectively. The region of the south alone accounted for 39% of all epilepsy visits during the 3 year period. 37% of all epilepsy visits were paid by private insurance, Medicare covered 25% and Medicaid covered 25% of all visits. Top co-morbidities for epilepsy visits included hypertension 18%, Diabetes 6.1%, Depression 10%, Arthritis 6.6%, Hyperlipidemia 8.4%, cerebrovascular disease 4.4%, cancer 3.8% of all epilepsy visits. Top anticonvulsants mentioned in epilepsy ambulatory care visits during 2006-2008 included Phenytoin (21%), Levetiracetam (16%), Lamotrigine (15%), Topiramate (12%), Valproic acid (11%), and Carbamazepine (11%).
When comparing epilepsy patients in physicians’ offices and hospital outpatient departments, epilepsy patients with Medicaid were more likely to visit hospital outpatient departments than privately insured patients. African-American patients accounted for a disproportionately large percentage of hospital outpatient department visits.

**Conclusion:** Our study describes the current national pattern of ambulatory health care visits among patients with epilepsy. Epilepsy patients with Medicaid were more likely to visit hospital outpatient departments than privately insured patients. African-American patients accounted for a disproportionately large percentage of hospital-based clinic visits. Health care providers and policy-makers should be aware of these patterns in order to develop strategies that lead to better ambulatory health care for epilepsy patients.
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<tr>
<th>Resident Name:</th>
<th>Avery Buchholz, M.D., MPH</th>
<th>PGY: 2</th>
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<tr>
<td>Title:</td>
<td>Posterior Less Invasive Decompression and Stabilization for the Treatment of Malignant Neoplasms of the Thoraco-lumbar Spine: Perioperative results and risk of hardware failure</td>
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<tr>
<td>Co-Investigators:</td>
<td>Vibhor Krishna, M.D., SM; Brian Blaker; Steven L. Morgan, M.D., Ph.D.; Bruce Frankel, M.D.</td>
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**Introduction:** Metastatic epidural spinal cord compression (MESCC) is a debilitating complication of cancer resulting in motor or sensory deficits and bowel and bladder incontinence. While chemotherapy and radiation are the primary treatment for MESCC, surgery is indicated for intractable pain, impending mechanical failure or instability, and neurological deficits. Open surgical techniques often cause extensive dissection, increased post operative pain, immobility and longer hospitalizations. Advances in technology and refinement of techniques in minimally invasive spine surgery (MIS) may provide effective decompression and stabilization in the MESCC patient.

**Methods:** We retrospectively reviewed the perioperative results from a series of 19 patients with malignant metastatic spine disease treated with minimally invasive techniques of posterior decompression and stabilization by the senior author. These results are compared to a consecutive series of similar patients performed at our institution by open surgery.

**Results:** Satisfactory decompression and stabilization was achieved in all patients thorough one of the three techniques: microtubular laminectomy, transpedicular corpectomy and constotransverse corpectomy. None of the patients experienced procedure related neurological deterioration and the deficits improved in all cases except those with complete spinal cord injury. The mean blood loss was 755 mL. The blood loss in a similar the open cohort was 2500 mL. The length of stay in our MIS series was 3.5 days as compared with 9.4 days in patients who underwent open surgery.

**Conclusion:** This case series demonstrates the feasibility of MIS approach for treatment of MESCC patients.
Abstract: Motor and sensory axonal neuropathy with autonomic dysfunction is a rare condition that has been only anecdotally noted. In addition to autonomic symptoms it is characterized by acute onset of distal weakness, loss of deep tendon reflexes, intense pain and sensory symptoms. There has been conflicting data on whether IVIG or plasmapharesis is more efficacious in treating axonal neuropathies. Treatments are typically focused on improving autonomic symptoms and pain control. I will describe a case of a 31 year old male who initially presented with intense abdominal pain and later developed autonomic dysfunction, painful dysesthesias, frequent oxygen desaturations and multiple cardiac arrests. He was later diagnosed with motor-sensory axonal neuropathy with autonomic dysfunction by electrodiagnostic testing, autonomic reflex testing and albuminocytologic dissociation in his CSF. The underlying cause of his neuropathy has not been determined.
Background: An increasing number of ER visits have been occurring across the country due to intoxication from new designer drugs, including bath salts. Psychoactive bath salts (PABS), or methylenedioxy.pyrovalerone (MDPV), is structurally related to pyrovalerone and α-pyrolidinophenone. These compounds inhibit norepinephrine-dopamine reuptake and thus act as central nervous system stimulants. Due to their stimulant effect on the central nervous system, symptoms of intoxication include tachycardia, myocardial infarction, vasoconstriction, tremor, hypertension, hyperthermia, arrhythmia, vasoconstriction, seizures, altered mental status, agitation, paranoia, hallucinations, violence and even death. Increasing use of bath salts as well as increased awareness of the use of bath salts by medical providers have resulted in more and more calls to poison centers regarding bath salt use, with more than 1100 calls to U.S. Poison Centers in 2011, up from 298 calls in 2010.

