

Bridging Efficacy and Access Gaps in Chronic Stroke Rehabilitation

Thursday, February 22, 2024 | 8:00 AM – 9:00 AM ET | Location: Sebastian I

Course Director(s)

- Preeti Raghavan, MD

Speaker(s)

- Ryan Roemmich, PhD

This session will discuss the development and FDA-approved translation of digital technology solutions to address walking impairment outside the clinic to address efficacy and access gaps in chronic stroke rehabilitation.

Leveraging the Value of Physiatry: The Impact of Acute Care Consultation Services

Thursday, February 22, 2024 | 11:15 AM – 12:15 PM ET | Location: Suwannee 15

Course Director(s)

- Patrick Kortebein, MD

As experts in functional evaluation and rehabilitation, physiatrists have the opportunity to optimize patient care across all health care settings. One under recognized area where physiatrists can demonstrate their value is in the acute care hospital setting by providing expert input regarding the rehabilitative management and post-acute care disposition for patients with disabling conditions. This session will discuss the role and purpose of the PM&R acute hospital consultation service and provide specific examples of consultation services for participants to emulate that benefit not only for patients but health care systems.

Being Better Allies to Women

Thursday, February 22, 2024 | 3:30 PM – 5:00 PM ET | Location: Sebastian I

Speaker(s)

- Preeti Raghavan, MD

This program will focus on how individuals can help promote and support women in medicine.

822 - Atypical Coexistence: Postherpetic Neuralgia and Brachial Plexitis in a 70-year-old Male

Thursday, February 22, 2024 | 5:00 PM – 6:30 PM ET

Presenting Author:

- Nikhil A. Gopal, MBBS

Co-Author(s)

- Pranamya Suri, MD
- Akhil Chhatre, MD

Case Diagnosis: Concurrent Postherpetic Neuralgia (PHN) and Brachial Plexitis.

Case Description: A 70-year-old male with a history of CLL, COVID, Hypothyroidism, and herpes zoster presented with severe left arm pain, allodynia, hyperalgesia, and weakness in the ulnar distribution. Initial investigations suggested PHN, but persisting motor deficits signaled an atypical scenario. A subsequent ganglion block (SGB) provided no relief. An MRI of the C-spine revealed multilevel degenerative disc disease but did not offer an anatomical explanation for the symptoms. An EMG study suggested axon-loss pathology involving C8 > T1 innervated muscles which confirmed brachial plexitis, revealing a rare combination of disorders.

Discussions: The coexistence of PHN and brachial plexitis in the same patient poses a unique diagnostic and therapeutic challenge. While PHN is a relatively common aftermath of herpes zoster, its convergence with brachial plexitis is scarcely documented in literature. The patient's non-response to the stellate ganglion block was an indicator of the underlying complex pathology, emphasizing the importance of a multifaceted diagnostic approach. The decision to proceed with ESI was based on earlier MRI findings, underscoring the necessity of correlating clinical findings with diagnostic tools. Moreover, introducing icosapent ethyl (Vascepa) in the patient's regimen, given its known anti-inflammatory benefits in neuropathic conditions, highlights the value of a personalized therapeutic approach.

Conclusions: The simultaneous presentation of PHN and Brachial Plexitis offers a unique diagnostic challenge. Treatment strategies must be comprehensive, considering the overlapping symptomatology and potential for atypical presentations. This case underscores the importance of nuanced clinical evaluation, especially in atypical presentations, guiding therapeutic decision-making.

1319 - Effects of Hyaluronidase Injections on Muscle Stiffness, Spasticity, Upper Limb Motor Impairment and Mood After Cerebral Injury

Friday, February 23, 2024 | 5:00 PM – 6:30 PM ET

Presenting Author(s)

- Paria Arfa Fatollahkhani, MD, MSc

Co-Author(s)

- Robert Nickl, PhD
- Azin Etemadimanesh, MD

Corresponding Author(s)

- Preeti Raghavan, MD

Objectives: Muscle stiffness and spasticity cause severe disability in approximately 12 million people after neurologic injury of cerebral or spinal origin. We hypothesized that non-neural alterations in the composition of the extracellular matrix of the muscle due to the accumulation of hyaluronan can produce muscle stiffness and may contribute to spasticity as well as upper limb motor impairment, which may be treated using intramuscular hyaluronidase injections.

