

University of Kentucky
Department of Physical
Medicine and
Rehabilitation

23rd Annual PM&R
Research Day

Cardinal Hill Rehabilitation Hospital
Center of Learning
Lexington, Kentucky

May 26, 2011



PROGRAM AND ABSTRACTS

23rd Annual

Physical Medicine and Rehabilitation Research Day

May 26, 2011

Cardinal Hill Rehabilitation Hospital

Lexington, KY

UKHealthCare



23rd Annual

**Physical Medicine and Rehabilitation
Research Day**

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**UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
23rd ANNUAL RESEARCH DAY AGENDA**

CARDINAL HILL REHABILITATION HOSPITAL
CENTER OF LEARNING
May 26, 2011

7:00 a.m. – 8:50 a.m. Dr. Braddom breakfast Lecture and Roundtable with Residents (CL1)

8:30 a.m. – 9:00 a.m. Buffet Breakfast (CL2)

9:00 a.m. – 9:10 a.m. Opening Remarks (CL3): Gerald Klim, D.O.

PM&R RESIDENT RESEARCH PRESENTATIONS – CL3

9:10 a.m. – 9:25 a.m. Erika Erlandson, M.D., Physical Medicine & Rehabilitation
“The Effects of Amantadine and Attention Process Training on Cognitive Rehabilitation in Adults with Traumatic Brain Injury”

9:25 a.m. – 9:40 a.m. Giridhar Gundu, M.D., Physical Medicine & Rehabilitation
“Comparison of the Side Stability of Scooters with 3 and 4 Wheels”

9:40 a.m. – 9:55 a.m. Thien Ngo, M.D., Physical Medicine & Rehabilitation
“Comparison of RIII Threshold Between Different Male Adult Age Groups (20-40 vs 40-60)”

9:55 a.m. – 10:10 a.m. Dwan Perry, D.O., Physical Medicine & Rehabilitation
“Rare Case of Neuroleptic Malignant Syndrome associated with the use of Carbidopa/Levodopa for Dystonia in Cerebral Palsy: A Case Report”

10:10 a.m. – 10:25 a.m. Pravardhan Birthi, M.D., Physical Medicine & Rehabilitation
“Incidence of Pneumonia Associated with The Frazier Free Water Protocol: A Randomized Control Study”

10:25 a.m. – 10:35 a.m. **BREAK**

10:35 a.m. – 10:50 a.m. David Brough, M.D., Physical Medicine & Rehabilitation
“Is there a Statistically Significant Symptom Profile for TBI in the Context of Overlapping Symptoms Between PTSD and TBI”

10:50 a.m. – 11:05 a.m. James Hammock, M.D., Physical Medicine & Rehabilitation
“Chronic Opioid Therapy, Hypothalamic-Pituitary-Gonadal Axis and Bone Density Loss”

11:05 a.m. – 11:20 a.m. Hena Sattar, M.D., Physical Medicine & Rehabilitation
“Influence of the Kentucky Resident Training Program in Rehabilitation Technology on ABPMR Part 1 Scores on the Equipment and Assistive Technology Portion”

UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
23rd ANNUAL RESEARCH DAY AGENDA
(Continued)

POSTER PRESENTATIONS – CL4

- 11:20 a.m. – 12:00 p.m.
- 1 Mona Bains, Ph.D., SCoBIRC
 “Inhibition of Cytoskeletal Degradation with Post-Injury Administration of the Calpain Inhibitor SNJ-1945 in Severe Mouse Traumatic Brain Injury”
 - 2 Pravardhan Birthi, M.D., UK/PM&R
 “The Role of Botulinum Toxin in Complex Regional Pain Syndrome: A Case Report”
 - 3 Tuoxin Cao, UK/Biology & SCoBIRC
 “Morphological and Genetic Activation of Microglia After Diffuse Traumatic Brain Injury in the Rat”
 - 4 Kenneth Chelette, M.S., UK/PM&R
 “Dose-Response Peripheral Nerve Stimulation in Poorly Recovered Stroke Patients: Ongoing Study”
 - 5 Talat Jamil, M.D., UK/PM&R & SCoBIRC
 “Brain Stimulation and Robotic Training to Facilitate Upper Extremity Motor Function in Incomplete Spinal Cord Injury: A Proposed Feasibility Study”
 - 6 Anastazia Learoyd, UK/Biology & Biochemistry & SCoBIRC
 “Comparison of Rat Sensory Behavioral Tests to Detect Somatosensory Morbidity after Diffuse Brain Injury”
 - 7 Darren M. Miller, SCoBIRC
 “Temporal and Spatial Dynamics of Nrf2-ARE Mediated Gene Targets in Cortex and Hippocampus Following Controlled Cortical Impact Traumatic Brain Injury in Mice”
 - 8 Hena Sattar, M.D., UK/PM&R
 “Avascular Necrosis of the Lunate Presenting as Persistent Severe Wrist Pain after Minor Trauma: A Case Report”
 - 9 Yu Shang, Ph.D., UK/Center for Biomedical Engineering
 Katelyn Gurley, Ph.D., UK/Center for Biomedical Engineering
 “Evaluation of Electrical Stimulation Impact on Muscle Hemodynamics Using Diffuse Optical Spectroscopies”
 - 10 Pooja Talauliker, Ph.D., SCoBIRC
 “Facial Whisker Kinematics after Diffuse Brain Injury may Reveal Chronic Behavioral Morbidity in Rats”
 - 11 Theresa Currier Thomas, Ph.D., SCoBIRC
 “Diffuse Brain Injury-Induced Increases in Glutamate Neurotransmission Parallel the Development of Late-Onset Behavioral Morbidity in Rats”

**UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
23rd ANNUAL RESEARCH DAY AGENDA
(Continued)**

POSTER PRESENTATIONS – CL4 (Continued)

- | | |
|----|---|
| 12 | Lindsay Shroyer, M.D., UK/PM&R
“Parsonage-Turner Syndrome after Roux-en-y
Esophagojejunostomy: A Case Report” |
| 13 | Pravardhan Birthi, M.D., UK/PM&R
“Recurrent UTI in Spinal Cord Injury, after Revision of
Mitrofanoff Procedure: A Case Report” |
| 14 | Pravardhan Birthi, M.D., UK/PM&R
“Incomplete Paraplegia in an Adult with SCIWORA with Bowel
and Bladder Continence despite Absence of Sacral Sensation” |

LUNCH – CL2

12:00 p.m. – 12:45 p.m.	Lunch (CL2)
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FEATURE SPEAKER – CL3

12:45 p.m. – 2:00 p.m.	Randall Braddom, M.D., The Orthopaedic, Sports Medicine and Rehabilitation Center Red Bank, NJ Clinical Professor of PM&R at Robert Wood Johnson Medical School and The New Jersey Medical School “The Future of PM&R”
2:00 p.m. – 2:30 p.m.	Awards & Closing Remarks Joe Springer, Ph.D., Physical Medicine & Rehabilitation Robert Nickerson, M.D., Physical Medicine & Rehabilitation

PM&R Resident Presentations

ORAL PRESENTATIONS

Presenter:

Abstract Presentation:

Erika Erlandson, M.D.