Case Summary: This case report describes a 52yo gentleman who presented with altered mental status and decorticate posturing found to have multiple ischemic infarcts in bilateral cerebral hemispheres. Extensive work-up was completed including CSF analysis, transthoracic and transesophageal echocardiogram, conventional angiogram and long term electroencephalogram monitoring, which did not elucidate an etiology of his strokes. After day seven of hospitalization, family reported heavy use of bath salts by the patient preceding this presentation. Based on the negative work-up, the use of bath salts was implicated as the cause of this patient’s ischemic infarcts, most likely due to vasospasm.

Discussion: This case demonstrates the potentially life-threatening complications of bath salt ingestion as well as the need for improved education and recognition of the effects of bath salt ingestion by medical professionals. With bath salt use on the rise and currently undetected by routine toxicology screening tests, the use of bath salts will need to be considered in the evaluation of patients with psychiatric and hyper-adrenergic symptoms upon presentation to emergency departments. The identification of bath salt use as the etiology of this patient’s presentation could have resulted in earlier management of vasospasm as well as prevented further invasive diagnostic procedures.
Abstract: Canebrake rattlesnakes also known as Crotalus Horridus atricaudalis are well known to cause significant injury from toxins stored within its venom. During envenomation, toxic systemic effects immediately begin to cause damage to many organ systems including cardiovascular, hematologic, musculoskeletal, respiratory, and neurologic.

One defining characteristic the canebrake rattlesnake has is a specific neurotoxin called crotoxin which is a potent beta neurotoxin effecting presynaptic nerves that can cause paralysis by inhibiting appropriate neuromuscular transmission. We present an unusual case of an 8 year old male who was bitten twice in his calf by a canebrake rattlesnake who presented with a life threatening envenomation and suffered prominent presynaptic neurotoxicity resulting in facial diplegia, pharyngeal paralysis and ophthalmoplegia.
Abstract: - 34 y/o AAF who was undergoing an endoscopic, endonasal anterior skull base procedure when a left sided cavernous internal carotid artery injury was encountered. All immediate bleeding was quickly stopped. Additional surgery was postponed, and pt was taken quickly from the operating room to the endovascular lab.

- A cerebral angiogram was performed revealing a small pseudo-aneurysm of the carotid artery.

- Treatment options were discussed. The pseudo-aneurysm was treated with a Pipeline flow diverting device with successful reconstruction of the carotid artery segment with the aforementioned pseudo-aneurysm.

- The pt was started on aspirin and clopidogrel. Once awake she was neurologically intact. The pt had a follow-up angiogram 2 days later that was stable, no pseudo-aneurysm was present. She was discharged home shortly after in good condition and was continuing to do well at follow up.

- The pipeline embolization device is a flexible microcatheter-delivered self-expanding cylindric construct composed of 48 braided strands of cobalt chromium and platinum. The pipeline flow diverting device was originally designed to treat large, wide-necked aneurysm that were not amenable to traditional coil embolization techniques. It was designed to be deployed into the parent vessel of an aneurysm and not into the aneurysm itself. With arterial blood flow into the aneurysm drastically reduced, the aneurysm itself thrombosis off. Neointimal endothelial overgrowth occurs and the pipeline device is slowly absorbed into the parent vessel.

