

# Abstracts of Scientific Papers and Posters Presented at Physiatry '24

February 20–24, 2024

## BEST PAPER PRESENTATIONS

### Faculty Category Award Winner

#### EFFICACY OF PERCUTANEOUS CRYONEUROLYSIS FOR WRIST OR HAND/FINGER SPASTICITY

Paul Winston, MD, Mahdis Hashemi, MD, Eve Boissonnault, MD, Daniel Vincent, MD, Fraser MacRae, BSC, Jia Song, MS, and Sandy Shi, MS

**OBJECTIVES:** To evaluate changes in range of motion (ROM), spasticity, and function after cryoneurolysis of wrist or wrist, hand, and fingers.

**DESIGN:** In this repeated-measures pilot study (NCT04670783), adults were eligible if they had refractory spasticity in wrist or hand/fingers that demonstrated further ROM and reducible spasticity in response to diagnostic nerve block. Participants received percutaneous cryoneurolysis of the wrist or wrist/hand/finger muscles. Wrist extension ROM was measured with a goniometer and spasticity was evaluated using the Modified Ashworth Scale (MAS; range 0-4 with 1+ converted to 1.5 for numerical calculation). The House Functional Scale (range 0-8) assessed hand function and the House classification assessed thumb deformity. Upper limb function was assessed using the Disability of the Arm, Shoulder, and Hand (DASH) questionnaire (30 questions; total score range 0 ["no disability"] to 100 ["most severe disability"]). A Wilcoxon signed-rank test analyzed changes from baseline in active ROM (AROM), maximal passive ROM (V1), and MAS scores after cryoneurolysis.

**RESULTS:** Of 15 participants receiving wrist cryoneurolysis, 12 participants also received hand cryoneurolysis. At 365 days after wrist cryoneurolysis, wrist extension MAS scores (n = 7) and V1 (n = 9) were significantly improved (mean [SD] change from baseline, -1.6 [0.7], P = 0.01, and 18.9 [21.8] degrees, P = 0.03, respectively). The mean (SD) improvement from baseline in wrist extension AROM (n = 3) at Day 365 was 31.7 (5.8) degrees (P = 0.09). At 365 days after hand/finger cryoneurolysis, hand function (n = 3) (mean [SD] change in House Functional Scale score from baseline, 0.7 [1.2]; P = 0.5) scores improved and 2/4 participants had ordinal House classification improvements. The mean (SD) change from baseline in DASH score at Day 365 (n = 6) was -13.8 (14.4) (P = 0.3).

**CONCLUSION:** Percutaneous cryoneurolysis of wrist or wrist/hand/finger nerves was associated with improvements in wrist active and passive ROM, spasticity, and thumb position classification 365 days after treatment.

### Fellow Category Award Winner

#### DIGITALIZATION OF MEASURING PHYSICAL PERFORMANCE

Wolfgang Grosek, MSC, Daniel Wiznia, MD, Necolle Morgado-Vega, DO, Jessica Garza-ricce, PT, DPT, CBIS, Yeomgmi Kim, PhD, and Rummana S. Aslam, MD

**OBJECTIVES:** The Modified Physical Performance Test consists of different tasks with a point system to measure the performance of functional mobility. However, currently, this test has been conducted with observation and a stopwatch. This leads to inaccuracy, aberrance, and missing data. Our study aim was to design a method of digital scoring of physical tasks to standardize the test results.

**DESIGN:** This was a pilot observational study to compare the digitized test score of physical performance with the objective test score obtained by the treating therapist. The physical tasks measured were sub-tasks in the modified physical performance test (MPPT). The use of wireless wearable sensors enabled the measurement of physical performance. The two types of sensors used for these measurements are the Inertial Measurement Unit (IMU) and force sensors. The subjects were patients undergoing acute inpatient rehabilitation. Ten subjects undergoing musculoskeletal rehabilitation were randomly chosen. The wearable sensors were placed over clothing at various parts of the body. The sensors are designed to measure movement in different directions, angles, and timing of completing a task. Computer software was developed to evaluate the digital test score of physical task performance.