“The Effects of Amantadine and Attention Process Training on Cognitive Rehabilitation in Adults with Traumatic Brain Injury”

Giridhar Gundu, M.D.

“Comparison of the Side Stability of Scooters with 3 and 4 Wheels”

Thien Ngo, M.D.

“Comparison of RIII Threshold Between Different Male Adult Age Groups (20-40 vs 40-60)”

Dwan Perry, D.O.

“Rare Case of Neuroleptic Malignant Syndrome associated with the use of Carbidopa/Levodopa for Dystonia in Cerebral Palsy: A Case Report”

Pravardhan Birthi, M.D.

“Incidence of Pneumonia Associated with The Frazier Free Water Protocol: A Randomized Control Study”

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“Is There a Statistically Significant Symptom Profile for TBI in Context of Overlapping Symptoms Between PTSD and TBI?”

James Hammock, M.D.

“Chronic Opioid Therapy, Hypothalamic-Pituitary-Gonadal Axis and Bone Density Loss”

Hena Sattar, M.D.

“Influence of the Kentucky Resident Training Program in Rehabilitation Technology on ABPMR Part 1 Scores on the Equipment and Assistive Technology Portion”

PM&R RESIDENT PRESENTATION

The Effects of Amantadine and Attention Process Training on Cognitive Rehabilitation in Adults with Traumatic Brain Injury

Presenter:

Erika Erlandson, M.D.¹

Faculty Mentors/Collaborators:

Jordan Harp, BA¹, Walter High, PhD¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine and Rehabilitation
Cardinal Hill Rehabilitation Hospital, UK Department of Neuropsychology

Abstract Text:

Objective: To assess the effect of Amantadine in conjunction with attention process training on cognitive recovery in patients with complicated mild to severe traumatic brain injury.

Background: Traumatic brain injury (TBI) often results in cognitive deficits, in particular, difficulty with attention. Areas including processing speed, attention, and working memory can be affected, which can contribute to impairment in the home, school, and workplace. Cognitive rehabilitation is an important part of recovery in patients with TBI.

Hypothesis: (1) Attention will exhibit significantly greater improvement due to the attention training intervention than due to spontaneous recovery; (2) Gains in attention during training will be greater for individuals receiving Amantadine than for those receiving placebo;

Methods: The proposed study is a randomized, double-blind, and placebo-controlled trial of Amantadine in a sample of 30 adults (age>18) who suffered a complicated mild to severe traumatic brain injury. Participants will be assigned to either a treatment or placebo group and then complete a 30 hour course of attention process training over a period of 10 weeks. Neuropsychological tests will be used at multiple pre-treatment baselines and after treatment to assess attention and cognitive recovery.

Intervention: Amantadine 100mg PO twice per day at 0700 and 1200

Outcome measures: The Brief Test of Attention, Conners' Continuous Performance Test, Paced Auditory Serial Addition Test, Wechsler Test of Adult Reading, Attention Process Training Test, subtests of the Delis-Kaplan Executive Function System, the Wechsler Adult Intelligence Scale—4th ed., the Rating Scale of Attentional Behavior, and the Mayo-Portland Adaptability Inventory.

Key Words: Amantadine, traumatic brain injury, attention process training, cognition

NOTES

PM&R RESIDENT PRESENTATION

Comparison of the Side Stability of Scooters with 3 and 4 Wheels

Presenter:

Giridhar Gundu, M.D.¹

Collaborators:

Oscar Ortiz-Vargas, M.D.²

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation

²Department of PM&R, VAMC, Lexington, KY

Abstract Text:

Objective: To compare the side stability of scooters with 3 and 4 wheels at a 90 degree turning angle.

Design: Prospective cohort study

Setting: Outpatient clinic

Participants: Healthy driver with average height and weight

Interventions: This experimental study assessed the velocity at which both scooters with 3 and 4 wheels tip sideways. Tipping velocity was defined as the velocity at which the internal-rear wheel raised off the floor, identified by digital video. Both scooters were similar in all their features except for the number of wheels and small differences in length (0.25 inches) and weight (3 pounds). The scooters were driven over a standard flat and smooth course of 30 feet that included a 90-degree turning point to the left at the 25 feet mark. The data was obtained with both scooters as a healthy driver with average height and weight who did and did not compensate with body posture to prevent tipping.

Main Outcome Measures: Velocity at which the scooter tips.

Results: During the 90 degree turning angle of the course, the scooter with 3 wheels tipped at a velocity of 3.44 miles/hr without body posture compensation, and at 3.785 miles/hr with compensation. The 4-wheel scooter did not tip at the maximum speed of 3.87 miles/hr.

Conclusions: The scooters with 3 wheels tend to tip during sharp turns when driven at usual speed. This might be a safety issue for patients using this type of power mobility. Further studies would help to better understand the implications of these findings in the use of scooters.

Key Words: power mobility, scooter, stability, safety

NOTES

PM&R RESIDENT PRESENTATION

- Note Title Change -

Comparison of RIII Threshold Between Different Male Adult Age Groups (20-40 vs 40-60) Using Objective Measurements Based on the Nociceptive Flexion Withdrawal Reflex

Presenter:

Thien Ngo, M.D.¹

Collaborators:

Oscar Ortiz-Vargas, M.D.²

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine and Rehabilitation

²Department of PM&R, VAMC, Lexington, KY

Abstract Text:

Effective pain management and understanding pain thresholds in males at different age groups are poorly understood. The correlation between pain thresholds in adult males at different age groups suggests that tolerance to cutaneous pain increases while tolerance to deep pain decreases with increasing age. However, the methodology used in previous studies has been based almost exclusively on subjective reporting. The recently developed method of stimulating the sural nerve to induce reflex of the ipsilateral bicep femoris allows for the potential measurement of pain in a more objective manner. The aim of this study is to investigate the correlation between ages in adult males in different groups (20-40 vs 40-60) and the nociceptive flexion reflex index, a standardized method that permits comparison of the nociceptive reflex response between individuals.

By identifying better protocols to investigate the correlation between age and pain thresholds, appropriate pain management can be tailored on an individual basis, eliminating the current "trial and error" process. This will impact our ability to manage and control pain and improve patient care and satisfaction.

Key Words: RIII reflex, pain threshold, electrical stimulation

NOTES

PM&R RESIDENT PRESENTATION

Rare Case of Neuroleptic Malignant Syndrome associated with the use of Carbidopa/Levodopa for Dystonia in Cerebral Palsy: A Case Report

Presenter:

Dwan Perry, D.O.¹

Collaborators:

Susan McDowell, M.D.¹; Sara Salles, D.O.¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine and Rehabilitation

Abstract Text:

This is a case report of a 9-year-old male with cerebral palsy (CP) with spastic quadraplegia with dystonic features who presented with fever, respiratory distress, and dehydration associated with levodopa/carbidopa use. The diagnosis of neuroleptic malignant syndrome (NMS) was made. Here, we discuss NMS as well as the possible causes for the illness and to make known possible pitfalls when using medications that, in theory, act on neurochemical pathways in the brain.