- This device has only recently been FDA approved. For this reason there are a lack of alternative use indications, and also long term data is lacking.

- Review of the current literature reveals a myriad of varying aneurysm shapes, sizes and locations successfully treated with this device. This current case, however, demonstrates a new alternative circumstance in which a pipeline device can be used successfully.

Abstract: To confirm an appropriate number of days for video EEG (VEEG) monitoring in establishing a diagnosis of psychogenic nonepileptic events (PNEEs) from epileptic seizures, a focused retrospective chart analysis of 111 patients discharged with a diagnosis of PNEEs was performed. Patients were admitted to the epilepsy monitoring unit (EMU) at the Medical University of South Carolina over a 24 month period (July 2009-June 2011). The median time to the first clinical nonepileptic event was just over 6 hours and 30 minutes, while the mean time was just under 17 hours (16 hrs and 49min). 95% of the patients (n=107) required less than 3 days admission until their first event (68hrs 52 min) with one patient in the study requiring more than 3.5 days until the first event (102 hrs 9min). The results from this study suggest a reasonable admission length for diagnosing PNEEs to be 3-4 days.
Background: Personality can be defined as the intrinsic organization of individual’s mental world that is stable over time and consistent over situations. It is a structured system by which individuals organize and orient themselves to the world around them (1).

Term multiple sclerosis (MS) personality has been frequently used by lay and professional population without clear understanding what the term indicates. It has also been used in somewhat derogatory context implying maladaptation or personality malfunction that has been caused by multiple sclerosis. Data describing association of depression and anxiety with disordered personality characteristics (2) or reporting immature and at times eccentric reasoning and affective approach to reality (3) have been published.

Given the sufficient amount of data gathered on disordered personality changes we decided to concentrate on non pathological aspects of personality and its alterations related to patients with MS. Our goal was to compare the personality characteristics of patients with MS to standard controls and determine whether the MS patients have the same traits.

Patients and Methods: This was a prospective study of MS patient cohort from South Carolina that were followed at MS clinic of Medical University of South Carolina (MUSC).

Based on the eligibility criteria which included (a) diagnosis of MS- relapsing-remitting, secondary and primary progressive form, (b) no current relapse of the disease or treatment with corticosteroids, (c) no significant cognitive impairment that would preclude active participation in the study, we were able to enroll sixty participants in different stages of MS.

In order to test the hypothesis that patients with MS had unique personality traits, the Revised NEO Personality Inventory (NEO PI-R) was administered during a routine outpatient visit and we conducted independent sample t-tests on the 5 major personality factors. NEO PI was previously showed to have adequate estimates of internal consistency, factorial validity and self-informant correlation in patients with MS (4).
**Summary:** Analyses show individuals with MS endorsed statistically significantly higher rates of Neuroticism ($t=6.57, p=.0001$) and Agreeableness ($t=2.57, p=.01$) when compared to the normative reference sample of healthy controls (see Figure 1). No significant differences between patients with MS and the reference control were found on the personality factors of Openness, Conscientiousness or Extraversion.

To further understand personality differences subscale scores for Neuroticism and Agreeableness were analyzed. On the Neuroticism factor subscales, patients with MS reported significantly higher levels across all 6 subscales: Anxiety ($t=6.83, p=.0001$), Angry Hostility ($t=3.99, p=.0001$), Depression ($t=5.53, p=.0001$), Self-consciousness ($t=3.25, p=.0012$), Impulsiveness ($t=2.26, p=.0238$), and Vulnerability ($t=4.91, p=.0001$) (see Figure 2). On the Agreeableness factor subscales, 3 of the 6 subscales were significantly higher for patients with MS than the reference control: Straightforwardness ($t=2.48, p=.132$), Altruism ($t=3.94, p=.0001$), and Tender-mindedness ($t=4.13, p=.0001$).

**Conclusion:** Based on the data gathered in our study, we were able to show that there is a distinctive personality trait profile in patients with MS that statistically differs from healthy control standard population characterized by higher rates of neuroticism and agreeableness.

