2015 AAPM&R Annual Assembly Abstracts

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Abstracts
from
AAPM&R
Annual Assembly
&
Technical Exhibition

October 1-4, 2015
Boston, MA

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natural history of neuroendocrine dysfunction after traumatic brain injury during inpatient rehabilitation

Margaret E. Wierman, MD (University of Colorado School of Medicine, Aurora, CO, United States), David L. Ripley, MD, MS, Don Gerber, PsyD, Robert Kowoltski, MD, MS, Micol S. Rothman, MD

Disclosures: M. E. Wierman, No Answer

Objective: To assess changes in hormone function in men undergoing acute rehabilitation after TBI.

Results or Clinical Course: 498 patients were screened, for a final N of 61. 38 subjects had normal T, 23 had low T levels (<260ng/dl). At baseline, LH, FSH, T, estradiol (E), SHBG prolactin, TSH, ft4, ACTH, cortisol, DHEAS and, IGF1 levels were measured. Men with low T demonstrated lower LH levels (P=.003) and a trend towards lower FSH levels than those with normal T, suggesting that hypogonadism was related to central dysfunction. TSH was also lower (P=.035) in subjects with low testosterone. Hormone levels in those with normal T remained stable. In those with low T, only 50% normalized their T levels by 4-8 wks. Other hormone deficits were infrequent and transitory.

Conclusions: After TBI, men with hypogonadism had lower gonadotropin and TSH levels suggesting central dysfunction. Testosterone levels remained low in 50% of subjects with low T at 4-8 wks. Associated neuroendocrine dysfunction was transient. These data suggest that hypogonadism detected during acute rehabilitation often does not resolve without intervention. Monitoring for hormonal deficits is appropriate. Future studies are needed to determine if T replacement modulates functional or cognitive outcomes after TBI.

Implementation of Medical Early Warning System in Rehabilitation: A Tool to Reduce Unplanned Transfers

Wesley Chay, MD (MossRehab, Elkins Park, PA, United States), Justine Sgrillo, RN, Alberto Esquenazi, MD

Disclosures: W. Chay: I Have No Relevant Financial Relationships To Disclose.

Objective: To test the hypothesis that implementing a novel early warning monitoring system in an acute inpatient rehabilitation unit will decrease the unplanned transfer out to acute care rates.

Design: Retrospective study.

Setting: Acute Inpatient SCI Rehabilitation Unit.

Participants: 458 patients admitted to an acute inpatient SCI rehabilitation unit from July 2013 through January 2015.

Interventions: A Medical Early Warning System (MEWS) Rehab monitoring system was implemented in February of 2014. Unplanned transfer out rate was monitored and compared to prior rate.

Main Outcome Measures: Unplanned transfer out rate (UTR).

Results or Clinical Course: Prior to implementation of the MEWSRehab monitoring system, UTR on the SCI rehab unit (year to date October 2013) was 19.44% (national average, 11.69%, case mix adjusted). After implementation of MEWSRehab in February of 2014, UTR trended downward. Year to date May 2014, UTR was 16.96% (national average, 13.69%, case mix adjusted). Year to date September 2014, UTR was 12.96% (national average, 14.03%, case mix adjusted). Year to date January 2015, UTR was 17.54% (national average, 14.16%, case mix adjusted).

Discussion: Medical monitoring systems have successfully been researched and implemented in the acute care hospital setting to alert clinicians to the declining medical status of patients. There has been limited implementation of such monitoring systems in the acute inpatient rehabilitation setting. As strong emphasis has been placed on quality metrics including minimizing hospital readmissions and reducing unplanned transfers, we introduced a modified medical early warning system in rehabilitation (MEWS-Rehab) based on the proven data used in some acute care facilities to predict transfer to higher intensity of care and mortality.

Conclusion: Variability of unplanned transfer out rates is noted but after implementation of MEWSRehab, there was a notable reduction of unplanned transfer out rate in the spinal cord injury inpatient unit.

Randomized Controlled Trial about Effectiveness of Personalized Treatment of Balance Disorders in Multiple Sclerosis: Integration of Visual, Proprioceptive and Vestibular Components

Guido Francavilla, Physician (Italian MS Society, Genoa, Italy), Caterina Sgarito, Physician, Giampaolo Brichetto, MD, PhD, Mario Alberto A. Battaglia, Maria Laura Lopes de Carvalho, MD

Disclosures: G. Francavilla: I Have No Relevant Financial Relationships To Disclose.
Objective: To evaluate the efficacy of a personalized rehabilitation treatment for balance disorders based on visual, proprioceptive and vestibular deficits evaluated by CDP versus a traditional rehabilitation program.

Design: Randomized, controlled study.


Participants: The study involves the recruitment of 240 MS patients with balance disorders. Patients are evaluated with computerized dynamic posturography to identify subjects with prevalent visual or proprioceptive or vestibular deficits. Patients are randomly assigned to the control group (traditional rehabilitation program [TRG]) or study groups (visual [VRG], proprioceptive [PRG] or vestibular [VSRG] rehabilitation group). Each group is composed with 60 subjects.

Interventions: Personalized rehabilitation treatments for balance disorders based on visual, proprioceptive and vestibular deficits evaluated by computerized dynamic posturography versus a traditional rehabilitation program. Each group received rehabilitation treatment for 20 sessions, 3 sessions/week, 1 hour/session.

Main Outcome Measures: Clinical and instrumental evaluations are: BBS, TUGT, Mini best test, ABC scale, MFIS, T25W, TWT 6min, SOT Composite score and Subscores (Equitest), falls diary, FES-I and VAS. All participants are evaluated at T0 (start of rehabilitation treatments), T1 (end of rehabilitation treatments), T2 (one month follow up), T3 (three month follow up) and T4 (six month follow up).

Results or Clinical Course: Preliminary results: 105 patients reached the end of rehabilitation treatments (T1) until now. 26 were assigned to VRG group, 25 to PRG group, 39 to VSRG group and 15 to TRG group. We performed multivariate analysis with RM ANOVA model. Preliminary results showed marked improvement of BBS (P<.02). VSRG group shows greater improvement in BBS than the other groups. SOT Composite Score Equitest shows greater improvement in treatment groups without even enhancement of the statistical data.

Conclusion: Personalized rehabilitation treatment for balance disorders have greater impact on both clinical outcomes (BBS) and instrumental (SOT Composite Score Equitest) compared to traditional treatment.

Rehabilitation Therapies in a Concussion Clinic Cohort: Range, Rate, Reasons and Risk Factors

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Disclosures: M. M. Vargo: I Have No Relevant Financial Relationships To Disclose.

Objective: To assess frequency and spectrum of referrals to rehabilitation disciplines in a concussion clinic population, and factors associated with need for referral.

Design: Retrospective study.

Setting: Concussion clinic within the Physical Medicine and Rehabilitation Department of an academic medical center.

Participants: Patients receiving psychiatric management for concussion care.

Interventions: Analysis of demographic and clinical variables for possible association with referral to rehabilitation disciplines. These independent variables included mechanism of injury, referral source, age, gender, provider, days since injury, presenting Sports Concussion Assessment Tool (SCAT2) symptom score, insurance type, clinical risk factors, whether the injury was work related and whether the patient had been hospitalized.

Main Outcome Measures: Referral to physical therapy (PT), Occupational therapy (OT), Speech therapy (ST), Neuropsychology (NP), or Any discipline (Any), and reasons for referral.

Results or Clinical Course: Among 262 patients meeting inclusion criteria, PT was most commonly prescribed (74 patients, 28%), followed by ST (60 patients, 23%), NP (27 patients, 10.3%), and OT (19 patients, 7.2%). In all, 121 (46%) of patients were referred to one or more disciplines. The most common reasons for referral were cognitive strategies (54 patients, 21%), balance/vestibular therapy (50 patients, 19%), and neck pain (32 patients, 12%). Per multivariate logistic regression analysis, covariates associated with PT: age, SCAT 2 symptom score, gender, provider, and cognitive/learning disorder; ST: time elapsed since injury, gender, and referral source of internal clinic; Any: SCAT2 symptom score. Referrals did not significantly vary by mechanism of injury (sports, fall, vehicular, etc.), whether work-related, or whether the patient had been hospitalized. Insurance factors were significant for PT and Any on the univariate analysis but not logistic regression.

Conclusion: Relatively little has been described about the typical rehabilitation requirements of individuals recovering from concussion. While rest and guided return to usual activities have been emphasized as mainstays of management, a large number of patients in this concussion cohort were determined to require additional rehabilitation services to assist in recovery.

Telephone Problem Solving Treatment for Active Duty Service Members with Mild Traumatic Brain Injury

Kathleen R. Bell, MD (University of Texas Southwestern, Dallas, TX, United States), Jesse Fann, MD, Jo Ann Brockway, PhD, Wesley R. Cole, PhD, Nigel Bush, PhD, Suresh Lakhotia, PhD, Tessa Hart, PhD, Ariel J. Lang, PhD, Sonia Jain, PhD, Rema Raman, PhD, Gerald Grant, MD, Gregory Gahm, PhD, Jef St. De Lore, MA, Murray Stein, MD, MPH, Nancy Temkin, PhD

Disclosures: K. R. Bell: Consulting Fees or Other Remuneration - University of Washington; Other - CDMRP

Objective: To evaluate the efficacy of problem-solving therapy delivered by telephone on persisting distress and physical symptoms in active duty service members with combat-related mild traumatic brain injury (mTBI).

Design: Randomized controlled trial.

Setting: Telephone delivery of intervention.

Participants: 356 active duty service members with clinically diagnosed combat-related mTBI enrolled within 1-24 months post-deployment.

Interventions: Random assignment to Group 1 (manualized problem-solving treatment [PST] administered in 12 biweekly telephone treatment sessions by Master’s level counselors) or Group 2 (Education only [EO]: biweekly educational material delivered to subject for review).

Main Outcome Measures: Two primary outcomes were assessed at 6 months by a blinded examiner: Brief Symptom Inventory Global Severity Index (BSI-GSI) and Rivermead Post Concussion Symptom Questionnaire (RPSQ).

Results or Clinical Course: Six month outcome assessment was completed for 304 subjects (Group 1, 138; Group 2, 166). There was a significant 6-month time-by-treatment interaction on the BSI-GSI (P=.0071) favoring Group 1. There were no differences noted in symptom frequency or severity as measured by the RPSQ (P=.1816). Sensitivity analyses to account for education and age difference groups at outcome demonstrated continued significant level of effect (P=.0132). Secondary analyses revealed PST but not EO resulted in improvements on other health-related ratings, including quality of sleep and depression, and that SMs preferred PST over EO.

Conclusion: Telephone-delivered PST, a manualized behavioral intervention, appears to be an effective treatment for reducing distress after combat-related mTBI. PST was well accepted by most
participants. Problem solving therapy could be an excellent treatment alternative or adjunct for military or veteran populations for emotional distress or mood disorder after mTBI.

Friday, October 2, 2015
4:00 PM - 5:00 PM
Meeting Room 313

BEST PEDIATRIC REHABILITATION RESEARCH POSTER PRESENTATIONS

Physical Activity and Walking Performance: Influence on Quality of Life in Ambulatory Children with Cerebral Palsy (CP)
Kilby Yarbrough, MD (University of Washington, Seattle, WA, United States), Kristie Bjornson, PhD, PT, PCS


Objective: Children with CP report lower quality of life (QOL) compared to their typically developing peers yet functional level is not consistently associated with QOL. Our objective is to describe QOL and examine the relationship of physical activity and walking performance to QOL in ambulatory children with CP.

Design: A secondary analysis of a cross-sectional cohort was employed. Individual multivariate regression models were developed for physical, psychosocial and overall domains of QOL controlling for frequency and level of participation in daily life, pain, age, satisfaction with participation, walking capacity, communication, and topography of CP.

Setting: Regional tertiary care children’s hospital.

Participants: A cohort of 128 ambulatory children with CP at Gross Motor Function Classification System Levels I=44, II= 54, and III=30; Diplegia=46, Hemiplegia=63, Other=19 and ages 2-9 years.

Interventions: Not applicable.

Main Outcome Measures: QOL was sampled through parental report of the PedsQL. Physical activity (PA) was documented by parental reports of the Activities Scale for Kids (ASKp) and walking performance through ankle worn accelerometry (StepWatch) with average # strides/day greater than 30 strides/min.

Results or Clinical Course: Overall QOL averaged 56.5(16.4) with physical and psychosocial domains 52.2 (21.4) and 60.9 (14.7), respectively. Only PA was associated with overall QOL (P<.001). PA and walking performance (P=.05) were associated with physical QOL (60% variance explained) but not psychosocial QOL (P = .10-.44, 38% variance explained). Frequency and total participation in daily life was also associated with psychosocial QOL (P = .02-.002).

Conclusion: Parental report of QOL in ambulatory children with CP appears lower than other chronic health conditions. Physical activity, walking performance, frequency and level of participation in daily life are positively associated with varying domains of QOL. Future work should explore the effect of interventions to enhance physical/walking activity and participation in daily life on QOL in this population.