Key Words: Cerebral Palsy, Levodopa, neuroleptic malignant syndrome

NOTES

PM&R RESIDENT PRESENTATION

Incidence of Pneumonia Associated with The Frazier Free Water Protocol: A Randomized Control Study

Presenter:

Pravardhan Birthi, M.D.¹

Collaborators:

Sara Salles, D.O.¹

Departmental Affiliations:

¹Department of Physical Medicine and Rehabilitation, University of Kentucky

Abstract Text:

Rationale and background: Patients with stroke commonly have dysphagia; these patients are considered high risk for aspiration which can result in pneumonia (1, 2). Martino et al(1) reported the incidence of pneumonia in stroke rehabilitation patients with dysphagia to be 7%-29% ; in patients without dysphagia aspiration pneumonia is 2%-7%. To prevent this complication of stroke , patients are not given anything by mouth or put on a restricted- thin-liquid diet. This restriction is modified depending upon improvement of dysphagia, usually determined by modified barium swallow testing. Modified barium swallow is a fluoroscopic based study used to evaluate the ability to swallow and to protect the airway. A small amount of liquid barium is given to swallow. The study focuses on the swallow and the anatomical structures of throat and musculature. A speech pathologist and a radiologist usually perform this test together. Currently, the "Frazier Free Water Protocol"⁽³⁾ is used by many rehabilitation hospitals for patients with dysphagia in the U.S and Canada. The safety and benefits of this protocol were assessed by a Frazier Rehabilitation Institute (4), which was based on a randomized controlled trial with a very small number of subjects. We intend to repeat this study with more patients.

Study goals and objectives: Clinical research to measure the effects of a free water protocol on the incidence of aspiration pneumonia, hydration status and patient satisfaction .Provide research supported evidence to guide patient care.

Method: Randomized control trial with 80 subjects, 40 in the experimental group and 40 in the control group. Experimental group will receive the Free Water Protocol. Control group will receive oral hygiene identical to that provided to experimental group.

Outcome measure: Incidence of pneumonia, hydration status and patient satisfaction will be measured.

Key Words: dysphagia, MBS, Frazier Free Water Protocol

NOTES

PM&R RESIDENT PRESENTATION

Is There a Statistically Significant Symptom Profile for TBI in the Context of Overlapping Symptoms Between PTSD and TBI?

Presenter:

David Brough, M.D.¹

Collaborators:

Randal Schleenbaker, M.D.^{1,2}

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine and Rehabilitation

²Veterans Administration, Lexington, KY

Abstract Text:

The conflicts in Iraq (OIF) and Afghanistan (OEF) have resulted in combat veterans with complex physical injury and emotional trauma. Rates of traumatic brain injury (TBI) are higher than in previous wars; with mild traumatic brain injury as a result of blast exposure being more prevalent. Symptoms of TBI and PTSD have clinical similarities, making a differential diagnosis difficult. The Department of Veterans Affairs uses the Neurobehavioral Symptom Inventory to evaluate veterans exposed to blast in the polytrauma clinic.

My research, in collaboration with Randal Schleenbaker, M.D. and others involves using statistical data collected from veterans exposed to blasts. All of these patients were seen in the Polytrauma Clinic at the Lexington Veterans Affairs facilities. After a retrospective chart review patients' data are divided into four groups based on their diagnosis of PTSD, TBI, both, or neither. Statistical analysis can then be used to evaluate if there is a significant symptom profile that is unique for TBI.

Key Words: Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), Traumatic Brain Injury (TBI), Post Traumatic Stress Disorder (PTSD), Neurobehavioral Symptom Inventory (NSI), Department of Veterans Affairs (VA)

NOTES

PM&R RESIDENT PRESENTATION

Chronic Opioid Therapy, Hypothalamic-Pituitary-Gonadal Axis and Bone Density Loss

Presenter:

James Hammock, M.D.¹

Collaborators:

Joe Springer, PhD¹

Departmental Affiliations:

¹University of Kentucky Medical Center, Department of Physical Medicine and Rehabilitation
Cardinal Hill Rehabilitation Hospital, Lexington, KY

Abstract Text:

The prescription of chronic opioid therapy has become commonplace for the treatment of numerous pain conditions. Since the mid-20th century, the medical community has known of the deleterious effects associated with prolonged continuous use of these medications. Such side effects include disruption of all axes of the Hypothalamic-Pituitary system. This would include alteration of circulating sex hormones, which have been correlated with changes in bone density. I propose a study to further explore the effects of chronic opioid therapy on the Hypothalamic-Pituitary-Gonadal system and how this effects change in bone density over time.

Key Words: opioids, endocrinopathy, opioid-associated androgen deficiency, osteopenia, osteoporosis

NOTES

PM&R RESIDENT PRESENTATION

Influence of the Kentucky Resident Training Program in Rehabilitation Technology on ABPMR Part 1 Scores on the Equipment and Assistive Technology Portion

Presenter:

Hena Sattar, M.D.¹

Collaborators:

Robert Nickerson M.D.¹

Kathy Sheppard-Jones M.D.²

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine and Rehabilitation

²University of Kentucky, Human Development Institute

University of Louisville/Frazier Rehabilitation Center, Department of Physical Medicine and Rehabilitation

Abstract Text:

Objective: The Kentucky Resident Training Program in Rehabilitation Technology was developed in order to provide PM&R residents with training, knowledge and skills in Assistive Technology. The program provides web-based training modules on a variety of topics in rehabilitation technology and a one month long field rotation in the delivery and planning of rehabilitation technology services in vocational, rural/agricultural and other community settings.

Our objective was to compare the average scores for first time test takers from the University of Kentucky, Lexington and University of Louisville/Frazier Rehab Institute on the ABPMR Part 1 Equipment and Assistive Technology portion to that of the national average.

Design: Analytic cohort study comparing average scores on the ABPMR part 1 Equipment and Assistive Technology portion for first time takers. Average scores from University of Kentucky, Lexington and University of Louisville/Frazier Rehab Institute were compared to the national average for first time takers. We predict with the addition of the Rehabilitation Technology Training Modules the scores on the Equipment and Assistive Technology portion on ABPMR part 1 is expected to increase.

Results: Results for first time takers from the University of Kentucky, Lexington have shown improvement in average scores when compared to the national average.

Conclusion: With the addition of The Kentucky Resident Training Program in Rehabilitation Technology modules, we have seen an improvement in first time test taker scores on the ABPMR part I Equipment and Assistive Technology portion. The web-based training program is a beneficial resource for residents looking to gain knowledge in a variety of topics in rehabilitation technology as well as practical experience in the delivery and planning of rehabilitation technology services in vocational, rural/agricultural and other community settings.