Whether this profile is a product of MS as a disease or an adaptive mechanism by which these patients react to their often disabling and unpredictable illness raises multiple questions and should be determined by further research.
Objective: Diffusional kurtosis imaging (DKI), can provide information about microstructural abnormalities within gray and white matter, by assessing the non-Gaussian properties of water diffusion. In this study, we aimed to investigate DKI metrics within the hippocampi and parahippocampal gyri of consecutive patients with TLE. We also evaluated the sensitivity and specificity of DKI in detecting abnormalities in TLE, as compared with conventional imaging techniques such as gray matter volume (voxel based morphometry-VBM) and conventional diffusion tensor imaging-DTI).

Methods: We selected 10 patients with left MTLE confirmed by VEEG and had unilateral hippocampus atrophy on high resolution MRI brain. We took 30 healthy control populations with age and gender matching. T1-weighted images were submitted to conventional voxel-based morphometry (VBM) preprocessing steps. Parametric maps of the standard diffusion tensor imaging (DTI) metrics of mean diffusivity (MD), axial diffusivity D||, radial diffusivity D⊥, and fractional anisotropy (FA), as well as the additional DKI metrics of mean kurtosis (MK), axial kurtosis K||, and radial kurtosis K⊥ were obtained. We performed voxel-by-voxel analyses of regions of interest (ROI); hippocampal and parahippocampal gyrus comparing patients with MTLE versus healthy controls using probabilistic gray and white matter maps, MD, FA, and MK. The comparisons were performed utilizing a parametric voxel-wise t-test, and a non-parametric voxel-wise Brunner Muntezel test.

Results: DKI demonstrated abnormalities in mesial temporal lobe in TLE, compared with healthy controls. Patients with TLE exhibited reduction in mean water kurtosis involving both hippocampus and parahippocampal gyrus. These findings are compatible with the impoverishment of the neural structure, reflecting the loss of water channel structures, namely axons and dendrites. ROC curves for DKI showed higher sensitivity with low false positive rates in detecting abnormalities than conventional diffusion tensor imaging (DTI).

Conclusion: Diffusional Kurtosis imaging is a novel technique that provides information about the microstructural milieu of cortical regions. Our study suggests DKI has a higher accuracy than conventional methods in detecting grey & white matter changes in both hippocampus and parahippocampal gyrus in patients with TLE. Further studies would need to evaluate the relevance of micro-structural profiles for different subtypes of TLE.
Resident Name: Nolan Williams, M.D.  
PGY: 4
Title: Coaches and athletic trainers perceptions of physicians’ role in the assessment and management of sports-related concussive injury
Co-Investigators: A Sas, J Madey, J Bodle, L Scovel, J Edwards

Abstract: Sports concussions are an increasingly recognized common type of mild traumatic brain injury (TBI) that affect athletes of all ages. The need for an increased involvement of trained physicians in the diagnosis and treatment of concussion has become more obvious as the pathophysiology and long-term sequelae of sports concussion are better understood. To date, there has been great variability in the athletic community about the recognition of symptoms, diagnosis, management, and physician role in concussion care. An awareness assessment survey administered to 96 high school coaches and 5 athletic trainers in a large metropolitan city demonstrated that 35% of responders refer their concussed players to an emergency department after the incident, only 41% of responders have a physician available to evaluate their players after a concussion, 88% of those who had a physician available sent their players to a sports medicine physician, and only 1 responder (2%) had their player’s concussion evaluated by a neurologist. Interestingly, 72% of responders stated that their players returned to the team with “return to play” guidelines from their physician. This survey has highlighted two important areas where the medical community can better serve the athletic community. Because a concussion is an injury to the nervous system, it could be optimally evaluated and managed by a clinician with relevant sports training. Furthermore, all physicians who see patients suffering concussion should be educated in the current recommendations from the Consensus Statement on Concussion and provide return to play instructions that outline a graduated return to play, allowing the athlete to return to the field safely.
Background: Parkinson’s disease (PD) is a neurodegenerative movement disorder frequently associated with neuropsychiatric symptoms. Electroconvulsive therapy (ECT) has been shown to be effective in treating depression and psychosis along with the simultaneous effect of improving parkinsonian motor symptoms. Despite its marked effectiveness in producing concurrent mood and motor recovery, there is reluctance to utilize ECT in PD patients with DBS implantation due to safety concerns regarding the DBS electrode.