**RESULTS:** The outcome of the work showed a significant correlation between the digital test score and the evaluation of specialists in the corresponding field of

rehabilitation via the traditional MPPT score. A correlation of  $r = 0.990$  could be determined via Pearson Correlation.

**CONCLUSION:** Digitalization of physical performance and function will provide accuracy and efficiency in measuring rehabilitation progress and enhance individualized and goal-directed rehabilitation planning. We are currently further developing the sensors and software to be applicable to additional tasks of physical performance in neuromuscular rehabilitation.

### Resident Category Award Winner

#### REHABILITATION OUTCOMES OF BILATERAL LUNG TRANSPLANT PATIENTS DUE TO COVID-19

Vishal Bansal, MD, Karen Huang, MD, Taylor Moore, DO, Diana McShane, MD, Lenart Vega Leyva, MD, Rahat Hussain, MD, and Kristin Varacalli, DO

**OBJECTIVES:** Approximately 2,000 individuals receive lung transplants per year in the US. Since 2020 when COVID-19 (CV) emerged, the effects on the lungs can be devastating, necessitating bilateral lung transplants in some. Our institution has performed a number of these transplants, most of whom have then been admitted to Inpatient Rehab (IR). To review the outcomes of patients with bilateral lung transplant secondary to COVID-19 who then admitted to acute inpatient rehab. No data exists looking at the rehab outcomes of this novel rehab population.

**DESIGN:** Retrospective chart review at a Level 1 trauma center who underwent bilateral lung transplant secondary to CV. Qualitative measures: disposition to home, supplemental oxygen use. Rehabilitation outcomes: gait distance, gait GG, upper body dressing (UBD), lower body dressing (LBD), toileting and diet.

**RESULTS:** All patients were discharged home and had no oxygen requirements on discharge. Average gait distance and GG score on admission was 35 feet and 3.14 which improved to 392 feet and 4.71, respectively. In our cohort, 71.4% and 85.7% of patients had improvement in their UBD and LBD GG scores respectively. All patients demonstrated improvements in toileting/hygiene. On discharge, all but one patient progressed to a regular diet and thin liquids. Furthermore, the thirty-day readmission rate was zero. Additionally, no infections, DVTs/PEs, new wounds, neurological or cardiovascular events occurred.

**CONCLUSION:** Patients undergoing bilateral lung transplantation in the setting of COVID-19 face unique challenges and inpatient rehab helps achieve better quality of life and functional outcomes. Our data demonstrates that inpatient rehab is a key component to achieve better quality of life and functional outcomes in this transplant patient population

### Medical Student Category Award Winner

#### MUSCLE ECHOGENICITY AND PRESSURE-PAIN THRESHOLDS IN INDIVIDUALS WITH SEVERE MUSCLE STIFFNESS AFTER CEREBRAL INJURY

Kaitlin Ballenger, BA, Nikhil A. Gopal, MBBS, Azin Etemadimanes, MD, Robert W. Nickl, PhD, Paria Arfa Fatollahkhani, MD, MSC, and Preeti Raghavan, MD

**OBJECTIVES:** Muscle stiffness and pain cause severe disability in people after cerebral injury. However, the relationship between muscle stiffness, muscle fibrosis and pain are not clear. The objective of this study was to examine muscles for fibrosis and assess muscle pain in individuals with severe spastic muscle stiffness before and after treatment with human recombinant hyaluronidase injections.

**DESIGN:** Twenty-three subjects with severe muscle stiffness (stiffness rating across all muscles =  $3.8 \pm 0.12/4$ ) after cerebral injury were enrolled in a double-blind, randomized, placebo-controlled, Phase II trial of human recombinant hyaluronidase injections. The trial included evaluation at baseline, after the first injection (hyaluronidase or placebo), and at the final visit. All subjects had received both hyaluronidase and placebo in a random order by the final visit. Eight muscles on both upper limbs (pectoralis major-minor, middle deltoid, lateral biceps, medial biceps, brachioradialis, long head of triceps, lateral triceps and medial triceps) were

and lower extremities, most severe with bilateral hip flexion graded at 3/5 and inability to do sit-to-stand.