Evaluation of the Mercy TAPE Height Estimation Method
John C. Luce, DO (Children’s Mercy Hospital, Kansas City, MO, United States), Susan M. Abdel-Rahman, PharmD, Ann C. Modrcin, MD

Disclosures: J. C. Luce: I Have No Relevant Financial Relationships To Disclose.

Objective: To assess whether the existing Mercy TAPE for pediatric weight estimation can be used to estimate height in the same population.

Design: Prospective multicenter observational study.

Setting: Research center, outpatient center, and inpatient ward.

Participants: A total of 19,407 NHANES datasets were used to develop the model. Independently collected data from 1,789 children residing in 3 countries were used to test the model.

Interventions: Not applicable

Main Outcome Measures: Accuracy of total body length estimation with Mercy TAPE.

Results or Clinical Course: Data on children (2 months–16 years) from the National Health and Nutrition Examination Survey (NHANES) were used to describe the relationship between humeral length (HL) and total body length (TBL), with HL segregated into 1 centimeter segments as defined on the Mercy TAPE. Data from four independently conducted international anthropometric studies served to externally validate the relationship. The Mercy TAPE predicted TBL highly correlated with actual TBL (r > 0.96). The absolute (percent) relative error observed in neurotypical children ranged from -1.7 to 1.1 cm (-1.3 - 1.0%). The method predicted TBL within 10% of the actual TBL in > 95% of children and within 20% of actual TBL in > 99% of children. Predictive performance in children with Down syndrome was slightly lower. However, the method still approached 99% of children when estimated TBL was within 20% of actual TBL.

Conclusion: The Mercy TAPE provides an accurate and uncomplicated means of estimating TBL in most children. It may be useful in the mobility-impaired population.

How Are Perceived Unmet Need for Therapy and Durable Medical Equipment Services Associated with Quality of Life Measures Among Children with Special Healthcare Needs?

Elizabeth Martin, MD, MPH, MHS (Stanford Hospital & Clinics, Redwood City, CA, United States), Lynn Huffman, MD

Disclosures: E. Martin: I Have No Relevant Financial Relationships To Disclose.

Objective: To examine perceived unmet need for DME or therapy services among children with special healthcare needs and determine if unmet needs are associated with indicators of a child’s quality of life.


Setting: Academic Medical Center.

Participants: Families of 40,242 children with special healthcare needs (CSHCN) between the ages of 0-17 years.

Interventions: Not applicable

Main Outcome Measures: Perceived unmet need for therapy (PT, OT, Speech Therapy), perceived unmet need for durable medical equipment (DME), and quality of life measures including missed school days, participation in organized activities, and ability to play with other children.

Results or Clinical Course: Age, spoken language, diagnosis and insurance characteristics were associated with unmet need for both DME and therapy services (P<.001). Among parents reporting unmet need for therapy services, 19.6% stated this was due to cost, 12.5% that therapies were not available in the area, 9.7% were unable to get an appointment, 6.7% reported lack of insurance, and 2.4% stated they did not know where to go for services. Among children with unmet need for DME, more children missed a higher number of school days (16.8% with > 10 days vs 9.9% with <5 days), more
reported substantial interference with participation in sports or organized activities (14.1% vs 5.8% with no interference), and more described substantial interference with ability to play with other children (29.7% vs 21.5% with no interference). Across all quality of life variables, higher proportions of children reporting unmet therapy needs were affected.

Conclusion: These recent national data indicate that a minority of CSHCN overall have unmet needs for DME (11%) or therapy services (23%). However, both unmet need for DME and, to a greater degree, unmet need for therapy services, were associated with decreased quality of life.

Children with Cerebral Palsy Experience Minimal Pain in the Two Days Following Botulinum Toxin Injections

Stacy M. Stibb, DO (Joe DiMaggio Children’s Hospital at Memorial, Hollywood, FL, United States), Chantel C. Barney, PhD, Supreet Deshpande, MD, Linda E. Krach, MD

Disclosures: S. M. Stibb: I Have No Relevant Financial Relationships To Disclose.

Objective: The purpose of this study was to investigate pain severity and interference with activities of daily living in the two days following botulinum toxin injections.

Design: Survey study.

Setting: Pediatric tertiary care center.

Participants: Parents/guardians of a child aged 2-18 diagnosed with spastic or mixed tone cerebral palsy undergoing botulinum toxin injections.

Interventions: Parents/guardians completed baseline pain measures in clinic prior to their child’s injections and completed follow-up measures at bedtime that night (day one) and the following night (day two).

Main Outcome Measures: Pain severity was assessed using the Dalhousie Pain Interview and the Parent Postoperative Pain Measure — short form (PPPM-SF). Pain interference was assessed using the modified Brief Pain Inventory (BPI) and the sleep disorder subscale of the Diagnostic Assessment for the Severely Handicapped.

Results or Clinical Course: Sixty-three participants completed the surveys (71% response rate). On average, children undergoing botulinum toxin injections (49% male, Mean age= 7.76 years, SD= 4.52) reported a mean pain intensity of 1.14 (scored 0-10; SD= 2.04) at baseline, 3.21 (SD= 2.67) during injections, and 1.75 (SD= 1.86) immediately following injections. Average pain intensity scores at bedtime day one (M= 1.50, SD= 1.75) and bedtime day two (M= 0.75, SD= 1.21) did not differ significantly from baseline (P > .05). PPPM-SF was sensitive to pain-related changes in behavior and scores significantly decreased from bedtime day one (scored 0-10; M= 2.05, SD 2.37) to bedtime day two (M= 0.63, SD= 1.35, P < .001). The majority (83%) of children had resumed their normal activities by bedtime day one. Pain interference (BPI) scores significantly decreased from baseline (M= 13.64, SD 23.27) to bedtime day two (M= 3.14, SD 8.67, P = .01). A small percentage of children had difficulty falling asleep (7.8%) or staying asleep (4.7%) on the night of the injections.

Conclusion: Concerns about lingering pain following botulinum toxin injections should not deter its use for the treatment of spasticity.

Long Term Functional Outcomes after Very Severe Pediatric Traumatic Brain Injury

Elana Katz, MD (Johns Hopkins University, Baltimore, MD, United States), Beth Slomine, Stacy J. Suskauer, MD


Objective: To evaluate changes in functional status at one year and beyond following very severe pediatric traumatic brain injury (TBI), as assessed by the Glasgow Outcome Scale – Extended, Pedriatics Revision (GOS-E Peds) and the King’s Outcome Scale for Childhood Head Injury (KOSCHI).

Design: Children admitted to inpatient rehabilitation with very severe TBI, defined as having a disorder of consciousness, were included. Outcome ratings were completed retrospectively based on documentation from outpatient follow-up evaluations between nine and fifteen months post injury and the patient’s most recent follow up evaluation that documented functional status.

Setting: Pediatric inpatient rehabilitation hospital and affiliated outpatient clinics.

Participants: 31 children with very severe TBI.

Interventions: Not applicable

Main Outcome Measures: GOS-E Peds, KOSCHI.

Results or Clinical Course: At one year, GOS-E Peds scores ranged from 3-7, with a median score of 6 (lower severe disability) and KOSCHI scores ranged from 2-4, with a median score of 3 (severe disability). At long term follow up, ranging from 690-4098 days (average 1,947 days) after injury, GOS-E Peds scores ranged from 3-8, with a median score of 6 and KOSCHI scores ranged from 1-4, with a median score of 3. 24% (n=7) of participants improved on one or both outcome measures between one year and the most recent follow up visit, with 4 participants improving on both measures, 2 improving on the GOS-E Peds only and 1 improving on the KOSCHI only.

Conclusion: A substantial proportion of children with profound functional impairments at admission to inpatient rehabilitation show improvement in function as measured by GOS-E Peds and the KOSCHI greater than one year after severe traumatic brain injury. Thus, for many patients, functional recovery is not complete by one year after injury.

Saturday, October 3, 2015
1:00 PM - 2:30 PM
Ballroom B, Level 3

BEST NEUROLOGICAL REHABILITATION RESEARCH PODIUM PRESENTATIONS

Testosterone Replacement in Hypogonadal Men Following Traumatic Brain Injury: Results from a Double-Blind, Placebo Controlled Pilot Study

David L. Ripley, MD, MS (RIC, Chicago, IL, United States), Margaret E. Wiernman, MD, Don Gerber, PsyD, Robert Kowolski, MD, MS, Alan H. Weintraub, MD

Disclosures: D. L. Ripley: Research Grants - AbbVie Pharmaceuticals

Objective: To determine the safety, feasibility, and efficacy of testosterone replacement therapy in men with hypogonadism following traumatic brain injury (TBI).

Design: Randomized, double-blind, placebo-controlled pilot clinical trial.

Setting: Inpatient brain injury unit in a private, not-for-profit rehabilitation hospital in the United States.

Participants: Men ages 18–65 enrolled in inpatient rehabilitation following moderate to severe TBI, within 6 months from date of injury.

Interventions: Testosterone transdermal gel and placebo, dose adjusted by independent endocrinologist not involved in project analyses.
Main Outcome Measures: Revised FIM score, the NIH Toolbox, adverse reactions.

Results or Clinical Course: 498 patients were screened of which 61 were enrolled and followed per protocol. 38% had low T levels (<260ng/dl) at screening and were randomized into placebo (n=10) or physiologic T gel therapy (n=13). No significant differences were found among the two low T and normal groups in the rate of improvement on the FIM over six weeks (intercepts t = -0.31, p=.7593, slopes t = 0.61, p = .5472). The low T treatment group demonstrated greater absolute FIM improvement than placebo or normal T groups (Normal T = 17.5, Placebo = 19.5, Treatment = 30). A similar pattern was found for grip strength. There was no difference in adverse events per patient between groups. Percentage of time with agitated and aggressive behaviors was highest in the Placebo group.

Conclusion: Although there was no difference in recovery rate, the Treatment group had greater functional improvement than the Placebo and the Normal T groups. Testosterone-supplemented patients had less frequent agitated and aggressive behavior than the Placebo group. Testosterone replacement to low normal levels was safe and well tolerated. Small sample size limited the study’s power.

Cortical Neurochemical Profile Provides Valuable Prognostic Information of Motor Recovery after Subcortical Stroke

Mihaela Carmen Cirstea, MD, PhD (University of Missouri, Columbia, MO, United States), William M. Brooks, PhD, Randolph J. Nudo, PhD

Disclosures: M. Cirstea: I Have No Relevant Financial Relationships To Disclose.

Objective: We assessed whether including non-invasive assessment of remote brain damage through proton magnetic resonance spectroscopy (1H-MRS) would improve the accuracy of prediction of motor recovery after stroke. We hypothesized that patients with less dysfunctional motor cortex would have a better chance of recovery in response to an arm-focused motor training. We also hypothesized that adding 1H-MRS measures to the conventional indices of stroke severity (i.e., lesion volume (LV), clinical impairment) would increase prediction accuracy.

Design: Prognostic study.

Setting: Academic Medical Center.

Participants: Chronic survivors (N=10, mean±SD, 58.7±6.8 years, 32.9±37.7 months post-onset) of an ischemic subcortical stroke leading to arm paresis underwent clinical (Fugl-Meyer test, FMbaseline, 35.6±18.6), 1H-MRS, and functional (fMRI) testing prior to a motor training.

Interventions: Training consisted of repetition of a reach-to-grasp task with the impaired arm for four weeks (90 repetitions/day, 3 days/week).

Main Outcome Measures: Neurochemicals reflective of neuronal integrity (N-acetylaspartate), glial function (myo-inositol), and glutamategic neurotransmission (glutamate-glutamine) were assessed in the ipsilesional motor and premotor hand representations defined functionally: during fMRI, patients executed handgrip with the impaired hand. LV was quantified. FM was also assessed after training and motor recovery was defined as change in FM scores over training (ΔFM).

Results or Clinical Course: We observed clinical improvements after training (ΔFM=3.9±2.4). Individual or composite measures of neurochemicals were correlated with ΔFM (Spearman, P=:.2001). Correlations were stronger than with FMbaseline (P=.4) or LV (P=.1). The correlations between 1H-MRS measures and ΔFM were strengthened by adding FMbaseline and/or LV to the regression model (R=0.99 vs. 0.93). These combinations also predicted ΔFM more accurately than FMbaseline and LV together (R=0.57).

Conclusion: We have shown that even in a moderate size sample the motor and premotor neurochemical profile predicts the potential to recover beyond that provided by conventional indices of stroke severity. Such a prognostic tool may help clinicians to prescribe restorative therapies with maximal efficacy, by matching treatment with patients who have a sufficient biological target.

Analysis of Registry Healthcare Utilization Data for Spinal Cord Injury Patients Over Ten Years

Simon Driver, PhD (Baylor Institute for Rehabilitation, Dallas, TX, United States), Megan Reynolds, Monica Bennett, PhD, Ann Marie Warren, PhD, Rita G. Hamilton, DO, Seema Sikka, MD, Laura Petrey, MD

Disclosures: S. Driver: I Have No Relevant Financial Relationships To Disclose.