Case History: We present the case of a 76-year-old male with a history of psychotic depression and a >10 year history of PD s/p right STN DBS with continued, significant tremor in the right side who presented with psychosis in the context of the recent addition of amantadine. The patient’s planned, contralateral DBS (left STN) implantation was postponed and he was admitted for psychiatric stabilization. The patient received an acute series of 8 right unilateral ultrabrief pulse ECT treatments (using Thymatron, Lake Bluff, IL). His psychiatric symptoms remitted along with a marked reduction in tremor. Amantadine and dopamine agonist were discontinued and levodopa was significantly reduced. He was able to sustain this medication reduction while maintaining improved motor/mood function during the interval between his acute ECT course and STN DBS implantation.

Conclusions: This is the first reported case of utilizing ECT as a bridge for contralateral DBS implantation in a patient with a prior unilateral DBS implantation. We discuss the functional neuroanatomy of mood and motor regulation, their overlap and ECT’s putative shared mechanism on both networks.
Resident Name: Nolan Williams, M.D.  
Title: Teaching the Management of Acute Cerebrovascular Emergencies through Live Simulation  
Co-Investigators: Justin Nolte, Christine Holmstedt, Angela Hays, & Robert Adams
**Resident Name:** Xiaoyan Sun, M.D., Ph.D  
**PGY:** 4  
**Title:** Evaluation of cerebral spinal fluid biomarker of Alzheimer’s disease in the patients with cognitive impairments  
**Co-Investigators:** Aljoeson Walker M.D., Mark T. Wagner PhD, David Bachman M.D.

**Abstract:** Motor and sensory axonal neuropathy with autonomic dysfunction is a rare condition that has been only anecdotally noted. In addition to autonomic symptoms it is characterized by acute onset of distal weakness, loss of deep tendon reflexes, intense pain and sensory symptoms. There has been conflicting data on whether IVIG or plasmapheresis is more efficacious in treating axonal neuropathies. Treatments are typically focused on improving autonomic symptoms and pain control. I will describe a case of a 31 year old male who initially presented with intense abdominal pain and later developed autonomic dysfunction, painful dysesthesias, frequent oxygen desaturations and multiple cardiac arrests. He was later diagnosed with motor-sensory axonal neuropathy with autonomic dysfunction by electrodiagnostic testing, autonomic reflex testing and albuminocytologic dissociation in his CSF. The underlying cause of his neuropathy has not been determined.
Objective: To assess the safety of pre-operative embolization using Onyx as well as compare the operative times and estimated blood loss of embolized and nonembolized intracranial hypervascular central nervous system tumors at our institution from March 2007 through February 2012.

Methods: A retrospective analysis was performed on all patients that required surgery at our institution for intracranial meningiomas and hemangiopericytomas from March 2007 through February 2012. Some of these hypervascular CNS tumors were treated with pre-operative embolization using either polyvinyl alcohol (PVA) particles or Onyx.

Results: Over a five-year period 248 intracranial hypervascular CNS tumors were treated surgically at our institution. 49 of the tumors were embolized prior to resection. The median estimated volume of embolized tumors was 113.6 cc compared to 23.6 cc for non-embolized tumors. Median time from tumor embolization to surgery was 25.2 hours. Mean surgical time was 205 minutes for embolized tumors and 191 minutes for nonembolized tumors. Mean intraoperative estimated blood loss (EBL) was 760 ml for embolized tumors and 414 ml for nonembolized tumors. Median estimated blood loss per cc of tumor volume was 12.7 ml per cc compared to 6.2 ml per cc in the embolization group. Three complications related to tumor embolization occurred.

Conclusion: Pre-operative embolization of intracranial hypervascular CNS tumors using Onyx can be performed safely. Tumor embolization prior to surgery can also be used to effectively reduce intraoperative blood loss.
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<th>Resident Name:</th>
<th>Libby Kosnik Infinger, M.D.</th>
<th>PGY: 5</th>
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<tr>
<td>Title:</td>
<td>Occipital Condyle to Cervical Fusion in the Pediatric Population</td>
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<td>Co-Investigators:</td>
<td>Avery L. Buchholz M.D., Steven S. Glazier M.D., Bruce M. Frankel M.D.</td>
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**Objectives:**
- To review congenital cranio cervical abnormalities
- To discuss four cases of occipital condyle to cervical fusion
- To discuss the advantages of occipital condyle to cervical fusion

**Introduction:**
- To review what makes the pediatric cranio cervical junction different from adults.
- Will review the types of congenital cervical abnormalities in the pediatric population.
- To review signs and symptoms of congenital cervical abnormalities.
- To discuss goals of surgical treatment.