Key Words: Rehabilitation Technology, Assistive Technology, Physiatrist

NOTES

POSTER PRESENTATIONS

<u>Presenter:</u>	<u>Poster #</u>	<u>Poster Presentation:</u>
Mona Bains, Ph.D. SCoBIRC	1	"Inhibition of Cytoskeletal Degradation with Post-Injury Administration of the Calpain Inhibitor SNJ-1945 in Severe Mouse Traumatic Brain Injury"
Pravardhan Birthi, M.D. UK/PM&R	2	"The Role of Botulinum Toxin in Complex Regional Pain Syndrome-Case Report"
Tuoxin Cao Dept of Biology & SCoBIRC	3	"Morphological and Genetic Activation of Microglia After Diffuse Traumatic Brain Injury in the Rat"
Kenneth Chelette, M.S. UK/PM&R	4	"Dose-Response Peripheral Nerve Stimulation in Poorly Recovered Stroke Patients: Ongoing Study"
Talat Jamil, M.D. UK/PM&R & SCoBIRC	5	"Brain Stimulation and Robotic Training to Facilitate Upper Extremity Motor Function in Incomplete Spinal Cord Injury: A Proposed Feasibility Study"
Anastazia Learoyd SCoBIRC & UK/Biology & Biochemistry	6	"Comparison of Rat Sensory Behavioral Tests to Detect Somatosensory Morbidity after Diffuse Brain Injury"
Darren M. Miller SCoBIRC	7	"Temporal and Spatial Dynamics of Nrf2-ARE Mediated Gene Targets in Cortex and Hippocampus Following Controlled Cortical Impact Traumatic Brain Injury in Mice"
Hena Sattar, M.D. UK/PM&R	8	"Avascular Necrosis of the Lunate Presenting as Persistent Severe Wrist Pain after Minor Trauma: A Case Report"
Yu Shang, Ph.D. Katelyn Gurley, Ph.D. UK/Center for Biomedical Eng.	9	"Evaluation of Electrical Stimulation Impact on Muscle Hemodynamics Using Diffuse Optical Spectroscopies"
Pooja Talauliker, Ph.D. SCoBIRC	10	"Facial Whisker Kinematics after Diffuse Brain Injury may Reveal Chronic Behavioral Morbidity in Rats"
Theresa Currier Thomas, Ph.D. SCoBIRC	11	"Diffuse Brain Injury-Induced Increases in Glutamate Neurotransmission Parallel the Development of Late-Onset Behavioral Morbidity in Rats"
Lindsay Shroyer, M.D. UK/PM&R	12	"Parsonage-Turner Syndrome after Roux-en-y Esophagojejunostomy: A Case Report"
Pravardhan Birthi, M.D. UK/PM&R	13	"Recurrent UTI in Spinal Cord Injury, after Revision of Mitrofanoff Procedure. A Case Report"
Pravardhan Birthi, M.D. UK/PM&R	14	"Incomplete Paraplegia in an Adult with SCIWORA with Bowel and Bladder Continence Despite Absence of Sacral Sensation"

POSTER PRESENTATION - 1

Inhibition of Cytoskeletal Degradation with Post-Injury Administration of the Calpain Inhibitor SNJ-1945 in Severe Mouse Traumatic Brain Injury

Presenter:

Mona Bains, Ph.D.¹

Collaborators:

Lesley K. Gilmer¹; Edward D. Hall, Ph.D.¹

Department Affiliations:

¹University of Kentucky Spinal Cord & Brain Injury Research Center

Abstract Text:

Calpain is activated in response to rapid increases in intracellular calcium levels following traumatic brain injury (TBI). Calpain, in turn degrades vital cytoskeletal proteins, which contributes to the secondary injury response and ultimately neuronal cell death. Although targeted calpain inhibition holds promise as a potential therapeutic for TBI, the available calpain inhibitors are limited by their low membrane permeability, solubility and metabolic stability. We have previously shown that the calpain inhibitor MDL-28170 decreases 24-hour cytoskeletal degradation in a mouse model of TBI, but this required repeated dosing over a period of 5 hours (Thompson et al., J. Neurotrauma 27:2233-2243, 2010). In the present study, we examined a newer calpain inhibitor, SNJ-1945, which has been described as having improved membrane permeability, using the controlled cortical impact TBI model. We found that compared to MDL-28170, an early (15 min), single post-injury dose of SNJ-1945 effectively decreased cytoskeletal degradation at 24 hours post-injury. Dose response studies (3.125 – 100 mg/kg, i.p.) demonstrated a U-shaped curve with 12.5 and 25 mg/kg, i.p. producing the maximal effect of SNJ-1945 on calpain-mediated degradation of the neuronal cytoskeletal protein α -spectrin. SNJ-1945 equally reduced calpain-nonspecific (150-kDa) and calpain-specific (145-kDa) α -spectrin breakdown products in both the ipsilateral cortex and hippocampus. Ongoing experiments include a comparative efficacy study of MDL-28170 versus SNJ-1945 with a repeated dosing regimen as well as a therapeutic window analysis on calpain-mediated α -spectrin degradation in cortical and hippocampal tissue post-injury. These studies were supported by 2P30 NS051220 and the Kentucky Spinal Cord & Head Injury Research Trust.

Key Words: Neurotrauma, Calpain, Neurodegeneration

POSTER PRESENTATION - 2

The Role of Botulinum Toxin in Complex Regional Pain Syndrome: A Case Report

Presenter:

Pravardhan Birthi, M.D.¹

Collaborators:

Sara Salles, D.O.¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation

Abstract Text:

Program or patients: A 44 year old female with 11 year history of complex regional pain syndrome type 1 (CRPS) in her left upper extremity after remote injury while lifting heavy object. Prior to Botulinum toxin subcutaneous injection, the patient has tried and failed multiple medication trials, epidural injection, sympathetic blocks and spinal cord stimulator placement and subsequent removal.

Program description: The patient was regularly followed in the outpatient who was maintained on long acting and short acting oral narcotic with significant allodynia, hyperalgesia and severe burning pain of left hand. The patient had decreased range of motion of left upper extremity at shoulder, elbow, wrist and finger secondary pain. Patient with visible skin and nail changes compared to right upper extremity.

100 units of Botulinum toxin A was injected subcutaneously at 20 sites, 5 units/site, and 10 cm apart on the dorsum of the left hand. McGill pain questionnaire was used for pain assessment, prior to treatment and weekly for 2 months post injection. Physical examination was performed to assess hand function before injection and at 2 month follow up visit.

Setting: Outpatient Physical Medicine and Rehabilitation clinic in an academic hospital.

Result: The patient completed McGill pain questionnaire which showed 33% relief in pain. Patient also had significant improvement in hand motor skill and improvement activity of daily living. Additionally the patient required 50% less breakthrough pain medication during the 2 month period after Botulinum toxin A injection.

Discussion: CRPS is a difficult condition to treat effectively. Botulinum toxin has been used in many painful conditions. To date there has only been one case series with limited results. In this case Botulinum toxin has provided improved pain relief, improvement in hand fine motor function as well as improvement in ADLS.

Conclusion: This case indicates that Botulinum toxin may play an important role in the treatment of patient with refractory CRPS.