Objective: To objectively identify the incidence, prevalence, and characteristics of healthcare utilization of patients admitted to a Level I trauma center with spinal cord injury (SCI) over a decade.

Design: Retrospective, registry.

Setting: A hospital council data registry across 75 member institutions (>140 hospitals) over 15,000 sq miles was used to track healthcare utilization among patients with SCI originally admitted to a Level I trauma center.

Participants: 649 patients admitted with newly acquired traumatic SCI from January 2003-June 2014 to a Level I trauma center. 52 patients expired during initial hospitalization for a final total of 597 patients.

Interventions: Analysis of healthcare utilization using a regional hospital registry.

Main Outcome Measures: Healthcare utilization post-SCI over a period of 11.5 years, demographics, injury-related characteristics, insurance, hospital charges, admit type, consults, and diagnosis related groups (DRGs).

Results or Clinical Course: Mean age was 45.9 years (±18.8 years); majority were male (74%), Caucasian (57%). Over half had public insurance or none (59%). Of the 597 patients, 447 (75%) had additional health care utilization accounting for 1850 visits. The median number of visits from the 447 patients was 3 (IQR: 1-6), maximum of 22. For each outpatient visit, median final charge to the hospital was $11,487; top 3 admit types were medical emergency (20%), urgent (1%), and trauma (0.3%), with 24% of visits having had a physical medicine and rehabilitation (PM&R) consultation. For inpatient visits, the median final charge to the hospital was $37,753; top 3 admit types were medical emergency (31%), urgent (15%), and trauma (1%), with 34% of visits having had a PM&R consultation. Top DRGs for inpatient encounters included rehabilitation (20%), spinal disorders and injuries (9%), sepsis and meningitis (5%), and pulmonary (4%); skin graft (2%).

Conclusion: Individuals with SCI experience healthcare utilization that may be largely preventable. These hospitalizations are not only costly to the healthcare system but to the individual with SCI. This analysis is unique in that it objectively reports healthcare utilization across different healthcare systems and is not limited to a single institution. Increasing our understanding of healthcare utilization after acute SCI is important for the development of preventive strategies.

Cardiovascular Risk Factors in Veterans with Spinal Cord Injury and Acute Myocardial Infarction

Sunil Sabharwal, MD (VA Boston HCS, West Roxbury, MA, United States)
**Objective:** Compare the prevalence of typical cardiovascular risk factors (hypertension, lipid disorders, diabetes, and smoking) in individuals with and without spinal cord injury (SCI) who develop acute myocardial infarction (AMI).

**Setting:** Veterans Administration (VA) hospital.

**Participants:** Veterans with SCI (n=191) and without SCI (n=55,958) hospitalized with AMI at any VA hospital between July 2003 and December 2010.

**Interventions:** Not applicable

**Main Outcome Measures:** Data, abstracted by trained abstractors using standard reporting forms, were obtained on all patients hospitalized with a discharge diagnosis of AMI from the VA Cardiac Care Follow-up Clinical Study (CCFCS) repository. Individuals with SCI in the CCFCS database were cross-matched with the VA Spinal Cord Disorders (SCD) registry for information about neurological level and completeness of SCI; chart review was conducted to obtain any missing information. Multiple logistic regression was used to assess the significance of select cardiovascular risk factors (hypertension, lipid disorder, diabetes, cigarette smoking, and age) on SCI status.

**Results or Clinical Course:** Individuals with SCI were less likely to have several of the conventional risk factors for cardiovascular disease than the non-SCI cohort, despite developing AMI at a younger age. This suggests possibility of a greater contributory role of non-conventional risk factors for cardiovascular disease in people with SCI.

**Conclusion:** Individuals with SCI were less likely to have an associated diagnosis of hypertension (51.8 vs. 63.3%, odds ratio 1.4; 95% confidence interval 1.1–2.0; P = .03), lipid disorder (55.9 vs. 72.1%, OR 2.0; 95% CI 1.5–2.8, P < .0001), or current smoking status (15.9 vs. 26.1%, OR 2.4; 95% CI 1.5–3.7; P = .0001). There was no significant difference between the prevalence of diabetes (29.9 vs. 34.4%, OR 1.1; 95% CI 0.8–1.7; P = .5) or history of having ever smoked (20.1 vs.22.6%, OR 1.3; 95% CI 0.9–1.9; P = .2) between the SCI and non-SCI groups.

**Disclosure:** S. Sabharwal: I Have No Relevant Financial Relationships To Disclose.
Patterns of Bone Stress Injuries in Division I Collegiate Distance Runners: A Retrospective Cohort Study

Emily Kraus, MD (Stanford Hospital and Clinics, Redwood City, CA, United States), Aurelia Nattiv, MD, Adam S. Tenforde, MD, Brian Kim, MD, Andrea Kussman, MD, Michael Fredericson, MD

Disclosures: E. Kraus: I Have No Relevant Financial Relationships To Disclose.

Objective: Bone stress injuries (BSIs) are a common overuse injury. The purpose of our study was to characterize the incidence and distribution of BSI in collegiate middle and long-distance runners at two NCAA Division I programs.

Design: Male and female middle and long-distance runners were included in a retrospective chart review over three years (2010-2013). Data were obtained from physician visits and pre-participation evaluation screening. All running-related BSI were diagnosed by a physician and confirmed with x-ray and/or magnetic resonance imaging. Overall BSI incidence rate and incidence by person-years was determined and distribution stratified by age, sex, and skeletal site using mixed effects Poisson regression models.

Setting: Stanford Hospital and Clinics, UCLA Medical Center.

Results or Clinical Course: One hundred thirty three runners were evaluated (57 females, 76 males). The overall BSI incidence rate was 20% (35% for females, 10% for males). The overall BSI incidence per person-years was 0.25. 72% of females and 63% of males were at age nineteen or younger when they sustained their first BSI. The most common location for BSI was tibia (31.3%) followed by sacrum (16.4%), metatarsal (13.4%), femoral shaft (8.9%), femoral neck, navicular, fibula (each 7.4%), and other (8%). 37.7% of females sustained a BSI at a trabecular site (femoral neck, sacrum, calcaneus, manubrium).

Conclusion: Twenty percent of collegiate distance runners sustained one or more BSI per year, with a higher incidence in females compared to males. Over half of males and females sustained BSIs at age nineteen or younger. The high percent of BSI at trabecular sites in female distance runners is concerning for inadequate nutrition and impaired bone health in this population and needs further study. These findings highlight the need for identifying risk factors for developing BSIs in collegiate runners with the ultimate goal of implementing management and prevention programs early in their collegiate training for widespread use by physicians, coaches and trainers. The authors would like to thank Sitaram Vangala, M.S., and David Elashoff, PhD for their help with the statistical analysis, and the UCLA Clinical Translational Science Institute and Research Laboratory (#UL1TR000124) for helping fund this study.

Lumbar Disc Height Change and Association with Farming Type in Korean Farmers

Sora Baek, MD, PhD (Kangwon National University Hospital, Chuncheon, Korea (the Republic of)), Hee-won Park, Eun Kyoung Kang, MD, PhD

Disclosures: S. Baek: Research Grants · Kangwon Center for Farmers’ Safety and Health from Korean Ministry of Agriculture, Food and Rural Affairs

Objective: To estimate the prevalence of lumbar disc height change (LDC) and association with farming type in Korean farmers.

Design: Cross-sectional study.

Setting: Field survey in rural area.

Participants: 987 farmers who owned or rented a farm and belonged to agricultural cooperative unit were recruited, and secondarily verified by the local representatives in the National Agricultural Cooperative Federation.

Interventions: Not applicable

Main Outcome Measures: LDC was assessed by a single radiologist based on disc height change of L4-5 or L5-S1 in x-ray. The 1-year self-reported prevalence of back pain that had lasted longer than 1 week or had been more frequent than once a month, and the severity of back pain was assessed as mild, moderate, severe, and very severe. Farming type was classified as paddy field farming, field farming, greenhouse farming, and orchard farming. Agricultural work burden like fatigue, body pain, or absurd posture was assessed.

Results or Clinical Course: The prevalence of LDC was 37.3% in men and 53.2% in women (P<.001). Relative risk of LDC was significantly higher in age 60 years or more (OR 1.46, 95% CI: 1.01, 2.11) compared to age less than 50 years, but not in age 50 to 59 years (OR 1.07, 95% CI: 0.75, 1.54). After adjustment for age and sex, greenhouse farming and orchard farming were more related with LDC compared to paddy field farming (OR 2.00, 95% CI: 1.33, 3.03; OR 2.31, 95% CI: 1.42, 3.78); moderate or more severe back pain were more related with LDC compared to no or mild back pain (OR 1.51, 95% CI: 1.16, 1.97). Farmers with LDC showed more fatigue, multiple body pain, and absurd posture during or after agricultural work.

Conclusion: Lumbar disc height change (LDC) in Korean farmers was significantly related with age, sex, farming type, moderate or more severe back pain, and suffered more agricultural work burden.

The Influence of Continuous Versus Interval Walking Exercise on Joint Loading and Serum Biomarker Profile in Patients with Knee Osteoarthritis

Prakash Jayabalan, MD, PhD (University of Pittsburgh Medical Center, Pittsburgh, PA, United States), Jonathon Gustafson, BS, Wan Huang, PhD, Sara Piva, PT, PhD, Gwendolyn A. Sowa, MD, PhD, Shawn Farrokhi, PT, PhD

Disclosures: P. Jayabalan: I Have No Relevant Financial Relationships To Disclose.

Objective: In subjects with knee osteoarthritis (OA), determine the influence of increasing walking volume as a single continuous session versus multiple intermittent shorter sessions on: 1) knee joint biomechanics as assessed by knee contact force (KCF) and 2) serum concentration of biomarkers that have been associated with cartilage turnover (cartilage oligomeric matrix protein, COMP), inflammation (TNF-α) and pain (neuropeptide-Y, NPY).

Design: Repeated-measures, cross-sectional study.

Setting: Laboratory study.

Participants: 27 subjects with knee OA, greater than 60 years of age and Kellgren-Lawrence radiographic scoring criteria of OA ≥2.

Interventions: All subjects completed two walking exercise sessions separated by at least 72 hours: 1) a single session of 45 minutes of continuous walking, and 2) three separate 15-minute bouts of walking with a 1-hour rest period between each bout, for a total of 45 minutes of walking exercise.

Main Outcome Measures: Biomechanical data consisting of passive marker trajectories and ground reaction force data along with 5-mL blood samples were collected at baseline and every 15 minutes of walking exercise. Gait simulations using OpenSimTM were used to estimate the first and second peaks in the KCF while walking on a treadmill at a speed of 1.3m/s. Serum concentration of COMP, TNF-α and NPY were quantified using ELISA.

Results or Clinical Course: Both regimens were associated with a significant increase in KCF equivalent to 25% of body weight after 30 minutes of cumulative walking (P<.004). A significant
condition × walking time interaction (P = .02) was observed for the changes in COMP concentration. Continuous walking was associated with a significant cumulative increase in COMP concentration from baseline to 45 minutes (23% increase, P < .05), whereas, COMP concentrations dropped to baseline levels after 30 minutes of intermittent walking with rest breaks. There were no significant associations noted in TNF-α and HPY concentrations.

Conclusion: This study suggests that an increase in walking exercise of greater than 30 minutes may lead to undesirable joint loading conditions, while the addition of rest breaks may attenuate the potential negative effects of longer bouts of walking exercise on cartilage health.

Sunday, October 4, 2015
7:30 AM - 9:00 AM
Meeting Room 302-306, Level 3

BEST PAIN AND SPINE MEDICINE RESEARCH PODIUM PRESENTATIONS

Subsequent Healthcare Utilization Associated with Early Physical Therapy for New Episodes of Low Back Pain in Older Adults

Deven Karvelas, MD (University of Washington, Seattle, WA, United States), Sean Rundell, PT, DPT, PhD, Janna Friedly, MD, Laurie Gold, PhD, Patrick Haggerty, PhD, Brian Comstock, MS, David Nerenz, PhD, Jeffrey Jarvik, MD, MPH

Disclosures: D. Karvelas: I Have No Relevant Financial Relationships To Disclose.
Objective: To estimate the association between initiating early physical therapy (PT) following a new visit for back pain and subsequent back pain specific health care utilization after adjusting for disease severity, symptom duration and a number of sociodemographic factors.
Design: Prospective cohort study.
Setting: 3 integrated health care systems in the United States. Data were collected through the Back Pain Outcomes using Longitudinal Data (BOLD) registry, for which protocols have been previously published.
Participants: 4,723 adults, aged 65 and older presenting to a primary care physician with a new episode of low back pain.
Interventions: Using appropriate, adjusted generalized linear models, we compared patients that had early PT (within 28 days of the index visit) to those not initiating early PT.
Main Outcome Measures: Primary outcome: Total back pain specific relative value units (RVU) over months 2-12. Secondary outcomes: Total RVUs and use of specific health care services including: imaging, emergency department visits, physician visits, physical therapy units, spinal injections, spinal surgeries and opioid use.
Results or Clinical Course: Adjusted analysis found no statistically significant difference in total spine RVUs between the two groups (ratio of means 1.19, 95% CI 0.72 to 1.96, P = .49). The early PT group had greater PT RVUs, (ratio of means 2.56, 95% CI 2.17-3.03, P < .001) and greater imaging RVUs (ratio of means 1.37, 95% CI, 1.09-1.71, P = .01). There were no other statistically significant differences in secondary outcomes between groups.
Conclusion: In older adults presenting for a new episode of care for low back pain, initiating early PT was not associated with increased subsequent spine-related healthcare utilization over months 2-12.