**Case Review:**
- Will review four cases of children with cranio cervical abnormalities.  Will discuss pre-op images, surgical goals, and post op imaging.

**Conclusion:**
- Will discuss the advantages of using this surgical technique in the pediatric population.
Background: Recent evidence indicates that multidisciplinary care improves patient outcomes for cerebrovascular (CV) disease. A multidisciplinary, integrated CV program was recently instituted at MUSC, providing the opportunity to evaluate patient outcomes before and after its introduction.

Objective: To evaluate outcomes of patients harboring intracranial aneurysm in relation to introduction of cerebrovascular program at MUSC.

Methodology: A retrospective chart review was performed on all new patient encounters for a six month time period each before and immediately after the introduction of the CV program, as well as at a more recent 6 month time period to evaluate long-term results. Data were collected on demographic variables, rupture status, medical co morbidities, hospital complications, in-hospital procedures, hospital course, and modified Rankin score at discharge and follow up.

Results: The total number of patients treated increased from 55 in the six months time period before the introduction of CV program to 112 in the most recent time period (p<0.05). Both the surgical clipping and endovascular coiling procedures increased (p<0.05). A significant increase in patients with multiple co morbidities (30.5% versus 34.7%, p=0.035). Mean length of stay decreased from 12.22±13.26 days before the program to 9.23±12.04 days in the most current data (p<0.05).

Conclusions: Creation of an integrated CV program at a large volume tertiary referral center resulted in better outcomes for an increased number of more medically complicated patients with intracranial aneurysms. This study provides preliminary data for developing an integrated model of multidisciplinary care for management of CV disease.
Introduction: Modern bioengineering strategies have sought to recondition the hostile micro-environment at the injury site. Among these strategies, hydrogels have emerged as a promising option for neuroprotection and effective neurotrophic factor delivery. We have developed a novel thermosensitive chitosan-gelatin hydrogel. The neuroprotective effects of this hydrogel were tested in a rat model of severe SCI.

Methods: Twenty three adult SD rats were randomly assigned to sham surgery group (N=2), control (spinal cord injury only (N=10) and treatment group (topical hydrogel application (N=11). Severe spinal cord injury was induced using standardized technique. The dura was opened widely to expose the injured segment. 60 μL of hydrogel solution was topically administered and allowed to gelate before closure. All animals were followed for 10 weeks and weekly behavioral testing was performed using the BBB scale (minimum 0, maximum 21). Animals were sacrificed and lesion volume assessed in 5 animals in each group after Luxol fast staining. Immunohistochemical stains were also performed to study vascularization (REC-1), axonal bridge (β-3 tubulin), myelination (MBP) astrogliosis (GFAP) and scar tissue (CSPG).

Results: The mean lesion volume was significantly less in the treatment group (Figure 1) (1.67±0.6 vs. 2.04±0.52, p=0.001). The mean BBB score of treatment group was significantly higher than the control group (Figure.2) (7.8±0.9 vs. 2.2±1.1, p=0.00). Immunostaining demonstrates a tissue bridge with abundant blood vessels and myelinated axons across the injury area. The axonal bridge also demonstrates decreased scar formation across the injury epicenter.

Conclusions: The topical chitosan-gelatin topical hydrogel improves functional outcomes after severe spinal cord injury in rats. This treatment strategy appears to preserve axons across injury site and prevent the formation of astroglial scar. Future studies are underway to maximize the efficacy of this hydrogel by combining it with neurotrophic factors.
Introduction: The treatment of neuropathic pain is challenging. Despite availability of effective medications surgical consultations are obtained for management of refractory cases. Motor cortex stimulation (MCS) is sometimes employed for treatment of these patients. The efficacy of stimulation may be influenced by the precision of preoperative motor cortex localization. At MUSC we have employed transcranial magnetic stimulation (TMS) for motor cortex localization. Our experience with 15 consecutive patients is described.