**DISCUSSION:** Autoimmune dermatomyositis is associated with six-fold higher risk of malignancy. Diagnosis is made by clinical criteria, MRI findings of muscle edema, and biopsy findings of chronic inflammation. TIF1- $\gamma$  antibodies are myositis-specific and strongly associated with dermatomyositis and malignancy. Muscle weakness progresses over months with 50% muscle destruction required to cause symptomatic weakness, and is commonly symmetric, classically involving proximal muscles such as hips and shoulders that can be visualized on T1-weighted imaging. When chronic, fatty atrophy of musculature is seen, and subcutaneous connective tissue and fascia can also be involved, causing swelling and compression of nearby nerves and vessels. When dermatomyositis is driven by underlying malignancy, immunosuppressive therapy is often insufficient, and prompt treatment of the cancer should be initiated. Physical activity including therapies should be curtailed until inflammation subsides.

**CONCLUSION:** This case illustrates a unique presentation of dermatomyositis secondary to malignancy, with associated functional deficits due to significant inflammation and edema of bilateral iliopsoas and paraspinal musculature. Clinical importance of this case stems from understanding imaging findings of inflammatory myopathies and connecting these findings to clinical symptoms.

### SEVERE LEFT SHOULDER PAIN: CASE REPORT ON COMPLEX REGIONAL PAIN SYNDROME AND THE IMPORTANCE OF EARLY DETECTION AND INTERVENTION

Eric Jones, MD

**CASE DIAGNOSIS:** Complex regional pain syndrome (CRPS)

**CASE DESCRIPTION:** 33 year-old woman with history of left thumb amputation due to workplace injury presented to the emergency department for three days of severe left shoulder pain with radiation to the left hand, unable to move arm due to pain. The pain was described as a tearing and a pressure-like sensation inside the arm. No recent trauma. Physical examination revealed left hand edema, induration, hyperpigmentation, and warmth to touch. Passive range of motion of the left upper extremity was limited by the patient being guarded with severe allodynia. Physical medicine and rehabilitation was consulted and recommended outpatient bone scan, physical and occupational therapy, pregabalin and duloxetine, and consulting pain management service for formal evaluation of CRPS and potential ketamine or stellate ganglion block. The patient was given methocarbamol, ketorolac, acetaminophen, and lidocaine patch, and discharged one day later with only mild improvement in pain, and dermatology and rheumatology follow up.

**DISCUSSION:** This patient meets the Budapest criteria for diagnosing CRPS, however she did not receive the proper aggressive management to not only improve pain, but restore function. Prior studies have shown the mean duration of CRPS symptoms prior to pain center evaluation is 30 months. Without the specific interprofessional approach to CRPS - physical and occupational therapy, pharmacotherapy, behavioral therapy, and potential procedural interventions - patients can develop significant muscle atrophy, contractures, and ultimately disability.

**CONCLUSION:** We present the case of a woman with likely CRPS based on Budapest criteria who was evaluated in the emergency department but ultimately not referred to pain medicine specialists. It remains critically important to provide CRPS awareness and education to physicians across all specialties in order for patients to receive tailored management to ultimately reduce pain-related disability and restore function.

### SIGN LANGUAGE IN COMMUNICATION IN A PATIENT WITH INFANTILE CEREBRAL PALSY

Alejandro Molina Barrera, MD

**CASE DIAGNOSIS:** Passive communicators infantile cerebral palsy

**CASE DESCRIPTION:** Patient ICP, GMFCS III, with oral language alteration, who prior to the pandemic performed physical therapy, occupational therapy and speech therapy, which were suspended during the beginning of the COVID 19. The rehabilitation process was carried out by two sign language instructors, sign language teaching strategies were carried out to the patient and family collectively, with an intensity of 2 sessions per week. lasting 90 minutes each for two months. Once a week, a 4-year-old girl without PCI who masters sign language is included in the strategy generating greater interest from the learner. We worked with a thematic field of the Basic Dictionary of the Colombian Sign Language Toys, drawings,

images and household items were used, integration and participation, allowing better acceptance.