Negative Impact of Modic I Degenerative Disc Disease on Lumbar Paraspinal Muscles

Emel E. Ozcan Eksi, MD, Japjot Bal, Student, Julio Carballido-Gamio, PhD, Roland Krug, PhD, Sigurd Berven, MD, Bobby Tay, MD, Jeffrey Lotz, PhD, Sibel Demir-Deviren, MD (University of California San Francisco, San Francisco, CA, United States)

Disclosures: S. Demir-Deviren: I Have No Relevant Financial Relationships To Disclose.
Objective: Atrophy and fatty infiltration of the paraspinal muscles are consistently observed in patients with low back pain, which correlate with disability. Increased TNF-α expression in paraspinal muscles, after disc injury, has been recently shown in an animal study as a biological mechanism for muscle metaplasia in degenerative disc disease (DDD). In this study, we aimed to determine the effect of Modic I DDD on lumbar paraspinal muscles (multifidus, erector spinae and psoas).
Design: Retrospective study on prospectively collected data.
Setting: University-based Spine Center.
Participants: Nine patients (mean age: 48.50±12.48 years) with Modic I DDD who had baseline and follow-up lumbar spine MRIs. Exclusion criteria were: BMI > 40 kg/m², DM, spondylolisthesis, scoliosis, compression fracture, metastatic cancer, neuromuscular disorders, and previous spine surgery.
Main Outcome Measures: Volumes of paraspinal muscles (multifidus, erector spinae, psoas) were measured based on manually defined contours using IPP36, and fatty infiltration of paraspinal muscles was evaluated using highly reproducible Goutallier and Quartile classifications (ICC:0.893-0.918) on T1-weighted axial images on baseline and follow-up lumbar spine MRIs. Then the changes in volume of the paraspinal muscles were calculated.
Results or Clinical Course: Fatty infiltration in multifidus and psoas muscles at the level of Modic I DDD significantly increased (P < .040). Psoas and multifidus total volume from L1 to sacrum significantly decreased on follow-up MRIs (P < .023). The average time between MRIs was 523.50±248.42 days.
Conclusion: This study provides evidence of fatty infiltrative changes in paraspinal muscles in patients with Modic I DDD, which compromise muscle endurance and contractility. These data support the hypothesis that in addition to the painful disc, patients with Modic I DDD might also develop atrophy and fatty infiltration of the paraspinal muscles that could cause poor physical performance and disability. We recommend early exercise programs including paraspinal muscles in patients with Modic I DDD.

Factors that Might Affect Pain Perception: A Study on the Role of Age, Gender and Depression on Pain Perception

Natasha Anand, BA, MS (Proove Biosciences, Irvine, CA, United States), Meshkin Brian, BA, Tobore Onojighofia, MD, MPH, Bilikis Akindele, MD, John Hubbard, PT, Daniel Schwarz, MD

Disclosures: N. Anand: Employment - Proove Biosciences
Objective: The objective of this study is to determine if any associations exist between age, gender, and depression with pain perception.
Design: Cross-sectional study.
Setting: Over 50 clinics located in 19 states.
Participants: 2159 patients completed the Pain Numeric Rating Scale (NRS). From this population, a sample of 1248 subjects was randomly selected to assess the association of age with the NRS. Age was split into three categories, 18 to 39 (n=403), 40 to 59 (n=438), and 60 and...
Triamcinolone vs. Hyaluronate Injections for Lumbar Facet Arthropathy: A Pragmatic, Double Blind Randomized Controlled Trial

Thiru M. Annaswamy, MD, MA (Dallas VA Medical Center, UT Southwestern Medical Center, Dallas, TX, United States), Samuel M. Bierner, MD, MRM, Ravid Avraham, MD, Corey Armstead, Luke Carlson, MD

Disclosures: T. M. Annaswamy: I Have No Relevant Financial Relationships To Disclose.

Objective: To compare the effectiveness of sodium hyaluronate (HA) injections to triamcinolone injections in improving pain and function in patients with lumbar zygapophyseal joint (ZJT) arthropathy.

Design: Prospective double-blind randomized controlled trial comparing effectiveness of intra-articular ZJT injections of HA with steroid for pain relief, functional improvement, patient satisfaction and safety.

Setting: Veteran Affairs Spine clinic.

Participants: Patients with symptomatic lumbar ZJT arthritis with axial CLBP, without radiculopathy. Study criteria based on clinical definition of facetogenic back pain consistent with Helbig and Lee's study (1988).

Interventions: After randomization, bilateral L3-L4, L4-L5 and L5-S1 ZJTs were fluoroscopically injected by an independent, masked interventional radiologist. Each joint received either 1ml of triamcinolone (10mg/ml Kenalog) or 1ml of Synvisc-One® (8mg of Hylan GF-20 per vial).

Main Outcome Measures: Follow up at 1, 3, and 6 months. Primary Outcomes: Pain (Visual Analog Scale [VAS]) and functional status (Pain Disability Questionnaire [PDQ]). Secondary Outcome: Overall percent improvement at 6 months.

Results or Clinical Course: 30 subjects. Pain (Kenalog/Synvisc-One®)-Baseline: 70±15/74±10; 1-month: 58±29/45±25; 3-month: 58±29/56±25; 6-month: 59±28/63±24. PDQ (Kenalog/Synvisc-One®)-Baseline: 100±23/102±28; 1-month: 77±30/74±34; 3-month: 87±26/74±36; 6-month: 96±25/79±25. Patient Satisfaction: 6-months-Kenolog/Synvisc-One®: 51±35/42±33 Inter-group comparisons: No significant differences noted. Within group comparisons: For pain, Synvisc group showed significant difference at 1m (69.60±19.68 to 45.15±25.23). For PDQ, Kenalog group showed significant difference at 1m (100.2±22.93 to 77.42±29.89) and Synvisc group showed significant differences at all time points (101.93±27.83 to 74.08±33.90 to 74±35.58 to 79 (Median: 52-99.5)).

Conclusion: Triamcinolone and hyaluronate injections into ZJTs provide similar pain and functional benefits in patients with symptomatic lumbar zygapophyseal joint arthropathy causing chronic low back pain. Hyaluronate injections provided statistically significant short- and long-term functional benefits and short-term pain improvement but triamcinolone injections only provided statistically significant short-term functional benefit and no significant short- or long-term pain improvement compared to baseline levels.

The Prevalence and Degree of Asymptomatic Cervical and Lumbar Facet Joint Arthritis: Retrospective Study

Mohammed Emam, MD (Montefiore Medical Center, Bronx, NY, United States), Ferdinand Chan, MD, Soo Yeon Kim, MD, Alok Sharan, MD

Disclosures: M. Emam: I Have No Relevant Financial Relationships To Disclose.

Objective: To determine the prevalence and degree of asymptomatic cervical and lumbar facet joint arthritis.

Design: Retrospective study.

Setting: Tertiary care center.

Participants: Retrospective sampling of computed tomography (CT) scans of 500 cervical facet joints in 50 patients and 500 lumbar facet joints from another 50 patients were reviewed. Electronic medical records were reviewed to exclude patients with a reported history of either neck or back pain.

Interventions: Retrospective sampling of CT scans of 500 cervical facet joints in 50 patients and 500 lumbar facet joints from another 50 patients were reviewed. Neck and abdominal CT scans were reviewed from patients who underwent examination for non-spinal pathology (i.e. thyroid disease, rule out cancer, ascites).

Main Outcome Measures: Using a previously published four-point CT scale, the severity of arthritis was graded.

Results or Clinical Course: Among the cervical facet joints the prevalence of arthritic changes include: Grade 0 – No Arthritis (67%), Grade 1 (19%), Grade 2 (11%), and Grade 3 (3%). The prevalence of asymptomatic cervical facet arthritis (Grade 1-3) was 33%. Among the lumbar facet joints the prevalence of arthritic changes include: Grade 0 – No Arthritis (63%), 1 (24%), 2 (9%), and 3 (4%) were found. The prevalence of asymptomatic lumbar facet arthritis was 37%. There was a statistically significant difference (Chi-square test, P<0.0001) in the number of older individuals demonstrating arthritic degeneration compared to younger individuals at all cervical and lumbar levels. Across all ages, the C6–C7 and the L5-S1 levels were the most likely to show arthritic changes.

Conclusion: Arthritic changes in the cervical and lumbar facet joints are highly prevalent among patients and often does not contribute to any symptoms. It is typically more common with increasing age and lower spinal levels.
To analyze if and how arm movement manipulations affect medicine, Tell-Aviv University, Israel. In part by a research grant of the Rozin Foundation. (Sackler faculty of Medicine, Tel-Aviv University, Israel.), Gabi Zeilig, MD, Ayala Bloch, PhD, Tamar Azrad, Moshe D. Bondi (The Sheba Medical Center at Tel Hashomer, Israel, Walking Coordination of Gait During Self-Paced Treadmill Arm Movement Manipulations Affect Bilateral
Exhibit Hall B, Plaza Level
12:00 PM - 1:00 PM
Friday, October 2, 2015
Design:
Observational.
Setting:
Self-paced treadmill.
Interventions: Participants performed walking trials on a self-paced treadmill. In each trial unilateral or bilateral arm swinging manipulations were performed by applying external verbal cues or forces (e.g., weights on one/both wrists).
Main Outcome Measures: 1. Phase Coordination Index (PCI) quantifies the consistency and accuracy of the anti-phase stepping pattern and assesses the bilateral coordination of gait (BCG). Higher PCI values represent worse coordination. 2. Gait asymmetry (GA) is quantified by the changes in gait characteristics and the consistency of the anti-phase stepping pattern and symmetry during self-paced treadmill walking.
Conclusion: The results of this study confirm that arm swinging amplitude of the contralateral arm.

Results or Clinical Course: Most arm swinging manipulations resulted in a decrease of BCG but didn’t influence GA. Walking with exaggerated both arms swinging resulted in higher PCI values (4.46 ± 1.35 % vs. 3.47 ± 0.96 % at baseline, P<0.01). There was a gender difference in baseline PCI values (Male PCI = 3.86 ± 1.18%, Female PCI = 3.08 ± 0.62%, P=0.05) and in a similar trend, male’s PCI were aggravated to a greater extent than female’s PCI in response to arm swinging manipulations. Regardless the side of motor dominancy unilateral manipulation of arm swinging affected significantly (P<.05) the swing amplitude of the contralateral arm.

Conclusion: The results of this study confirm that arm swinging influences the motor coordination between the lower limbs during walking. Incorporating personalized upper limb movement interventions may contribute to improve gait performance in asymptomatically neurological impaired population during gait rehabilitation.

Poster 2
The Effect of Repetitive Transcranial Magnetic Stimulation on Patients with Dysarthria in Subacute Stroke
Yonggyu Kwon, Resident 3rd grade (Asan Medical Center, Seoul, Korea (the Republic of))
Objective: Several studies have reported that repetitive transcranial magnetic simulation (rTMS) can improve motor function in stroke patients. However, little is known about the effect on dysarthria following stroke. The aim of this study was to evaluate whether rTMS can improve dysarthria of stroke patients in subacute stage.

Design: Randomized double blind sham controlled study.
Setting: Prospective study.
Participants: Inclusion criteria: MCA infarction, First time stroke, Duration after onset: from 1 week to 2 months, K-MMSE (Korean-Mini Mental Status Examination ) ≥ 20. Exclusion criteria: aphasia, Multiple or bilateral stroke, Vocal cord palsy, History of epilepsy, Metal material in brain.
Interventions: rTMS group - 10 sessions of low frequency (1Hz) rTMS (total 1500 shots) 90% amplitude of evoked motor threshold on brain area where motor potential of orbicularis oris of non-affected side is evoked - 10 sessions of conventional speech therapy. Sham stimulation group - 10 sessions of random frequency rTMS (total 1500 shots) random amplitude on random site - 10 sessions of conventional speech therapy.
Main Outcome Measures: Before and after the treatment session 1) Uralm Test of Articulation and Phonology (U-TAP) 2) Alternative Motion Rates (AMR) /Pa/, /Ta/, /Ka/ for 5 seconds 3) Sequential Motion Rates (SMR)/Pa,Ta,Ka/ for 5 seconds 4) Maximal phonation time (MPT).
Results or Clinical Course: Overall 17 patients were enrolled in this study, but 2 patients were dropped out due to sudden discharge. The other 15 patients completed 2-week therapy. The baseline characteristics of rTMS and sham groups were not significantly different. After 2 weeks of therapy, rTMS group and sham stimulation group showed improvement in many parameters. And rTMS group showed more improvement in U-TAP and showed a tendency of improvement in SMR-PaTaKa vs sham stimulation group. In patients in the sham and speech therapy group, there were not significant improvement in any parameters after treatment.
Conclusion: Dysarthria improved in rTMS group patients after treatment more than sham group patients in our study. So we might suggest that rTMS has additional effect to the speech therapy in the treatment of dysarthria after stroke. However due to small numbers of the patients, only one parameter improved significantly. To know the exact effect of rTMS in dysarthria, larger size study is warranted.