Methods: Patients underwent preoperative neuropsychological testing and TMS stimulation for localization of motor cortex. The scalp was marked at the expected location of post-central gyrus along with corresponding body parts (face, arm or leg). The paddle electrode placement was done in the epidural space after performing strip craniectomy. Pre and post-operative patient records were reviewed for pain location, duration and medical & surgical therapies performed before receiving MCS. Post-operative pain resolution was recorded based on patient’s subjective reporting in the clinic.

Results: 15 patients underwent MCS between 2007-2011 with variety of diagnoses including trigeminal neuropathic pain (11 patients) and glossopharyngeal neuropathic pain (1 patient), post-herpetic neuralgia (1 patient), reflex sympathetic dystrophy (1 patient), thalamic pain syndrome (1 patient). The mean follow-up period was 2.8 years. No surgical or implant related adverse events were noted. 9 patients (66.6%) reported significant pain resolution. Only 1 out of 4 patients with TNP after tumor resection experienced pain resolution.

Discussion: Several modalities for motor cortex localization have previously been described including functional MRI, intra-operative stimulation and combination. In this case series we report our experience with rTMS directed localization of motor cortex with comparable efficacy (66%) to the published literature.

Conclusions: MCS offers an efficacious treatment choice for refractory neuropathic pain of central origin. TMS allows a precise localization of motor cortex for preoperative planning.
Resident Name: Karen M. Sequeira, M.D.  PGY: 1
Title: Seizures cause a functional limbic reorganization in medial temporal lobe epilepsy.
Co-Investigators: Ali Tabesh Ph.D., Stacia M. DeSantis Ph.D., Jane E. Joseph Ph.D., Mark A. Ahlman M.D., Kenneth M. Spicer M.D., Ph.D., Jonathan C. Edwards M.D., Leonardo Bonilha M.D., Ph.D.

**Background:** Structural imaging studies have demonstrated that medial temporal lobe epilepsy (MTLE) is associated with limbic atrophy involving not only the hippocampus but also peri-hippocampal and extra-temporal structures. [1-5] While MTLE is related to static structural limbic compromise[6], it is unknown whether the limbic system undergoes a dynamic functional reconfiguration during seizures. In this study, we aimed to investigate state specific (i.e. ictal versus interictal) configuration of functional limbic networks in patients[7] with MTLE.

**Methods:** We studied the clinical information and single positron computed tomography (SPECT) images obtained with intravenous infusion of the radioactive tracer Technetium Tc 99m Hexamethylpropyleneamine Oxime (Tc-99m HMPAO) during ictal and interictal state in 20 patients with unilateral MTLE (12 left and 8 right MTLE). The SPECT data was normalized for whole brain radiotracer uptake, and spatially normalized using linear and nonlinear parameters using SPM8. Pair-wise voxel-based analyses were used to define global changes in tracer between states. Regional uptake was calculated for anatomical areas, and state specific adjacency matrices were constructed based on regional correlation of uptake across subjects. Graph theoretical measures were then applied to investigate global and regional state specific network reconfigurations.[7]

**Results:** A significant increase in tracer uptake was observed in the medial temporal region, cerebellum, thalamus, insula and putamen, in the ictal state compared with the interictal state. A mild increase in whole network clustering coefficient increase was in the ictal state. Regional clustering coefficient and local efficiency were increased over the ipsilateral and contralateral hippocampus, contralateral anterior cingulate, and ipsilateral fusiform gyrus. Compared to whole brain analyses, graph measures unveiled a significant change in network parameters of the fusiform gyrus during the ictal state.

**Conclusion:** These results suggest that MTLE is associated with a functional state specific limbic system organization. Increased ictal tracer uptake suggests an increase metabolic demand of limbic regions associated with epileptogenesis, and the reorganization of the functional network during a seizure suggests higher connectivity and synchrony of limbic areas, notably leading to an increase local participation of the fusiform region. Seizures cause a functional limbic reorganization in medial temporal lobe epilepsy.