POSTER PRESENTATION - 3

Morphological and Genetic Activation of Microglia After Diffuse Traumatic Brain Injury in the Rat

Presenter:

Tuoxin Cao^{1,2}

Collaborators:

Amanda M. Lisembee², Kelley D. Hall², James R. Pauly^{2,3} and Jonathan Lifshitz, Ph.D.^{2,4,5}

Departmental Affiliations:

¹University of Kentucky, Department of Biology, College of Arts and Science

²Spinal Cord and Brain Injury Research Center, College of Medicine

³Department of Pharmaceutical Sciences, College of Pharmacy

⁴Department of Anatomy & Neurobiology, College of Medicine

⁵Department of Physical Medicine & Rehabilitation, College of Medicine
University of Kentucky, Lexington, KY

Abstract Text:

Traumatic brain injury (TBI) survivors experience long term post-traumatic morbidities, which are thought to be exacerbated by secondary injury processes following the primary insult to the brain. Here we examine the acute and chronic microglia activation as a potential secondary injury processes by examining differential microglial activation states and neuroplasticity through change in microglia morphology and gene expression. Adult male, Sprague-Dawley rats were subjected to a single moderate midline fluid percussion (FPI) or sham injury. Microglial activation was determined by immunohistochemistry, receptor autoradiography and quantitative real-time PCR in primary somatosensory barrel field and ventral posteromedial nucleus of the thalamus at seven and 28 days following FPI. At seven days post-injury, classical activation (CD45) and acquired deactivation (TGF β 1, TGF β R2) gene expression were elevated significantly above uninjured sham levels. Evidence for alternative activation (arginase 1) was not observed. Daily anti-inflammatory ibuprofen administration (20 mg/kg, i.p.) significantly reduced classical activation, but had no effect on neuroplastic gene expression (GAP-43, synaptophysin) compared to saline vehicle. These data confirm concomitant classical activation and de-activation phenotypes of microglia acutely after diffuse TBI, which are thought to be degenerative. Microglia activation is unlikely to contribute to injury-induced neuroplasticity that is typically associated with alternative microglial activation.

Key Words: traumatic brain injury, microglia activation, ibuprofen treatment.

Supports: NINDS R01 065052, NINDS P30 051220, UK College of Medicine; UK EUREKA Summer Undergraduate Research and Creativity Grant, 2009 & 2010

POSTER PRESENTATION - 4

Dose-Response Peripheral Nerve Stimulation in Poorly Recovered Stroke Patients: Ongoing Study

Presenter:

Kenneth Chelette, M.S.¹

Collaborators:

Cameron Henzman, B.S.¹; Cheryl Carrico, M.S., OT/L¹; Laurie Nichols, B.S., OTR/L¹; Lumy Sawaki, M.D., Ph.D.¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation
Cardinal Hill Rehabilitation Hospital, Lexington, KY

Abstract Text:

Objective: The objective of this study is to develop a dose-response model of peripheral nerve stimulation (PNS) as an adjunctive therapy to upper extremity motor training for subjects with severe motor deficit following stroke.

Design: Twenty-four subjects with chronic stroke were randomly assigned to 1 of 5 groups in an ongoing double-blind study (power analysis: n=60). Each group received PNS coupled with upper extremity motor training on a robot-assisted device (InMotion2). This intervention varied with respect to PNS timing (ie, before or during training) and intensity (ie, above or below 100 μ v, or sham). Baseline evaluation preceded 10 consecutive weekdays of intervention, followed by completion evaluation. We used transcranial magnetic stimulation (TMS) to evaluate cortical reorganization and the Fugl-Meyer Assessment Scale (FMA) and the Stroke Impact Scale (SIS) to determine behavioral outcomes.

Results: Preliminary behavioral data show that the group receiving PNS below 100 μ v during training showed greater change in FMA than other groups. The most notable corticomotor reorganization occurred in this group and in the group receiving PNS above 100 μ v before training.

Conclusions: Our preliminary results suggest that different intensity/timing configurations of PNS coupled with motor training will potentially have differential effects on recovery of motor function and cortical plasticity.

Key Words: PNS, TMS, chronic stroke, motor recovery, robotic-assisted therapy, neuroplasticity

POSTER PRESENTATION - 5

Brain Stimulation and Robotic Training to Facilitate Upper Extremity Motor Function in Incomplete Spinal cord Injury: A proposed Feasibility Study

Presenter:

Talat Jamil, M.D.¹

Collaborators:

Kenneth Chelette II, M.S.¹; Laurie Nichols, B.S., OTR/L;¹ Cheryl Carrico, M.S., OT/L¹; Lumy Sawaki, M.D., Ph.D.¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation
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Abstract Text:

According to the National Spinal Cord Injury Statistical Center, as many as 300,000 people in the United States are living with spinal cord injury (SCI). Every year, there are approximately 12,000 new cases of SCI in the United States. Less than 1% of those with SCI will experience complete recovery, highlighting the need for effective therapeutic interventions after neurologic damage has occurred. It is believed that neuroplastic change plays a crucial role in recovery of function after neurological injury. Transcranial direct current stimulation (tDCS) is a non-invasive form of brain stimulation that has been shown to improve neuroplastic change and upper extremity motor function after stroke. However, it is not known if tDCS will improve upper extremity motor function after incomplete spinal cord injury (SCI). Our central hypothesis for this feasibility study is that application of active tDCS to the arm corticomotor area in combination with motor training will lead to greater improvement of motor function than will sham tDCS and motor training. Furthermore, the degree of this behaviorally measured effect will correlate with cortical reorganization as measured by transcranial magnetic stimulation. We plan to enroll 8 subjects who are at least 1 year post-injury and who have incomplete SCI at neurological level C5 -C7, classified by the ASIA impairment Scale as C or D. This double-blind study will consist of 15 days of intervention and 3 evaluations (baseline, post-intervention and 1-month follow-up). The long-range goal is to maximize upper extremity motor function in incomplete SCI patients.

Key Words: transcranial direct current stimulation, motor recovery, neuroplasticity, neuroimaging

POSTER PRESENTATION - 6

Comparison of Rat Sensory Behavioral Tests to Detect Somatosensory Morbidity after Diffuse Brain Injury

Presenter:

Annastazia Learoyd^{1,2}

Collaborators:

Jonathan Lifshitz, Ph.D.^{2,3,4}

Departmental Affiliations:

¹Department of Biology & Biochemistry, University of Bath, UK

²Spinal Cord and Brain Injury Research Center (SCoBIRC)

³Department of Anatomy & Neurobiology

⁴Department of Physical Medicine & Rehabilitation
University of Kentucky College of Medicine, Lexington, KY

Abstract Text:

Brain injury disrupts neuronal circuits, which can impact neurological function. To pursue therapeutic interventions and explore anatomical underpinnings of neurological dysfunction, selective and sensitive behavioral tests are necessary to evaluate the injury and recovery processes. Previously, we reported that the whisker nuisance task (WNT), where whiskers are manually stimulated in an open field, shows delayed-onset sensory sensitivity in diffuse brain-injured rats. In the present communication, we evaluate a battery of tests to explore this somatosensory deficit. In addition to the WNT, we selected the gap cross test, a novel angle entrance test and the whisker guided exploration test, because they require sensory input from the whiskers without pre-requisite training or learning. Brain-injured (n=11) and sham (n=8) rats were tested prior to, one and four weeks after midline fluid percussion brain injury (moderate: 2.0 ATM). For the WNT, we confirmed that brain-injured rats develop significant sensory sensitivity to whisker stimulation over 28 days. In the gap cross test, where rats cross progressively larger elevated gaps, we found that animals were inconsistent in the crossable distance regardless of injury. In the angle entrance task, where rats enter corners of 30°, 40°, 50° or 80°, rats entered equally far into the corner regardless of injury. In the whisker guided exploration test, where rats voluntarily explore an oval circuit, we identified significant decreases in the expression of certain behavioral traits (number of rears and reversals) and differences in the predominant location (injured rats spend more time in the inside turn compared to the outside turn) after injury and increased thigmotaxis after sham and brain-injury. Both the WNT and whisker guided exploration tasks show injury-induced somatosensory behavioral morbidity; however, the WNT is superior in the detection of neurological dysfunction, possibly due to the repeated manual stimulation while other tasks were voluntary behaviors.

Key Words: whisker nuisance task, gap cross test, angle entrance task, whisker guided exploration test; diffuse brain injury

POSTER PRESENTATION - 7

Temporal and Spatial Dynamics of Nrf2-ARE Mediated Gene Targets in Cortex and Hippocampus Following Controlled Cortical Impact Traumatic Brain Injury in Mice

Presenter:

Darren M. Miller^{1,2}

Collaborators:

Ashley K. Buchanan¹, Juan A. Wang¹, and Edward D. Hall, Ph.D.^{1,2}

Departmental Affiliations:

¹Spinal Cord & Brain Injury Research Center, University of Kentucky College of Medicine

²Department of Anatomy & Neurobiology, University of Kentucky College of Medicine

Abstract Text:

The pathophysiological importance of oxidative damage after traumatic brain injury (TBI) has been extensively demonstrated. The transcription factor Nrf2 mediates transcription of antioxidant/cytoprotective genes by binding to the antioxidant response element (ARE) within DNA. Upregulation of these genes constitutes a pleiotropic cytoprotective-defense pathway. We investigated the time-course of Nrf2-ARE-mediated expression in cortex and hippocampus using a unilateral controlled cortical impact (CCI) model. Young-adult male CF-1 mice underwent sham surgery (craniotomy only) or severe CCI (1.0mm). Ipsilateral hippocampus and cortex were collected for Western-blot protein analysis (n=6/group) or quantitative-RT-PCR of mRNA (n=3/group) at 3, 6, 12, 24, 48, 72 hours or 1-week post-injury. HO-1 mRNA and protein increased at 24, 72 hours in cortex and 24, 48 hours in hippocampus ($p<.05$). SOD1 mRNA decreased in hippocampus at 3, 6, 48, 72 hours ($p<.05$) but no changes occurred in cortex. GFAP mRNA increased at 24, 48, 72 hours and 1-week ($p<.05$) in both regions. GR mRNA increased in hippocampus at 24 hours ($p<.05$) but without change in cortex or GR protein expression. NQO1 mRNA increased at 72 hours and 1-week ($p<.05$) in cortex but not in hippocampus. Catalase mRNA increased at 72 hours in hippocampus and at 48, 72 hours in cortex ($p<.05$). GST-mu5 mRNA decreased at 6, 24, 48 hours in hippocampus and 24, 48 hours in cortex ($p<.05$). GPx-3 mRNA decreased at 3, 6, 24 hours in cortex but increased at 72 hours and 1-week in hippocampus ($p<.05$). Nrf2 mRNA increased at 48, 72 hours in cortex and at 48, 72 hours and 1-week in hippocampus ($p<.05$) demonstrating the first evidence of such changes post-TBI. Interestingly, increased Nrf2-ARE-mediated expression was not observed until ~24 hours, whereas prior work showed oxidative damage occurring 1-12 hours post-TBI. These results underscore the need to discover pharmacological agents to enhance Nrf2-ARE-mediated expression early post-TBI.

Key Words: Traumatic brain injury, oxidative stress, gene expression

POSTER PRESENTATION - 8

Avascular Necrosis of the Lunate Presenting as Persistent Severe Wrist Pain after Minor Trauma: A Case Report

Presenter:

Hena Sattar, M.D.¹

Collaborators:

Susan McDowell, M.D.¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation

Abstract Text:

61 y/o Caucasian male with sudden onset of sharp, throbbing left wrist pain, after falling on hyperflexed wrist. Initial x-rays were unremarkable. He was splinted and provided with NSAIDs. At follow up he reported increased pain and edema despite NSAIDs and immobilization. Due to concerns of fracture repeat imaging was completed, including CT scan. Repeat x-ray was unremarkable. CT scan reported possible vertical fracture line in ventral portion of capitate vs. artifact. He was provided with an orthoplast resting hand splint. As symptoms became worrisome for Complex Regional Pain Syndrome, neurontin and tramadol were initiated. A 3 Phase bone scan of left forearm, wrist and hand was performed to clarify differential diagnosis. MRI was contraindicated due to patient having an implantable device. Bone scan revealed prominent activity of the left lunate. Further review of x-rays and CT scan revealed areas of increased density and cystic changes. Patient was diagnosed with avascular necrosis (AVN) of the lunate. Orthopedics was consulted for further management they decided to proceed with proximal row carpectomy.

AVN of the lunate, also known as Kienbock's disease, pathophysiology is unknown. AVN may be caused by interruption of blood supply to the lunate or repetitive trauma. Presentation and severity vary; can be subacute and chronic, with pain improving with immobilization. Early imaging is usually normal, with time developing deterioration, beginning with sclerosis of the lunate then fragmentation, collapse and finally arthritis. Splinting or casting is controversial. Treatment is directed to decrease compressive loading of the lunate through surgical correction of negative ulnar variance or vascular bundle implantation. Late disease is managed surgically with proximal row carpectomy or wrist arthrodesis.

This case study highlights the importance of high index of suspicion for the early diagnosis of this condition, current diagnostic criteria, as well as treatment options.