Poster 3
Buried Bumper Syndrome: A Case Report
Ryan Kruse (Mayo Clinic Rochester, Rochester, MN, United States), Billie A. Schultz, MD
Case Description: An 18-year-old man with no pertinent medical history was admitted to an acute inpatient rehabilitation unit following a motor vehicle collision which resulted in multiple fractures and a severe traumatic brain injury. Due to dysphagia and variable level of alertness, a PEG tube was placed which the patient tolerated for more than a month. However while on the rehabilitation unit, he noted progressively worsening pain just lateral to his PEG site. There was no history of traction on the PEG tube.
Setting: Tertiary care rehabilitation hospital.
Results or Clinical Course: The pain continued to worsen and the patient subsequently underwent CT of the abdomen which showed that the internal portion of the PEG was embedded in the anterior abdominal wall. Surgery was consulted and the patient underwent urgent PEG removal. After removal, the patient had immediate relief of his pain and did not have any further issues.
Discussion: Percutaneous endoscopic gastrostomy tubes have been used for decades to provide nutrition to patients that are unable to tolerate oral nutrition. The complication rate can be high, reportedly from 16-78% of cases. While the majority of complications are minor, major complications do occur. Buried bumper syndrome occurs in approximately 0.3-2% of patients and is a potentially fatal complication. The internal bumper of the PEG causes ischemic necrosis and can erode through the stomach mucosa to become embedded in the abdominal wall. This typically occurs when the PEG is secured too tightly against the stomach wall, however the definite
etiology varies. Once diagnosed, the PEG tube should be urgently removed as necrotizing fasciitis, peritonitis and sepsis can rapidly occur.

**Conclusion:** Many patients are admitted to the rehabilitation unit after having undergone PEG tube placement. As a result, physiatrists should be aware of possible PEG complications. Although uncommon, buried bumper syndrome is a potentially fatal complication and physiatrists should have a high suspicion for this in any patient with abdominal pain after PEG placement.

**Poster 4**

**Methotrexate CNS Toxicity Improved with Dextromethorphan: Case Series**

Joseph Rabi, MD (University of Chicago/Schwab Rehab, Chicago, IL, United States), Lauren Kremm, DO

**Disclosures:** J. Rabi: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** 24-year-old man with leukemia undergoing consolidation therapy which consisted of intrathecal MTX presented with disorientation, slurry speech and weakness. MRI displayed diffusion restriction throughout cerebral white matter. DXM was given at 15mg QID for 28 days. At his initial consult he was mod to max assist with ADLs and mobility, and with completion of acute rehab he was mod I with ADLs, mobility, and cognition. 21-year-old man with T cell lymphoma undergoing consolidation therapy which consisted of intrathecal MTX presented with facial droop, hallucinations, and weakness. MRI displayed diffusion restriction in frontal white matter. DXM was given at 15mg QID for 28 days. His hospital course was complicated by agitation, dysautonomia, and seizures. At his initial consult he was max assist with ADLs and mobility. By completion of acute rehab he was mod I with ADLs and mobility and supervision with cognition.

**Program Description:** Methotrexate Induced Leukoencephalopathy (MIL) is a complication that can occur in patients receiving intrathecal, -ventricular, or -venous MTX. Risks of MIL include elderly, CNS malignancy, cranial radiation and intra-thecal or -ventricular MTX administration. The incidence is not known. MIL typically occurs days to months after administration. We report 2 cases at our rehab hospital that both presented at mod to max assist for mobility and cognition and discharged at supervision level after dextromethorphan (DXM) administration and acute rehab.

**Setting:** Inpatient Rehabilitation Hospital.

**Results or Clinical Course:** Both patients improved functionally with DXM and acute rehab.

**Discussion:** MTX can cause CNS toxicity after MTX administration. MTX disrupts the conversion of homocysteine (HC) to methionine causing a buildup of HC which is toxic to vascular endothelium and causes neurodegeneration. HC is an excitatory agonist of NMDA receptors. DXM is an NMDA antagonist that can counteract the role of HC. Both patients improved with DXM administration. In case 1, patient’s cognition, strength and speech improved to an independent level after DXM and acute rehab. In case 2, patient’s cognition, strength, and gait improved to an independent level after DXM and acute rehab.

**Conclusion:** Future studies are needed to determine efficacy of DXM in MIL. DXM appears to be a promising therapy for patients with MIL and possibly non-TBI.

**Poster 5**

**Recovery of an Injured Corticoreticular Pathway in a Patient with Pontine Hemorrhage: A Case Report**

Hanseon Kim (Asan Medical Center, Seoul, Korea (the Republic of)), In young Sung, PhD, MD

**Disclosures:** H. Kim: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 53-year-old man underwent conservative treatment for management of spontaneous hemorrhage in the bilateral pontine tegmentum. Two weeks after onset, when he started rehabilitation, he showed mild quadriplegia with more severe proximal weakness and was not able to stand or walk independently. After four week’s rehabilitation, he had regained his ability to walk independently and showed good recovery of motor weakness.

**Setting:** Tertiary care hospital

**Results or Clinical Course:** On two-week DTT, discontinuation of the right CRP was observed at the midbrain level (fiber number: 340), and the left CRP was not reconstructed. On six-week DTT, the right CRP was extended to the right premotor cortex, and had become thicker (fiber number: 1076). In addition, transcallosal fibers originating from the right CRP descended below the corpus callosum in the left hemisphere. The left CRP ended at the midbrain level, although it was reconstructed on six-week DTT.

**Discussion:** Although one study reported on recovery of an injured CRP in the affected hemisphere in a patient with a putaminal hemorrhage, this is the first study to demonstrate that patients with brain injury can regain walking ability with recovery of the injured CRPs.

**Conclusion:** A patient with bilateral pontine hemorrhage who exhibited gait recovery by recovery of the injured CRPs. We believe that this is a mechanism for recovery of gait function in patients with bilateral pontine hemorrhage.

**Poster 6**

**An Oxytocin Gene Polymorphism Affects Social Outcome after Traumatic Brain Injury**

Heather M. Ma, MD, MS (Rehabilitation Institute of Chicago, Chicago, IL, United States), Jordan Grafman, PhD, Aileen Chau, MA

**Disclosures:** H. M. Ma: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To assess the effects of patient oxytocin gene polymorphisms on caregiver burden.

**Design:** A prospective study of combat veterans with penetrating traumatic brain injury (pTBI) enrolled in Phases 2 and 3 of the Vietnam Head Injury Study (VHIS).

**Setting:** Outpatient evaluation of American combat veterans with pTBI injured between 1967-1970. Questionnaires, including the Katz Adjustment Scale (KAS), were mailed to the patients’ primary caregivers in 1985-1986. Blood samples were collected during Phase 3 (2003-2006).

**Participants:** 131 combat veterans with pTBI and their caregivers (completed the KAS in 1985-1986).

**Interventions:** Not applicable

**Main Outcome Measures:** KAS subscales: R1 measures psychiatric symptoms; R2 indicates how frequently subjects participate in 16 socially expected activities; R3 measures caregiver expectations of subject participation in R2 activities; R4 measures the frequency of subjects’ involvement in 23 leisure activities; R5 measures caregiver satisfaction with subject participation in R4 activities. Oxytocin single nucleotide polymorphisms tested in combat veterans with pTBI included rs7632287, rs53576, and rs2254298 (A to G), as well as rs1042778 (G to T).

**Results or Clinical Course:** There was a significant difference in R2 between oxytocin rs7632287 AG (mean 34) and G (mean 38, P= .011). Subjects with G (a polymorphism that is known to be associated with pair-bonding relationships) compared to the AG polymorphism participated significantly more in household activities. There was also a significant difference in R4 between oxytocin rs2254298 AG (mean 38) and G (mean 43, P=.024). Subjects with the G polymorphism (associated with emotion and amygdala size) participated more in leisure activities. Having the A allele at either location did not significantly affect caregiver ratings on R2 or R4. None of the other KAS subscales were significantly affected by oxytocin gene expression.
Conclusion: Genetic endowment can affect social integration after brain injury and should be considered as part of an individually tailored approach to rehabilitation intervention.

Poster 7
Plasmodium Falciparum Malaria and Stroke: A Case Report
Hongmei Wang, MD (Albert Einstein College of Medicine/Montefiore Medical Center, Bronx, NY, United States), Mary Apliai, MD, Jay M. Shah, MD, Stephen Erosa, DO, Michelle Stern

Case Description: A 71-year-old man, recent immigrant from Ghana, was admitted to acute inpatient rehabilitation for left middle cerebral artery infarct developed in Ghana and was found to have deep venous thrombosis (DVT). Comprehensive rehabilitation focusing on right hemiplegia and aphasia was interrupted by spiked fever with leukopenia not responding to empiric broad spectrum antibiotics. Parasitemia with Plasmodium falciparum (0.06%) was found on blood smear. On further questioning, patient recalled a history of malaria while in Ghana. He completed a 7-day course of quinine and doxycycline. Hypoglycemia secondary to quinine-induced hyperinsulinemia was managed with intravenous glucose.

Setting: Acute inpatient rehabilitation unit at a university hospital.

Results or Clinical Course: Patient remained afebrile with negative blood parasites and achieved improvement in mobility and active daily activities with intensive rehabilitation.

Discussion: Malaria is a parasitic disease with high prevalence in several regions of the world. Cerebral malaria is the most severe complication of Plasmodium falciparum malaria and presents with various neurological manifestations including cerebral venous thrombosis and cerebral arterial occlusion. Postulated pathogenesis favors hypercoagulable state and mechanical plugging of cerebral venules by clumped, parasitized red cells. Malaria is known to cause activation of the coagulation cascade resulting in pulmonary embolism, peripheral gangrene and intracranial venous thrombosis. In our case, with the absence of risk factors of hypertension, diabetes mellitus, smoking, dyslipidemia and previous stroke, the possibility of this stroke being a chance occurrence with Plasmodium falciparum malaria is highly likely. The concomitance DVT can also be explained as a hypercoagulation complication of malaria. Physiatrist should be aware of the possible cause of stroke by malaria for patient with high risk so that proper treatment can be initiated in a timely manner.

Conclusion: Although rare, cerebral malaria should be considered as a differential diagnosis for stroke patients from hyperendemic area. Prompt diagnosis and anti-malarial therapy are critical to prevent further complications.

Poster 8
First-Ever Reported Case of Anterior Spinal Artery Syndrome Caused by Penetrating Atherosclerotic Aortic Ulcers
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Disclosures: C. J. Yee: I Have No Relevant Financial Relationships To Disclose.

Case Description: An independent 78-year-old black woman with PMHx of HTN, DM2, HLD presented to an acute hospital with sudden and rapid progression of bilateral lower extremity pain, weakness, and chest pain.

Program Description: Patient had hypertensive emergency and paraplegia. She was transferred for MRI and intensive care for malignant hypertension. She was incontinent of urine and without rectal tone. CTA Chest/Abdomen/Pelvis demonstrated tortuous aorta with ulcerations and thoracic aorta pseudoaneurysm. Cardiothoracic surgery and Neurosurgery deemed no acute surgical intervention in the absence of structural neural compression on MRI. Vascular Surgery consult for paraplegia due to cord infarction deemed no surgical intervention for penetrating distal thoracic aortic ulcers (AU); recommended aggressive BP control and outpatient surveillance. Neurology evaluation with CT head, vasculitis, and infectious work ups were negative; lumbar puncture was negative. Neurological physical examination of the lower extremities demonstrated intact proprioception and vibration, impaired pinprick and hot-cold, and flaccid paralysis with trace movement of right toes.

Setting: Inpatient acute hospital; Inpatient acute rehabilitation hospital.

Results or Clinical Course: Examination was consistent with anterior spinal artery (ASA) syndrome with impairments of corticospinal and spinothalamic tracts with preserved dorsal columns. The most likely etiology was her multiple AUs. She completed acute inpatient rehabilitation, improving to wheelchair level mobility, transfers, and self-care. She was discharged home with family.

Discussion: This is the first documented case of AU causing ASA syndrome. Vessels to the spinal cord (SC) originate from the aorta, branch to the artery of Adamkiewicz, and supply the lower two-thirds of the SC via the ASA, a crucial vessel of the SC grey matter. The most common causes of ASA syndromes include aortic clamping in surgery, dissection, hypotension, and arteriovenous malformation. Penetrating atherosclerotic ulcers are most commonly seen in elderly, atherosclerotic, hypertensive patients in the descending thoracic aorta. AUs must be followed closely.