Design: 24 individuals with upper limb muscle stiffness after cerebral injury completed a single-center, double-blind, randomized, placebo-controlled, Phase II trial of human recombinant hyaluronidase injections. All subjects received both human recombinant hyaluronidase and placebo injections in a random order in multiple upper limb muscles and were evaluated at baseline and 1-2 weeks after each injection visit. Resistance to passive movement was assessed using the modified Ashworth Scale (MAS), and reflex-induced muscle activity was measured using surface EMG from the medial biceps during tendon tap using an electronic hammer. Motor impairment was evaluated using the upper limb Fugl-Meyer Assessment (FMA). The patient health questionnaire-9 (PHQ9) was used to evaluate mood.

Results: Analysis on 17 subjects showed that at baseline, the reflex EMG amplitude to tendon tap (mean \pm SD) was 7.67 ± 10.43 mV on the affected side vs. 1.65 ± 2.17 mV on the contralateral side. On the last post-injection visit, the muscle reflex EMG amplitude decreased by 4.06 ± 10.37 mV (47%) on the affected side, and the MAS score for elbow extension decreased by 0.59 ± 0.57 . The total upper limb FMA increased by 6.59 ± 5.15 , whereas the PHQ9 showed a score reduction of 1 ± 2.33 .

Conclusions: The results suggest that peripheral modulation of muscle stiffness using hyaluronidase injections can reduce resistance to passive movement, hyperreflexia, and motor impairment after cerebral injury, which can also improve mood. These findings suggest that secondary changes in muscle composition contribute to these phenomena.

343 - Treatment of Post-COVID-19 POTS by inhibiting FcRn: A phase 2 randomized, placebo controlled, double-blind, proof of concept study with efgartigimod

Friday, February 23, 2024 | 5:00 PM – 6:30 PM ET

Presenting Author(s)

- Tae Hwan Chung, MD

Co-Author(s)

- Max Konig, MD

Corresponding Author(s)

- Antoine Azar, MD

Objectives: While the underlying pathophysiology is unknown, post-COVID-19 postural orthostatic tachycardia syndrome (POTS) may be related to immune dysfunction and autoimmunity precipitated by SARS-CoV-2 infection. Various autoantibodies, including those targeting G-protein coupled receptors (GPCRs), have been observed in patients with POTS. We hypothesize that a reduction in autoantibody levels by efgartigimod, a FcRn-antagonist, will ameliorate the underlying immune-mediated pathogenesis and lead to clinical improvements in patients who developed POTS following COVID-19 infection. We propose a phase II multicenter, randomized, placebo-controlled, double-blind, proof-of-mechanism study initiated to evaluate the safety and efficacy of efgartigimod in adults with post-COVID-19 POTS.

Design: Patients diagnosed with new-onset of POTS following SARS-CoV-2 infection are eligible for participation in the study. Prior COVID-19 must be confirmed by documentation of historical PCR test, and POTS diagnosis must meet consensus criteria. Study subjects must have moderate to severe autonomic symptoms (COMPASS-31 score ≥ 35 points at screening). Approximately 42 patients will be randomly allocated (2:1) to receive weekly intravenous efgartigimod or placebo for 24 weeks followed by an option to roll over into an open-label extension. The co-primary endpoints are change from baseline to week 24 in the COMPASS-31 and Malmo

POTS Symptom Score as well as safety and tolerability outcomes. Key secondary endpoints include assessments of disease activity, fatigue, cognitive function, walking capacity and quantitative autonomic testing.

Results: Not Applicable

Conclusions: This phase II study of efgartigimod will evaluate the effect of FcRn inhibition on disease pathology and the potential for therapeutic benefit in patients with post-COVID-19 POTS.