Key Words: Keinbock's disease, avascular necrosis, lunate

POSTER PRESENTATION - 9

Evaluation of Electrical Stimulation Impact on Muscle Hemodynamics Using Diffuse Optical Spectroscopies

Presenter:

Yu Shang, Ph.D.¹; Katelyn Gurley, Ph.D.¹

Collaborators:

Ran Cheng¹, Lixin Dong¹, Daniel Irwin¹, Katelyn M. Gurley¹, Karin R. Swartz², Sara S. Salles, D.O.³, and Guoqiang Yu¹

Departmental Affiliations:

¹Center for Biomedical Engineering, ²Department of Neurosurgery,

³Department of Physical Medicine and Rehabilitation, University of Kentucky

Abstract Text:

Electrical stimulation (ES) can activate muscle contraction, promote blood circulation, and decrease the incidence of pressure ulcers. In order to evaluate and optimize muscle hemodynamic responses to ES, we developed a hybrid instrument combining a diffuse correlation spectroscopy (DCS) for blood flow measurement and a diffuse optical tissue-oximeter for blood oxygenation measurement. ES was applied on five healthy volunteers for five minutes while they lied supine on an airbed. A muscular stimulator delivered 50 mA biphasic electrical current to the skin via a pair of electrodes placed on the sacrum and right erector spinae. The electrical pulse was set up at high or low frequency (30 or 2Hz). A fiber-optical probe connected to the hybrid instrument was taped on the skin between the two electrodes. Muscle blood flow at 15-minute after ES was increased 50.4 ± 12.3 % (mean \pm SE) at 30Hz and 70.7 ± 19.5 % at 2Hz, respectively. By contrast, the short-period (five minutes) ES didn't significantly improve blood oxygenation. Low-frequency stimulation is more favorable since it causes less muscle fatigue and is more tolerable for the subjects. This pilot study demonstrates a potential role for the diffuse optical spectroscopies in evaluation of ES treatment for diseases caused by poor blood circulation (e.g., pressure ulcers). Future study will optimize and apply ES treatment in patients with pressure ulcers and follow up long-term effects of the ES on muscle hemodynamics.

Key Words: electrical stimulation; pressure ulcers; blood flow; blood oxygenation; diffuse optical spectroscopies

POSTER PRESENTATION - 10

Facial Whisker Kinematics After Diffuse Brain Injury May Reveal Chronic Behavioral Morbidity In Rats

Presenter:

Pooja Talauliker, Ph.D.¹

Collaborators:

Jahan Miremami^{1,4}, Jonathan Lifshitz, Ph.D.^{1,2,3}

Departmental Affiliations:

¹ Spinal Cord and Brain Injury Research Center (SCoBIRC)

²Department of Anatomy and Neurobiology, ³Department of Physical Medicine and Rehabilitation, College of Medicine, ⁴Department of Biology, College of Arts and Sciences, University of Kentucky, Lexington, Kentucky

Abstract Text:

In the United States alone, traumatic brain injuries (TBI) afflict over 1.5 million people each year, making TBI a leading cause of death and disability. Circuit disruption may be responsible for post-concussive morbidity, either from loss of original connections or formation of new aberrant circuitry. We focus on the rodent vibrissal system because of its functional relevance and relatively simplified afferent-efferent connections. Recently, our laboratory demonstrated that brain-injured rats develop persistent central sensitivity to whisker stimulation though whisking capability appears to be retained. In the present study, we hypothesize that diffuse brain injury impairs whisking kinematics because posttraumatic pathology disrupts sensory control over patterned whisking. Adult male rats underwent sham or midline fluid percussion injury of moderate severity. Subsequently, high-speed video recordings (300 fps) of active exploratory whisking were obtained prior to and at 1, 4 and 8 weeks post-injury. Kinematic analyses involved a detailed examination of whisking frequency, velocity, amplitude and synchronicity. Our study revealed an increase in whisking frequency and left-right synchronicity in brain-injured rats suggesting decreased cortical control over patterned whisking. In addition, an examination of whisking-associated sensory and motor nuclei of the brainstem revealed increased neurodegeneration, microglial activation and astrogliosis. By delineating the relationship between post-injury pathophysiology and whisking behavior, this study may lend insight to the functional consequences of TBI in more complex sensorimotor systems while also advancing efforts to develop effective therapeutic interventions.

Key Words: Neurodegeneration after TBI, Post-concussive morbidity, Central pattern generators

Grant Support: NIH NINDS R01 NS065052

POSTER PRESENTATION - 11

Diffuse Brain Injury-Induced Increases in Glutamate Neurotransmission Parallel the Development of Late-Onset Behavioral Morbidity in Rats

Presenter:

Theresa Currier Thomas, Ph.D.¹

Collaborators:

Jason Hinzman^{1,2,4}, Greg A. Gerhardt^{2,4,5}, Jonathan Lifshitz, Ph.D.^{1,2,3}

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¹Spinal Cord & Brain Injury Research Center, ²Anatomy & Neurobiology, ³Physical Medicine & Rehabilitation, ⁴Center for Microelectrode Technology, ⁵Morris K. Udall Parkinson's Disease Research Center of Excellence, University of Kentucky College of Medicine, Lexington, KY, USA

Abstract Text:

Midline fluid percussion injury (mFPI) in rodents causes diffuse axonal injury (axotomy) and deafferentation. After mFPI, brain-injured rats demonstrate robust sensory sensitivity in response to manual whisker stimulation that develops over 28 days post-injury, comparable to agitation with overstimulation in brain-injured individuals. Whisker somatosensation relies on thalamocortical glutamatergic relays between the ventral posterior medial (VPM) nucleus of thalamus and barrel fields of primary somatosensory cortex (S1BF). Using novel glutamate-selective microelectrodes with amperometric detection, we measured alterations in glutamate neurotransmission that developed with post-traumatic sensory sensitivity after brain injury as indicated by a 110% increase in tonic glutamate levels in the VPM, 100% increase in potassium-evoked-glutamate release in the VPM and S1BF, with no change in glutamate clearance. To confirm whether the evoked release of glutamate in the VPM originated from presynaptic terminals, the calcium channel inhibitor ω -conotoxin was applied to block evoked glutamate release in the VPM of sham and 28 day brain-injured rats. A 50% greater reduction in evoked glutamate release after ω -conotoxin was observed in brain-injured animals. These experiments elucidate a temporal relationship between the development of post-traumatic behavioral morbidity and disruption in presynaptic glutamate neurotransmission. Effective therapies to restore pre-synaptic glutamate function in diffuse-injured circuits may translate to improvements in essential brain function in other injured circuits in rodents and man.

Support: KSCHIRT #7-11, P30 NS051220-01, NIH R01 NS-065052, T32 AG000242, UK College of Medicine

Key Words: diffuse traumatic brain injury, late-onset morbidity, glutamate, amperometry, hyperexcitable, thalamocortical circuit

POSTER PRESENTATION - 12

Effects of the Lipid Peroxidation Inhibitor U-83836E on Mitochondrial Dysfunction in the Mouse TBI Model

Presenter:

Lindsay Shroyer, M.D.¹

Collaborators:

Oscar Ortiz-Vargas, M.D.²

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation

²Department of PM&R, VAMC, Lexington, KY

Abstract Text:

A 55 year-old patient developed Parsonage-Turner syndrome after Roux-en-y esophagojejunostomy secondary to hemorrhagic gastritis. The patient reports severe pain in his anterior shoulder associated with paresthesias to his anterior arm, which improved over the course of several weeks. Patient was originally noted to have generalized weakness, originally thought to be secondary to deconditioning. During his stay at a sub acute rehabilitation facility, his generalized weakness improved except he continued to have weakness in his left upper extremity. Patient was then noted to have atrophy in the proximal left upper extremity including shoulder girdle, pectoral muscle and muscles in the anterior compartment of the arm. There were no reports of falls or traction injury. EMG/NCS revealed that patient had Parsonage-Turner syndrome. There are currently no reports of Parsonage-Turner syndrome after Roux-en-y esophagojejunostomy.