Conclusion: The prognosis of AUs may be more serious than aortic dissection. As ASA Syndrome is an uncommon complication of AUs and can cause profound disability, further research is warranted.

Poster 9
Differences between Objective and Subjective Improvement in Facial Paralysis
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Disclosures: S. Moraleda: I Have No Relevant Financial Relationships To Disclose.

Objective: Our objectives were to evaluate if patients were able to assess subjectively the improvement after Botulinum Toxin A (BTA) injection, and if their sensation were related to both initial severity of the Facial Paralysis (FP) and the length of therapeutic effect.

Design: Descriptive, retrospective study.

Setting: University Tertiary Care Hospital.

Participants: 179 patients with FP treated by BTA.

Interventions: We held a telephone interview in order to quantify the degree of improvement and the length of therapeutic effect of BTA.

Main Outcome Measures: All patients were evaluated before and after BTA injection by the Sunnybrook Facial Grading System (SFGS) scale. To evaluate the treatment global efficacy we used the Wilcoxon test. The relationship between objective and subjective improvement, and between initial severity of FP and length of therapeutic effect were evaluated by the Kruskal-Wallis test.

Results or Clinical Course: We found statistically significant improvement after the BTA treatment (P<.00) using the SFGS scale. Subjectively, from the 131 patients included (48 were excluded for different reasons), 89 improved significantly, 40 improved slightly, and 2 did not improve at all. There was no statistically significant relationship between objective and subjective improvement. We did not find any statistically significant relationship either between the subjective impression of shorter therapeutic effect of BTA injection and a previous worse SFGS score.
Conclusion: 1) Facial paralysis patients improve both subjectively and objectively after the botulinum toxin A treatment. 2) The subjective perception of improvement is not related to the initial severity of the facial paralysis. 3) The subjective perception of length of therapeutic effect is not related to the initial severity of the facial paralysis. 4) It would be advisable to add psychological impact and quality of life specific scales to the evaluation.

Poster 10
Progressive Myelopathy Mimicking Subacute Combined Degeneration After Intrathecal Methotrexate and Cytarabine
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Objective: To describe a rare cause of myelopathy and discuss strategies for prevention and early recognition.

Case Description: We present a 55-year-old man with acute myeloid leukemia and Burkitt’s lymphoma who underwent intrathecal (IT) chemotherapy and developed acute, progressive paraplegia. While undergoing Hyper-CVAD (cyclophosphamide, vincristine, doxorubicin, dexamethasone), he developed urinary retention, bowel incontinence, and rapidly progressive lower extremity weakness several days after receiving IT cytarabine and IT methotrexate (MTX). MRI showed hyperintensity in T8-T12 dorsal columns. Multiple serum and CSF studies, nerve conduction studies and electromyography were all non-diagnostic.

Setting: Acute inpatient rehabilitation.

Results or Clinical Course: Despite empiric IVIG and pulsed methylprednisone, clinical status further declined. Patient was admitted to acute spinal cord injury unit with T8 complete paraplegia and started on comprehensive rehabilitation. He reached neurologic nadir at 1.5 months with flaccidity in both legs and significant sensory loss. By discharge, he regained trace movement but has remained non-ambulatory.

Discussion: This case demonstrates progressive myelopathy after IT chemotherapy, a rare but recognized complication. Whereas MRI findings from IT cytarabine may involve the entire cord, IT MTX is associated with isolated involvement of dorsal columns, mimicking findings in subacute combined degeneration. As there is no diagnostic test, other differentials must be excluded including transverse myelitis, radiation-induced myelopathy, infection, paraneoplastic syndrome, and nutritional deficiency. Recovery is uncommon and primary strategies lie in prevention to identify susceptible patients and prudent toxicity monitoring. There is however clinical significance in early recognition to withdraw treatment and initiate trials to reverse damage. Rather than dwelling on undiagnosed etiology, acceptance of this sequela can help patients better focus their efforts on interdisciplinary therapy.

Conclusion: Progressive myelopathy attributed to IT chemotherapy is a rare complication and early recognition is clinically significant for intervention. Insight into diagnosis can help optimize a patient’s endeavor in rehabilitation to maximize potential for independence.

Poster 11
Management of Refractory Autonomic Abnormalities in a Tetraplegic with a Wound: A Case Report
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Disclosures: L. Del Prato: I Have No Relevant Financial Relationships To Disclose.

Objective: To present a symptom-based approach to severe autonomic abnormalities (AA), including autonomic dysreflexia, persistent sudoresis and symptomatic hypothermia, in a spinal cord injury (SCI) patient with a large decubitus wound.

Case Description: A 60-year-old man with tetraplegia (C6 AIS B) due to traumatic C5 fracture in 1995. Nineteen years post-injury, he developed a large sacral wound with osteomyelitis requiring surgical debridement. One week post-admission, he developed severe autonomic dysreflexia (AD) when seated upright associated with “discomfort” in his buttocks. AD resolved upon repositioning supine. Imaging of the spine and pelvis was negative for deformities, occult fracture, and syrinx. The patient continued to display sudoresis and non-environmental hypothermia despite adequate blood pressure control.

Setting: Inpatient SCI unit.

Results or Clinical Course: Pain management was achieved with transdermal fentanyl patch (37.5 mcg/h) and gabapentin (1800 mg/day). Terazosin (3mg/day) effectively controlled hypertension. The patient continued to complain of profuse sweating, which resolved with an anticholinergic (oxybutynin 20mg/day). Laboratory and radiographic workup for hypothermia was negative for infection, seizures, hormonal abnormalities, stroke, and brain tumor. Cyproheptadine (8mg/day), a potent serotonin antagonist used to treat spontaneous hypothermia with hyperhidrosis, prevented future episodes of hypothermia.

Discussion: AA in SCI is a treatment challenge when associated with a trigger that cannot be immediately rectified, such as a large wound. Standard management for AD, sitting the patient upright, exacerbated pain and complicated treatment. The following systematic approach was beneficial: 1) in-depth investigation of the potential causes of AA including complete neuraxial imaging and determination of infectious or hormonal causes; 2) discontinuation of hypertensives (midodrine); 3) aggressive pain control; 4) use of sympathetic blockers (terazosin); 5) anticholinergic drug to manage sudoresis (oxybutynin); and 6) treatment of non-environmental hypothermia with an anti-serotonergic drug (cyproheptadine).

Conclusion: Direct treatment of pain, in addition to targeting abnormal central and peripheral sympathetic responses, was successful in controlling AD, persistent sudoresis and non-environmental hypothermia.

Poster 12
Therapeutic Effects of Gait Training and Gait-Related Training with Functional Electrical Stimulation for Chronic Stroke Patients: Prospective Observational Study
Koichiro Sota (Hyogo College of Medicine Hospital, Nishinomiya, Japan), Tatsushi Wakisugi, BSc, Yosuke Honda, Tetsuya Harada, bachelor, Shinichiro Morishita, Sayaka Adachi, BSc, Norihiko Kodama, PhD, Kazuhisa Domen, PhD, MD


Objective: To investigate the therapeutic effects of gait training and gait-related training with functional electrical stimulation (FES) for chronic stroke patients.

Setting: College hospital.

Participants: Chronic stroke patients (N = 12) with an average age of 59.3 ± 8.6 years and average post stroke duration of 64.1 ± 47.0 months.

Interventions: We provided 4 weeks of gait training and gait-related training with FES for the patients. The patients underwent these trainings 3 times a week, at 1 h per session. We assessed patients without FES before intervention (baseline) and after the end of all interventions (4 weeks).

Main Outcome Measures: Main outcome measurements were comfortable 10-m gait speed, 6 minutes walking test (6MWT), and Timed up & go test (TUG).
Results or Clinical Course: The comfortable 10-m gait speed was significantly faster at 4 weeks than at baseline (baseline: 0.83 ± 0.28 m/s, 4 weeks: 0.91 ± 0.25 m/s; P < .05). However, there was no significant difference between baseline and 4 weeks in 6MWT (baseline: 274.3 ± 84.1 m, 4 weeks: 293.7 ± 90.2 m; P = .076) and TUG (baseline: 15.0 ± 4.0 s, 4 weeks: 14.3 ± 3.1 s; P = .13).

Conclusion: In this study, gait training and gait-related training with FES yielded statistically significant improvement in comfortable walking speed for chronic stroke patients. Our study provided encouraging evidence that rehabilitation intervention with FES can have a positive impact for chronic stroke patients. In the future, it will be necessary to do a randomized controlled trial to compare the effects of gait training and gait-related training without FES.

Post-13
Traumatic Brain Injury (TBI) is Underreported in Acute Care after Traumatic Spinal Cord Injury (SCI)

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Disclosures: D. C. Lee, Research supported by grant H133N110009 from the National Institute on Disability and Rehabilitation Research

Objective: Comorbid traumatic brain injury (TBI) is associated with decreased cognitive functioning and rehabilitation outcomes and may benefit from early intervention. However, TBI may be overlooked or not reported in the medical record, particularly in the acute care setting in individuals with spinal cord injury (SCI). Identification of where and when TBI diagnosis is missed could facilitate system changes to promote earlier diagnosis of comorbid TBI and SCI.

Design: Retrospective medical record review of patients with new traumatic SCI.

Setting: Inpatient rehabilitation units at two university hospitals in the northwestern United States.

Participants: 103 consecutively enrolled adults with new traumatic SCI admitted to inpatient rehabilitation unit.

Interventions: Not applicable

Main Outcome Measures: Medical record evidence of TBI based on American Congress of Rehabilitation Medicine criteria.

Results or Clinical Course: The sample was 73% male, 74% White and 17% Hispanic, 46 (±17) years old, 58% tetraplegia, with 24% neurologically complete injuries. Inter-rater agreement (TBI yes/no) on 20 cases was 85%. Sixty-nine (67%) sustained no TBI, 31 mild TBI, 2 moderate and 0 severe TBI. Medical record review found that TBI was mentioned in 14 prehospital notes, 11 emergency department notes, 8 acute service notes, 18 rehabilitation medicine consult notes, and 26 inpatient rehabilitation notes. Two cases of mild TBI were reported by an acute care team but not during inpatient rehabilitation.

Conclusion: TBI was underreported in chart review of patients with comorbid SCI and TBI. The lowest rate of TBI reporting was in the acute care setting (8/31) while the highest rate of reporting was in inpatient rehabilitation (26/31). Systematic assessment of TBI signs and symptoms at each level of care could improve the rate of early recognition of TBI and facilitate intervention to promote rehabilitation outcomes.

Post-14
Treatment of Neurogenic Bladder in Spinal Cord Injury Using Mirabegron with, and without, Anticholinergic Medication

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Disclosures: S. Schrumm: I Have No Relevant Financial Relationships To Disclose.

Case Description: Three patients with spinal cord injury, detrusor hyperreflexia, incontinence are described. A 66-year-old man with gunshot injury resulting in T11 ASIA A paraplegia and detrusor hyperreflexia could not tolerate anticholinergic medications. Mirabegron at 25 mg a day was effective and well tolerated. A 42-year-old woman with C5 ASIA B and detrusor hyperreflexia had partial control with anticholinergics; the addition of mirabegron 25 mg a day was effective. A 46-year-old with a cervical ependymoma with detrusor hyperreflexia responded to the combined use of mirabegron 25 mg a day and anticholinergic medication. The details of these cases will be presented. The incidence, pathophysiology, evaluation, and treatment options for neurogenic bladder in spinal cord injury will be presented, with a focus on the role of anticholinergic medications, and the unique action of mirabegron as the only medication in its class that targets the B3 pathway. Medication indications, side effects, dosing and use will be presented

Program Description: Neurogenic bladder management.

Setting: Inpatient hospital (rehabilitation).

Results or Clinical Course: There was improvement in bladder function with the combined use of anticholinergic medication and mirabegron.

Discussion: Neurogenic bladder is a common sequela of spinal cord injury. Overactive bladder, or detrusor hyperreflexia, can cause urinary incontinence even in people utilizing intermittent catheterization. Pharmacological interventions are aimed at bladder relaxation to allow the bladder to fill more- and hold- urine without detrusor spasm causing incontinence. Anticholinergic medications are often utilized as a first line medication option. However, they may not be fully effective, nor well tolerated. Mirabegron, a beta-3 receptor adrenergic receptor agonist, is the only bladder medication approved by the FDA for use in overactive bladder in its class. Its unique mechanism of action has potential advantages which include the absence of dry mouth. The use of a beta-3 receptor agonist either alone, or in combination with an anticholinergic, may be an effective pharmacological option for persistent and difficult to treat detrusor hyperreflexia.

Conclusion: The use of a beta-3 receptor adrenergic agonist may be an effective and well tolerated treatment option for detrusor hyperreflexia in spinal cord injury.