I239 - Bullets Left Behind: Lead Toxicity in Chronic Spinal Cord Injury

Friday, February 23, 2024 | 5:00 PM – 6:30 PM ET

Presenting Author(s)

- Philippines Cabahug, MD

Case Diagnosis: Lead Toxicity from Retained Bullet Fragments in a Patient with Chronic Spinal Cord Injury (SCI)

Case Description: 38-year-old male with chronic SCI from a gunshot wound sustained 8 years ago. He has a retained bullet fragment (RBF) at the left T10-T11 neural foramen. He developed severe left-sided abdominal pain and trunk spasms 9 months post-injury. Patient had extensive gastrointestinal evaluation with different providers. Pain management strategies include medications for neuropathic pain, trigger point and botox injections. CT myelogram showed RBF at the left T11 pedicle and severe left T10-T11 neural foraminal narrowing. Patient was initially referred to surgery for RBF removal, but surgeon did not recommend surgery. Given progression of abdominal pain, a blood lead level was obtained. Patient had significantly elevated levels at 63 mcg/dl (normal: < 5).

Medical toxicologist recommended removal of RBF as no other source was identified. Patient underwent surgery. Post-op patient reported a brief period of improvement in symptoms. Serial monitoring show gradual decrease of lead levels, with latest at 44.6 mcg/dl.

Discussions: Symptoms of lead toxicity can be difficult to identify in patients with chronic SCI as they can be variable and are often overlooked as part of sequelae following their injury. Routine monitoring of lead levels is not a common practice in chronic SCI care. A high index of suspicion is warranted in individuals with history of RBF presenting with worsening abdominal pain, nausea, or with encephalopathy or peripheral neuropathy. Removal of the bullet does not guarantee resolution of symptoms.

Conclusions: Lead toxicity should be part of the differential diagnosis in SCI patients with RBF.

I440 - Orthotic-related Limb Pain and Modification during Inpatient Stroke Rehabilitation

Friday, February 23, 2024 | 5:00 PM – 6:30 PM ET

Co-Author(s)

- Ning Cao, MD

Objectives: Off-the-shelf ankle-foot orthotics (AFOs) are widely used in therapy training for stroke patients with gait dysfunction in the inpatient rehab. However, pain and skin breakdown resulting from the poor fitting braces hinder effective gait training and potentially lead to hospital acquired injuries. Our study aims to demonstrate the prevalence of the orthotic-related limb pain and skin breakdown during AFO usage for patients with stroke in the acute inpatient rehab unit.

Design: 30 patients who met enrollment criteria were enrolled into the IRB-approved prospective study. Patients received individualized therapy sessions and were assessed daily by therapists regarding any specific limb pain and skin breakdown regarding the orthotic. Data obtained includes age, gender, length of stay, pain and skin assessments, and number of orthotic modifications during rehabilitation. A survey was constructed and filled out by therapists recording their satisfaction scores related to the production, modification, and efficiency the AFO for their respective patients.

Results: There were 2.2 modifications made to AFOs on average during acute inpatient rehabilitation. AFO modifications doubled from pre- to post-therapy ($p < 0.05$). Limb pain scores tripled from pre- to post-therapy ($p < 0.05$). Limp pain developed 8 days after using AFOs (if no limb pain was present before, and excluding those that never developed pain). Skin breakdown developed 9.5 days after using AFOs (if no skin breakdown was present before, and excluding those that never developed skin breakdown). Our survey demonstrated low satisfaction from the therapy team.

Conclusions: Our study demonstrates that using an AFO (even for just 1 hour/session, over 3-5 sessions per week) is associated with increase in skin breakdown (33%) and limb pain (200%, $p < 0.05$), and required multiple modifications throughout rehabilitation. The next phase of this study will assess the same outcomes for custom fabricated 3D printed AFOs in the acute inpatient rehab setting.

I339 - Assessment of Bradykinesia in Parkinson's Disease using Video-Based Pose Estimation

Friday, February 23, 2024 | 5:00 PM – 6:30 PM ET

Co-Author(s)

- Jan Stenum, PhD
- Alexander Pantelyat, MD

Corresponding Author(s)

- Ryan Roemmich, PhD

Objectives: Repetitive motion is an important part of many neurologic exams like the Unified Parkinson's Disease Rating Scale (UPDRS) for persons with Parkinson's disease (PD). Bradykinesia is a prevalent symptom in persons with PD, and the UPDRS tests this via observational assessment of repetitive movements. Bradykinesia is typically evaluated subjectively in the clinic via visual observation by a movement disorders neurologist, but computer vision offers an opportunity for remote and objective assessments.