Key Words: Parsonage-Turner syndrome, Roux-en-y esophagojejunostomy, Brachial Neuritis, Neuralgic amyotrophy

POSTER PRESENTATION - 13

Recurrent UTI in Spinal Cord Injury, after Revision of Mitrofanoff Procedure: A Case Report

Presenter:

Pravardhan Birthi, M.D.¹

Collaborators:

Jaymin Patel¹, Susan McDowell M.D.²

Departmental Affiliations:

¹University of Kentucky, College of Medicine

²University of Kentucky, Department of Physical Medicine & Rehabilitation

Abstract Text:

Case Description: A 42 year old female with C6 ASIA A spinal cord injury and history of neurogenic bowel and bladder, spasticity and intermittent autonomic dysfunction, underwent a Mitrofanoff procedure one year after initial injury for management of her neurogenic bladder, presents with urosepsis.

Discussion: Spinal cord injury (SCI) can result in neurogenic bladder, a condition that can be very distressing and difficult to manage for the patient. Urinary tract infections (UTI) are common and unfortunate complications of neurogenic bladder. This is due to many factors including the need for self-catherization, high pressure voiding and the failure to completely void.¹ Urinary diversion procedures such as the Mitrofanoff procedure have become mainstays in addressing the long term complications of a neurogenic bladder. The Mitrofanoff procedure originally specified the use of the appendix to create a continent catheterizable channel into the bladder.² It is now a looser term to describe any continent catheterizable channels into the urinary bladder. Common long-term complications for the procedure include bladder stones, abdominal abscess, and leakage around the bladder neck and stoma stenosis.⁵

Assessment/Result: We describe a case of a patient who underwent a Mitrofanoff procedure with revision and presents with fistulous connection and its complication.

Conclusion: The case reported here was an example of a fistula formation between the initial urinary diversion and the revision which resulted in recurrent urinary tract infections and bacteremia. This is an uncommon complication in a patient with Mitrofanoff diversion with revision. Consideration should be given to recurrent urinary tract infections in a patient who has undergone a urinary diversion as a cause to their ailment.

Key Words: Mitrofanoff, recurrent urinary tract infection, neurogenic bladder

POSTER PRESENTATION - 14

Incomplete Paraplegia in an Adult with SCIWORA with Bowel and Bladder Continence despite Absence of Sacral Sensation

Presenter:

Pravardhan Birthi, M.D.¹

Collaborators:

Ninad Karandikar, M.D.¹; Sara Salles, M.D.¹

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation

Abstract Text:

Case Description: A 32-year-old morbidly obese white male presented to our acute inpatient rehabilitation hospital, status post work related bulldozer rollover accident with incomplete paraplegia. Documents from the history and physical exam in the ED revealed incomplete paraplegia, sensory loss below T12, normal rectal sensation and rectal tone, areflexic lower extremities with preservation of bowel and bladder function. Work up included a CT head, C-spine chest/abdomen all of which were negative. CT of the C/T/L spines without contrast did not reveal any changes suggestive of acute trauma to the spinal cord. There were findings of a chronic L1 compression fracture and mild degenerative joint disease. MRI 5 days later was unrevealing. The patient was given the working diagnosis of "Incomplete Spinal cord injury". The patient did receive methylprednisolone after admission to acute care. Once felt to be medically stable, the patient was transferred to our acute rehabilitation facility. The presentation of incomplete paraplegia with sacral sensory loss but continence of bowel and bladder and negative radiographic findings are discussed.

Discussion: The clinical picture is consistent with a T 9 ASIA C spinal cord injury with paraplegia, continence of bowel and bladder, and intact voluntary anal contraction. We could not explain the anatomical basis for absent sacral sensations given the other neurological findings. In addition, initial CT and MRI five days post injury, was negative for any pathology which could account for the clinical picture. A vascular etiology was considered unlikely since the sensory loss was diffuse across multiple arterial territories and MRI imaging was negative for any "hyperintensity" zones. An EMG/NCV study was consistent with "upper motor neuron syndrome" and ruled out the possibility of a psychogenic cause. We then considered the possibility of "SCIWORA" (Spinal Cord Injury without Radiologic Abnormality). Literature review of SCIWORA reveals that it is more prevalent in the pediatric population and usually most commonly seen in the cervical spine. SCIWORA however does reveal MRI imaging abnormalities that co-relate clinically with the neurologic deficit, unlike in our patient.

Conclusion: We present an unusual clinical scenario with paraplegia, loss of sacral sensation but continence of bowel and bladder, strongly suggestive of a thoracic spinal cord injury but negative MRI imaging to determine the etiology of the injury. Recovery with functional improvement in this specific scenario was similar to that expected in an any patient with incomplete paraplegia.

Key Words: cord injury, paraplegia, ASIA exam, MRI, SCIWORA

NOTES

KEYNOTE SPEAKER PRESENTATION

“The Future of PM&R”



RANDALL L. BRADDOM, M.D.

Dr. Braddom was named the Best Student in PM&R in his senior year in medical school at Ohio State, and Chief Resident at Ohio State. His article written during his residency on the use of the H reflex in S-I radiculopathy (which was also his Master's Thesis), popularized this technique that is now used by electromyographers around the world.

While a resident, he was named the Columbus Citizen-Journal Man of the Year in Columbus, Ohio for founding an inner city health center for the poor that is still in existence today. He served during the Vietnam conflict as a Lieutenant Commander in the Navy. At the age of 32 Dr. Braddom became the youngest person ever appointed a clinical department chairman at the University of Cincinnati College of Medicine. He founded rehabilitation units at two hospitals in Cincinnati, Ohio.

Dr. Braddom has been President of the American Academy of PM&R, the American Association of Electrodiagnostic Medicine, the Association of Academic Physiatrists, and Treasurer of the American Board of Electrodiagnostic Medicine. He has authored numerous scientific articles, book chapters, and has made over one hundred invited scientific presentations. He is Editor in Chief of *Physical Medicine & Rehabilitation*, soon to be in its fourth edition. He is also the Editor in Chief of the *Physiatrist* for the AAPM&R.

Dr. Braddom has been selected in multiple years by two different organizations as one of the best doctors in America. He has received the Krusen Award from the American Academy of PM&R, the Lifetime Achievement Award from the American Association of Electrodiagnostic Medicine, and the Distinguished Member Award from the Association of Academic Physiatrists.

He is the father of three children and six grandchildren. After hours activities include bicycling and writing murder mysteries (His novel entitled: *Murder on the Rehab Unit* was published in 2002 and *Faith Hope and Murder* in 2005). He has also published *Appalachian Echoes* in 2009.

Currently Dr. Braddom practices as part of Orthopaedics, Sports Medicine, and Rehabilitation, PC in Red Bank, NJ. He is Clinical Professor of PM&R at Robert Wood Johnson Medical School and the New Jersey Medical School.

**NOTES: Randall L. Braddom, M.D.
“The Future of PM&R”**

NOTES