Poster 15
Acute Vision Loss after Treatment with Amantadine in the Setting of Traumatic Brain Injury in a Patient with History of Fuchs’ Dystrophy: A Case Report

Erika Trovato (NYU Langone Medical Center, New York, NY, United States), John Danko, DO, Brian Im, MD

Disclosures: E. Trovato: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 66-year-old woman with history of Fuchs’ dystrophy presented to an outpatient traumatic brain injury (TBI) office visit one year after sustaining a concussion during a fall. Her complaints at the visit included fatigue, decreased attention, decreased workplace productivity and feeling overwhelmed with basic activities of daily living (ADL). Given her persistent deficits and symptoms, she was trialed on amantadine and instructed to follow up in one month.

Setting: Outpatient office.

Results or Clinical Course: The patient reported an overall improvement in her cognitive functioning and fatigue on twice daily dosing of amantadine. However, she developed acute left eye blindness, prompting a visit to her ophthalmologist, who instructed her that amantadine has been shown to aggravate Fuchs’ dystrophy, causing corneal edema. Amantadine was discontinued and steroid eye drops were prescribed with rapid improvement in her vision upon cessation of the medication.

Discussion: While amantadine has demonstrated positive outcomes in persistent executive functioning deficits following TBI, several case reports have reported acute visual loss and exacerbation of ocular
Symptoms in the setting of Fuchs’ dystrophy. Fuchs’ Dystrophy, also known as Fuchs’ corneal endothelial dystrophy (FCED) is an autosomal dominant, slowly progressing degenerative disease leading to corneal edema and vision loss, eventually requiring corneal transplant. The mechanism of action by which amantadine causes corneal edema is currently unknown, though review of the literature suggests a causal relationship between the two and does not appear to be dose dependent.

**Conclusion:** Persistent deficits in higher executive functioning and workplace performance are common following concussion. However, although improvements in these domains are noted following initiation of neurostimulants such as amantadine, this case outlines the importance of weighing the risks and benefits of symptomatic management in TBI.

**Poster 16**  
**Subjective Fatigue Is Associated with Higher Resting Energy Expenditure Following Traumatic Brain Injury**  
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**Disclosures:** D. L. Ripley: Research Grants - AbbVie Pharmaceuticals

**Objective:** To evaluate the potential association between subjective fatigue and resting energy expenditure after traumatic brain injury (TBI).

**Design:** Observational Cohort.

**Setting:** Research lab in an academic rehabilitation hospital in the United States.

**Participants:** 11 individuals (3 female, 8 male, mean age 48 years) at least one year post moderate to severe brain injury.

**Interventions:** Not applicable

**Main Outcome Measures:** TBI-QOL fatigue subscale, Resting Energy Expenditure (REE) obtained via indirect calorimetry, daily activity levels obtained via actigraph.

**Results or Clinical Course:** 11 subjects participated in an evaluation to determine the association between fatigue and other physiological measures, including activity levels, sleep, resting energy expenditure, and neurocognitive measures. There was a significant correlation between Subjective fatigue on the TBI-QOL subscale and Resting Energy Expenditure ($R = 0.6210$, $P = 0.0414$). No significant association was found between subjective fatigue and daily activity levels.

**Conclusion:** Subjects with greater subjective fatigue had higher average resting energy expenditure as measured by indirect calorimetry. Fatigue after TBI may relate, in part, to issues with energy metabolism. Further research is needed to clarify this association. This finding may ultimately impact on treatment of fatigue following TBI.

**Poster 17**  
**Spinal Cord Injury Increases Risk for Coronary Artery Disease as Determined by Coronary Artery Calcification Score**  
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**Disclosures:** C. McKenna: Speakers Bureau - Merz, Avanir, Depomed

**Objective:** Persons with spinal cord injury (SCI) have reduced levels of activity, adverse changes in soft tissue body composition, carbohydrate disorders, and dyslipidemia. These changes would be anticipated to increase the risk for coronary artery disease (CAD). An increasing body of evidence suggests a higher prevalence of CAD in persons with chronic SCI than that observed in the general population. The objective of this study is to compare coronary artery calcification (CAC) scores in persons with SCI with an equivalent number of CAD risk factors to that of historical able-bodied controls (HABC), and to compare mean CAC scores greater than zero in both cohorts matched for demographics and number of CAD risk factors.

**Design:** A cross-sectional study was applied to assess the total number of cardiac risk factors (hypertension (13%), dyslipidemia (65%), obesity (45%), sedentary lifestyle (78%), impaired fasting glucose (23%), and family history of CVD (18%)) and CAC scores in a SCI group compared to a matched HABC group.  

**Setting:** Outpatient Rehabilitation Setting.

**Participants:** Thirty-six males with chronic SCI (20 with paraplegia; 16 with tetraplegia) demographically matched to HABC.

**Interventions:** Not applicable

**Main Outcome Measures:** The number of cardiac risk factors, as determined by Framingham risk factor scoring method, and CAC scores.

**Results or Clinical Course:** Nineteen participants (53%) were found to have a CAC score greater than 0 Hounsfield Units (HU). In those with SCI, the mean CAC score was 208 HU in participants with average of 2 CAD risk factors. In the SCI groups with 2 or 3 CAD risk factors, the mean CAC score was 47% and 35% higher, respectively, than that of HABC groups with equivalent number of risk factors.

**Conclusion:** As determined by CAC score, SCI subjects had a greater atherosclerotic burden compared to a HABC group matched for a similar number of conventional CAD risk factors.

**Poster 18**  
**A Curious Case of Primary Spinal Cord Tumor: A Case Report**  
Ryan R. Ramsook, MD (Icahn School of Medicine at Mount Sinai, New York, NY, United States), Miguel X. Escalon, MD, MPH

**Disclosures:** R. R. Ramsook: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 53-year-old man with no past medical presented with progressive bilateral hand weakness, leg heaviness and trouble walking for 1 month. Surgical pathology was consistent with ependymoma, WHO grade II. During his inpatient rehabilitation stay, he became progressively and more atactic ultimately requiring a revision of his decompression. However, his weakness, severe ataxia, and extensive tumor burden on MRI worsened resulting in a third procedure in 1 month.

**Setting:** Acute inpatient rehabilitation.

**Results or Clinical Course:** Surgical pathology from the 3rd surgery suggested a new pathology of an extremely rare and deadly high grade glioblastoma, WHO grade IV. Patient started intense chemotherapy and radiation therapy which left him with significant deficits in mobility and activities of daily living. 10 weeks after diagnosis of glioblastoma, follow-up pathology showed questionable tumor type. Electron microscopy strikingly showed features normally reserved for anaplastic ependymoma as well as features highly unique to deadly malignant gliomas.

**Discussion:** Primary spinal cord tumor occurs in less than 1.5 per 100,000 people. Of those individuals, glioblastomas represent 1.5% of primary spinal cord tumors, whereas ependymomas comprise about 60%. Spinal ependymomas are associated with a very high cure rate with complete resection alone. Due to the rarity, <200 cases, of primary intramedullary glioblastoma, treatment guidelines are difficult to establish. However, due to the poor prognosis and short survival time, focal spinal radiotherapy and chemotherapy with temozolomide are utilized in addition to resection. Patients often come to rehab with a post-operative diagnosis. However, when patients do not improve in an expected manner, a provider must review the original diagnosis. Without such thought, delay in appropriate treatment or worsened functionality can occur.

**Conclusion:** This case represents an unusual case of a primary spinal cord tumor presenting with characteristics of both glioblastoma and...
ependymoma. Treatment options, goals of care, prognosis and rehabilitation course can greatly vary based on the prompt, accurate diagnostic differentiation between these two tumor types.

**Poster 20**  
Cerebellar Cognitive Affective Syndrome: A Case Report  
Erik W. Latzka, MD (University of Washington, Seattle, WA, United States), Jennifer M. Zumsteg, MD  
**Case Description:** A 71-year-old man presented reporting 48 hours of dizziness, dysarthria, dysphagia, and ataxia. Clinical examination and imaging were consistent with a bilateral cerebellar ischemic stroke. The patient’s 3-week acute care course included management with bilateral posterior fossa decompressive craniotomy, external ventricular drain placement, and a nasogastric tube for enteral nutrition secondary to severe oropharyngeal dysphagia.  
**Setting:** Tertiary care stroke center, acute inpatient rehabilitation.  
**Results or Clinical Course:** Physiatriy examination and rehabilitation team findings included slight slowing and decreased accuracy in finger to nose coordination on the right, but otherwise normal coordination. Cognitive assessment revealed impairments in naming, orientation, direction following, attention, visuospatial skills, and memory. The patient had significant functional recovery during his 2-week admission to acute inpatient rehabilitation with resolved dysarthria, improved ataxia and mobility, and improved oropharyngeal dysphagia. He continued to demonstrate moderate impairments in cognition and communication including the domains of reasoning, problem solving, word retrieval, auditory processing, visuospatial tasks, attention, executive function and memory.  
**Discussion:** The cerebellum is well known for its role in coordination, spanning a wide range of motor control functions including gait, swallowing, visual tracking, and vocalizing, but its role in cognition and affective regulation is less well appreciated. The impairments seen in Cerebellar Cognitive Affective Syndrome (CCAS) commonly include executive function, language, visual-spatial attention, and mood/personality. Clinical evaluation after cerebellar stroke that is limited to coordination tasks is unlikely to appreciate deficits in cognitive and affective domains that are excellent targets for rehabilitation interventions.  
**Conclusion:** Clinical evaluation of patients after cerebellar strokes should include a thorough evaluation of cognition and mood, as these may be impaired along with well-recognized deficits such as ataxia, dysarthria, and dysphagia. The understanding of the role of the cerebellum in neuropsychologic function continues to evolve and is an area of interest for continuing medical education for physiatrists.

**Poster 21**  
The Prediction of Pharyngeal Dysphagia Using High-resolution Manometry Parameters  
Donghwi Park (Seoul National University Bundang Hospital, Seongnam-si, Korea (the Republic of)), Ju Seok Ryu, MD, PhD, Yoongul Oh, MD  
Disclosures: D. Park: I Have No Relevant Financial Relationships To Disclose.  
**Objective:** To identify the high-resolution manometry (HRM) parameters that have a significant correlation with pharyngeal dysphagia.  
**Design:** Prospective cross-sectional study.  
**Setting:** HRM and Fluoroscopic machine.  
**Participants:** 40 participants.  
**Interventions:** Participants swallowed thin fluid 5cc in neutral head position for two times and were evaluated with HRM and video-fluoroscopic swallowing study (VFSS) simultaneously.  
**Main Outcome Measures:** HRM parameters included maximal pressure, area integral, rise time and duration of the Velopharynx (VP) and Tongue base (TB), maximal pressure of pre-Upper esophageal sphincter (UES) and low pharynx, cricopharyngeus, minimal UES pressure, UES activity time (the interval between pre-UES peak and post-UES peak) and nadir UES duration. HRM parameters were compared with the findings of VFSS. Receiver operating characteristic (ROC) analysis was performed to obtain cutoff value, sensitivity and specificity of the HRM parameters for the prediction of pharyngeal dysphagia.  
**Results or Clinical Course:** Maximal pressure of VP had significant positive prediction for most of the abnormal parameters of VFSS in pharyngeal phase. Nadir UES pressure duration was significant for impaired laryngeal elevation, residue at pyriform sinuses and combination of penetration and aspiration. Minimal UES pressure and duration of TB contraction had significant positive prediction for residue at valvular pouch. The maximal pressure of VP below 180.0 showed 100% of sensitivity and 75.0% of specificity for the presence of penetration and aspiration and the cutoff point of 178.8 showed 86.7% of sensitivity and 75.0% of specificity for the presence of subglottic aspiration.  
**Conclusion:** The present study identified significant HRM parameters highly specific for pharyngeal dysphagia and suggested cutoff value, sensitivity and specificity for these findings. As HRM could inform the quantitative measurement of pharyngeal weakness, the cutoff value of the HRM parameter could be used to predict aspiration in patients with pharyngeal weakness.
common treatment-related AEs included injection site pain (1.7% vs 0.9%) and pain in extremity (0.4% vs 2.1%).

Conclusion: In this phase 3 study, onabotulinumtoxinA (300U–400U) improved MAS, CGI, and some GAS endpoints versus placebo and was well tolerated in patients with PSLLS.

Poster 23
Cauda Equina Syndrome Complicated by Arachnoiditis and Hydrocephalus Following Routine Lumbar Epidural Steroid Injection: A Case Report

Steven Ross, DO (NYU, New York, NY, United States), Joseph Riley, MD

Disclosures: S. Ross: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 68-year-old woman with a history of spinal stenosis presented to the ER with new-onset right-sided back pain, right foot numbness, difficulty walking, and overflow incontinence immediately following a right L4-5 interlaminar epidural steroid injection (ESI) performed with 2cc of 40mg Depo-medrol under fluoroscopic guidance. Initial MRI was stable with her prior examination and the patient subsequently had L4-5 laminectomy with fusion. The patient had a course of acute rehabilitation and at discharge was modified independent with all mobility and ADLs. At one-month follow-up, she had 3+/5 ankle dorsiflexion bilaterally with mild cognitive impairment and MRI of her spine revealed extensive enhancement of the cauda equina and intradural patchy enhancement throughout the entire spine, consistent with cauda equina syndrome (CES) complicated by arachnoiditis. Brain MRI revealed severe hydrocephalus and a VP shunt was placed resulting in improvement in cognitive function. The patient was transferred once more to inpatient rehabilitation to address her ADL and mobility deficits.