Design: We evaluated a pose estimation approach for measuring movement frequency in persons with PD from smartphone videos. We used 48 videos of the UPDRS done on 22 individuals with PD. The videos were segmented into portions containing two repetitive motion tasks: finger tapping (FT) and hand opening and closing (HOC). Tasks were scored by a neurologist and given UPDRS subscores from 0-4 (no symptoms to severe symptoms). We used a workflow that included Google MediaPipe (a freely available pose estimation algorithm) to estimate movement frequency and compared that to ground-truth manual measurements.

Results: The means of the manually calculated and Mediapipe frequency for the FT tasks were 4.37 ± 0.89 and 4.03 ± 0.98 Hz, respectively. The means of the manually calculated and Mediapipe frequency for the HOC task were 2.98 ± 0.88 and 2.66 ± 0.75 Hz, respectively. The correlation coefficient between the manual and Mediapipe calculations for both movements showed strong positive correlations (0.74, 0.61). These results suggest that pose estimation is a promising tool to provide accurate assessments of upper limb bradykinesia in PD.

Conclusions: As this is a preliminary analysis, we restricted our analysis to the FT and HOC tasks, but we plan to include the remaining bradykinesia items in future work.

I146 - Exploring the relationship between the Revised Physical and Neurological Examination of Subtle Signs (PANESS) Total Gaits and Stations Summary Score and self-reported and performance-based assessments of balance in youth

Friday, February 23, 2024 | 5:00 PM – 6:30 PM ET

Presenting Author(s)

- Sopatip Rerkmoung, MD

Co-Author(s)

- Tyler Busch, BS
- Adrian Svingos, PhD, MS

- Beth Slomine, PhD, MS

Corresponding Author(s)

- Stacy Suskauer, MD

Objectives: To explore divergent validity of the Physical and Neurological Examination of Subtle Signs Gaits and Stations (PANESS G/S) with performance (Bruininks-Oseretsky Test of Motor Proficiency, Second Edition balance scale - BOT-2) and self-report (Activities-specific Balance Confidence Scale - ABC) measures of balance in youth medically cleared post-mTBI (MC post-mTBI) and never-concussed controls.

Design: Cross-sectional correlational study

Method: Data were obtained from 79 youths (32 MC post-mTBI) ages 10-17 years enrolled in a longitudinal study of subtle motor function. Cross-sectional data were examined from the participant's first exposure to the performance measures. Between-group differences in PANESS, BOT-2, and ABC were explored. Correlations were explored between demographic variables and balance measures to identify demographic variables to control for through partial correlations to examine relationships of PANESS with BOT-2 and ABC. When significant correlations were identified of BOT-2 or ABC with PANESS, correlations with 3 PANESS G/S factor scores were exploratorily evaluated.

Results: Given no differences between MC post-mTBI and controls on PANESS G/S, BOT-2, or ABC, correlations were examined across the entire cohort of 79 participants. PANESS G/S was correlated with age ($r = -.233$, $p = 0.04$). Better PANESS G/S performance was associated with better BOT-2 performance ($r = -.408$, $p < .001$). Two PANESS G/S factors correlated with BOT-2: dynamic stability ($r = -.346$, $p = 0.002$) and underlying motor systems ($r = -.418$, $p < .001$) while movement strategies/coordination did not. PANESS G/S and ABC were not correlated ($r = .002$, $p = 0.989$)

Conclusions: This work adds to the literature characterizing the use of PANESS in adolescents, including those post-mTBI. Correlation between PANESS G/S and BOT-2 balance supports overlapping constructs, with correlations of factor scores providing more information about both convergent and divergent validity. Lack of PANESS G/S correlation with ABC may reflect the lack of balance in concerns in daily life reported by the study population.