**DISCUSSION:** Patients with ICP, depending on their level of neurological deficit, may have limitations in speech and phonation and therefore communication with third parties is altered, without having a major motor limitation. This leads to a great negative impact on the child's growth and adaptation to the environment in which they are dependent on third parties for communication. These same phonation limitations can undermine the literacy of future patients and limit family and social inclusion. With this clinical case the great impact generated by teaching the patient and his family sign language was demonstrated, with a pedagogical plan of different strategies, in which the acquisition and learning LSC, stimulating the development of linguistic competencies and teaching in an environment with family members, going from being passive to active communicator.

**CONCLUSION:** With this case report we hope to encourage more research studies with a larger sample of patients, with different educational strategies to establish better results in favor of communication for patients with cerebral palsy. Child whist ICP going from being passive to active communicator.

### SIX-YEAR FOLLOW-UP OF INTRATHECAL BACLOFEN TREATMENT IN A MIXED SPASTIC DYSTONIA CEREBRAL PALSY: CHALLENGES AND STRATEGIES

Chung Khian Yew, MD, Ai Lee Ooi, MBBS,

Sharifah Hanisah Wan Mohamad Akbar, MBBS, Norfazira Pisa'al, MBBS,

Archana Vijayan, MBBS, and Chau Chung Chai, MBBS

**CASE DIAGNOSIS:** Mixed Spastic Dystonic Cerebral Palsy (GMFCS V)

**CASE DESCRIPTION:** This case follows a 24-year-old woman with Mixed Spastic Dystonic Cerebral Palsy (GMFCS V) over six years. She received intrathecal baclofen (ITB) treatment at 18 years old to manage dystonia and spasticity, showing positive initial outcomes in positioning, quality of life, and caregiver burden. In the fourth year, her cervical and upper limb issues worsened, correlated with catheter tip movement seen in imaging. Scoliosis progressed, and the catheter migrated from the C6 to C7 level. The patient's deteriorating dystonia and spasticity align with catheter positioning concerns. Thus, the multidisciplinary team recommended several interventions including raising treatment dosage by 10%, using botulinum toxin for cervical dystonia, and reanchoring the catheter at a higher cervical level during pump replacement. Constipation was reported post-increment of ITB treatment dosage which was improved with laxatives.

**DISCUSSION:** While limited evidence suggests that ITB treatment can accelerate scoliosis progression possibly due to hypotonia worsening instability, consistent scoliosis surveillance remains important. The manifestation of worsening cervical dystonia and upper limb spasticity over time in the patient aligns with observations that these issues can be related to the migration of the ITB catheter tip and require re-anchoring of the catheter to a higher cervical level. ITB for spasticity management can lead to reduced gastrointestinal peristalsis causing constipation, however administering laxative drugs can improve this effect, enabling continued ITB treatment.

**CONCLUSION:** Despite challenges, intrathecal baclofen is essential for managing severe dystonia and spasticity, requiring a holistic multidisciplinary approach, regular follow-ups, scoliosis monitoring, and addressing potential adverse events.

### SNAPPING PES SYNDROME: AN ATYPICAL PRESENTATION OF PES ANSERINE BURSTITIS

Dominic Salvatore, BSC, and Kyle Smith, MD

**CASE DIAGNOSIS:** Snapping Pes Syndrome with Pes Anserine Bursitis

**CASE DESCRIPTION:** A 68-year-old female presented with medial right knee pain and a snapping sensation with minimal relief from prior bracing, analgesics, corticosteroid injections, and physical therapy. Physical examination revealed medial joint line and pes anserinus tenderness with visible subluxation of the medial hamstring tendons over the medial femoral condyle during knee flexion and extension. Initial knee radiographs demonstrated small tri-compartmental marginal osteophytes and chondrocalcinosis. MRI of the right knee revealed a large pes anserine bursal effusion, mild tri-compartmental degenerative disease, and posterior lateral and possible posterior medial meniscal tears. The patient underwent ultrasound-guided bursal steroid injection, which led to gradual symptomatic improvement. After several weeks of physical therapy, she underwent a repeat injection with added bursal aspiration. If symptoms do not improve, an orthopedic referral for surgical management may be considered at the next visit.