Setting: Inpatient rehabilitation.

Results or Clinical Course: The rehabilitation program focused primarily on the patient's poor sitting balance, poor proprioception and poor activity tolerance secondary to pain. Mirror Therapy was used to improve the patient's balance sense and positioning in space. For pain control, she initially required oxycodone, but through a multidisciplinary approach via psychology, psychiatry, recreational therapy, and mind/body therapy, her pain decreased enough to only require Tylenol. She had slow but significant neurologic recovery and at discharge was ambulating with a walker with supervision.

Discussion: CES and arachnoiditis are rare but serious complications of ESIs; the incidence of neurologic injury is about 1:100,000. It is thought that preservatives found in steroid may contribute to the development of arachnoiditis. Unfortunately, arachnoiditis is hard to treat and patients typically suffer with serious disability and chronic pain.

Conclusion: Physicians performing ESIs must be aware not only of CES and arachnoiditis as possible complications, especially when performed with a particulate agent such as Depo-medrol, but also of the potential for improvement in multiple domains with inpatient rehabilitation.

Poster 24
Attention and Executive Function Impairment After High-Voltage Electrical Injury

Kwang-Ik Jung, MD, PhD (Halym University College of Medicine, Anyang, Korea (the Republic of)), Woo-Kyung Yoo, MD, PhD, Cheong Hoon Seo, MD, PhD, Soyeon Jang, MD, Suk Hoon Ohn, MD, PhD

Disclosures: K. Jung: I Have No Relevant Financial Relationships To Disclose.

Objective: To evaluate the characteristics of cognitive impairment in chronic patients with high-voltage electrical injury (HVEI).

Design: Observational cohort study.

Setting: Outpatient rehabilitation center in specialized burn care hospital.

Participants: 13 patients (mean age: 41.1) with decreased attention span, easy loss of memory or difficulty of learning for more than 3 months after HVEI were enrolled in this study. Age matched 18 people participated as a control group.

Interventions: Not applicable.

Main Outcome Measures: The cognitive function, executive function, language, visuospatial function, memory, and depressive symptom were assessed using (1) animal naming test, (2) phonemic fluency with Korean consonant, (3) digit symbol coding, (4) Trail making test- Korean version, (5) Seoul verbal learning test, (6) Boston naming test- Korean version; short form, (7) Rey-Osterrieth complex test, (8) Hamilton depression rating scale, (9) Mini mental status examination- Korean version, and (10) Korean Wechsler Intelligence Scale-III.

Results or Clinical Course: The patients had lower scores in all cognitive domains with significance (P<.05). Especially, attention and executive function were most severely deteriorated. The P values of attention tests (digit span forward test and immediate recall test) and executive function tests (animal naming test, phonemic fluency test, digit symbol coding test) were less than .0001. And patients had more depressive mood than control subjects in Hamilton depression rating scale (P<.05).

Conclusion: The patients after HVEI demonstrated significantly impaired task performance in all the cognitive function test, particularly domains of attention and executive function. Moreover, the patients had severe depressive mood. Considering the results of both cognitive function tests and depressive mood, the patients are thought to have lesion in the frontal lobe.
encephalopathy; typically, cefepime-induced neurotoxicity occurs within a week after initiation of the agent.

**Conclusion:** As increasingly medically complex patients on multiple antibiotic regimens are cared for in the acute inpatient rehabilitation setting, physiatrists require a heightened awareness for potential adverse effects from medications. Cefepime-induced encephalopathy should be suspected in the presence of acute mental status changes, even if the treatment duration exceeds a week.

**Poster 26**

**Oligodendroglioma with Leptomeningeal Carcinomatosis Presenting as Ventriculoperitoneal Shunt Malfunction: A Case Report**

Aaron McGuire, DO (University of Arkansas for Medical Sciences, Little Rock, AR, United States), Rani Hailey, MD

**Disclosures:** A. McGuire: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 54-year-old male patient with history of resected glioma brain tumors recently hospitalized due to increased falls, decline in cognition, and transient bladder incontinence. Workup revealed glioma recurrence with ventriculomegaly from obstruction of the posterior right choroidal fissure. A ventriculoperitoneal (VP) shunt was placed to treat hydrocephalus yielding improvement in symptoms. On day three of rehabilitation admission, the patient experienced worsening sitting balance with waxing and waning ataxia, bladder incontinence, and confusion. Workup was unremarkable for infection, electrolyte imbalance, or medication toxicity. Repeat head CT demonstrated stable ventricle size. The patient’s neurosurgery team made adjustments to the patient’s VP shunt settings for known hydrocephalus which resulted in improvement of symptoms. Shunt adjustment was made two additional times due to return and worsening of hydrocephalus symptoms, now including bowel incontinence. MRI of the spine was requested in addition to the intracranial evaluation. MRI of the lumbar spine revealed leptomeningeal spread of glioma involving the entire spinal cord.

**Program Description:** Academic university hospital and Private Inpatient rehabilitation hospital.

**Setting:** Acute inpatient rehabilitation hospital.

**Results or Clinical Course:** The patient’s functional goals were adjusted to include spinal cord injury rehabilitation. The patient did well within this new rehabilitation framework.

**Discussion:** This is the first reported case, to our knowledge, of leptomeningeal carcinomatosis presenting with symptoms nearly indistinguishable from peri-operative VP shunt malfunction, leading to high potential for misdiagnosis.

**Conclusion:** We present a case of a patient with a primary brain tumor that caused obstructive hydrocephalus and was treated with a VP shunt. It is important to maintain a high index of suspicion that includes the entirety of the CNS in this patient population, despite symptoms that seem to localize to intracranial lesions and devices.

**Poster 27**

**Analyzing the Patient Journey for Patients Living with Spastic Paresis**

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**Disclosures:** D. Bowers: Consulting fees or other remuneration - Participated in an advisory board for Ipsen.

**Objective:** To identify international barriers to optimal management of spastic paresis, and to recommend strategies for overcoming them.

**Design:** Literature review and analysis, supplemented with the authors’ personal clinical experiences, focusing on the current patient pathway - from diagnosis to long-term rehabilitation - of spastic paresis caused by damage to the brain or spinal cord.

**Setting:** All healthcare settings.

**Participants:** Healthcare professionals with experience in treating spastic paresis.

**Interventions:** Not applicable

**Main Outcome Measures:** Development of robust guidance for all stakeholders (healthcare practitioners, patients, caregivers, and payors) involved in the treatment of spastic paresis.

**Results or Clinical Course:** Barriers to optimal management of spastic paresis were identified as the absence of global guidelines on its management, financial and logistical restrictions on access to treatment in some countries, lack of educational resources for stakeholders, and under use of injectable therapies such as botulinum toxin-A (BoNT-A) to relieve symptoms of spasticity. BoNT-A therapy has been proven to be effective and well tolerated in the treatment of spasticity, and careful monitoring and timely use of BoNT-A in conjunction with other treatment is crucial for effective management. The authors developed a 3-step process highlighting the role of all stakeholders along the patient pathway and recommendations. Better understanding of the relationship between underlying etiology and spastic paresis, and an awareness of gaps in service provision can help physicians and patients/caregivers navigate their treatment journey. Education will help to ensure that spasticity is recognized early and patient-centered treatment goals are set to encourage patients to take an active role in the treatment process.

**Conclusion:** Specific guidelines for the comprehensive treatment of patients with spastic paresis and a coordinated effort from all stakeholders are needed to deliver optimal care and to overcome financial barriers from diagnosis through to long-term management. Patient-centered goal-setting and appropriate therapies, including guided self-rehabilitation, are important elements of the patient journey.

**Disclosures:** Supported by Ipsen Innovations.

**Poster 28**

**Efficacy and Safety of AbobotulinumtoxinA (Dysport®) in Adult Hemiparetic Patients with Upper Limb Spasticity Previously Treated with Botulinum Toxins**

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**Disclosures:** C. M. Marciniak: Institutional Research Grants - Allergan, Ipsen, Merz, Paul Ruby Foundation; Non-Remunerative Positions of Influence — ABEM Board of Directors, Ipsen Advisory Board.

**Objective:** To determine the efficacy and safety of abobotulinumtoxinA (Dysport®) in adult hemiparetic patients who had previously received Botulinum Toxins (excluding abobotulinumtoxinA) for the treatment of upper limb spasticity (ULS).

**Design:** Sub-analysis in a randomized (1:1:1), placebo-controlled, double-blind study.

**Setting:** International, multicenter.

**Participants:** Patients (n = 105) previously treated with botulinum toxins for ULS of a total of 243 patients (naïve and experienced) included in the study.

**Interventions:** In a single treatment cycle, subjects received abobotulinumtoxinA 500U or 1000U or placebo intramuscularly.

**Main Outcome Measures:** Modified Ashworth Scale (MAS); Physician Global Assessment (PGA), Tardieu scale (TS); Active range of motion (AROM); Ease of applying a splint.
and males represented 62%. Patients who had suffered stroke (87%) or traumatic brain injury (13%); mean time since the event was 6 or 7 years, respectively, 88% patients had previously received onabotulinumtoxinA, Botox® (mean dose 292U, maximum dose 800U), 16% had previously received incobotulinumtoxinA, Xeomin® (mean dose 312U, maximum dose 1000U). Sixty-nine patients received 500U (n = 37) or 1000U (n = 32) abobotulinumtoxinA. Four weeks after injection, 78% of patients were responders in terms of tone reduction (≥1 point improvement in MAS) vs. 25% for placebo. Overall clinical improvement (mean PGA score reaching -1 point improvement in MAS) vs. -3 to -11 [placebo]) and spasticity angle improved by 15 to 31° (vs. -3 to 11° [placebo]), resulting in a gain in extension (AROM) from 12 to 19° (vs. -1 to 4° [placebo]). Ease of applying a splint also improved. No unexpected safety events were observed.

Conclusion: In this small population of hemiparetic adults, previously treated with onabotulinumtoxinA or incobotulinumtoxinA for ULS, abobotulinumtoxinA (500/1000U) improved muscle tone, spasticity, active movement and overall clinical improvement. Safety profile was consistent with the total population in this trial and the known profile of abobotulinumtoxinA in spasticity.

Poster 29
Debbie Tan, MD (University of Washington, Seattle, WA, United States), Jeanne M. Hoffman, PhD, Darren C. Lee, MD, Charles Bombardier, PhD

Disclosures: D. Tan: I Have No Relevant Financial Relationships To Disclose.

Objective: It is estimated that 60% of people who sustain a traumatic spinal cord injury (SCI) also sustain a traumatic brain injury (TBI). Most of these comorbid TBIs are mild. Nevertheless, comorbid TBI is associated with significantly worse cognitive functioning after TBI and poorer rehabilitation outcomes. Co-occurring TBI may be overlooked or not reported in the medical record. If self-reported TBI with SCI is valid, systematic questioning may help improve case-finding and rehabilitation tailoring.

Design: Compared validated self-report TBI screening assessment administered by a trained research assistant to medical record review by physician trainees.

Setting: Inpatient rehabilitation units at two university hospitals in the northwestern United States.

Participants: Consecutively admitted adults with recent traumatic SCI in inpatient rehabilitation unit.

Interventions: None

Main Outcome Measures: Occurrence of TBI determined by Step 2 of the Ohio State University TBI Identification Method (OSU-TBID). Medical record evidence of TBI based on American Congress of Rehabilitation Medicine criteria.

Results or Clinical Course: Subjects were 105 people with acute SCI admitted within 24 hours of injury to one of our hospitals (including a Level I trauma center). The sample was 73% male, 74% White and 17% Hispanic, 46 (+/- 17) years old, 58% tetraplegia, 24% neurologically complete injuries. Inter-rater agreement (TBI yes/no) on 20 cases was 85%. We found that 70 (67%) sustained no TBI, 32 mild TBI, 1 complicated-mild, 2 moderate and 0 severe TBI. By self-report, 42 patients reported improbable TBI, 15 possible TBI, 28 mild, 16 moderate and 4 severe. The optimal cut-point on the OSU-TBID was possible TBI or greater resulting in sensitivity =83%, specificity 51%, positive predictive value =46% and negative predictive value =86%. Total area under the curve = 71%. Subjective estimates of TBI exceeded actual TBI by 66%.

Conclusion: In the context of acute traumatic SCI, self-report identification of co-occurring TBI is a poor indicator of medically diagnosed TBI possibly due to medications and other medical/surgical treatment used to manage acute SCI. Self-report identification of no TBI does correlate reasonably with no medical diagnosis of TBI. Modifications to the standardized questions utilized through the SCI model systems may yield better self-report identification of TBI in SCI.

Poster 30
Rhythmic Auditory Stimulation Improves Gait Training After Cerebellar Stroke: A Case Report
Shirley Shih, MD (Spaulding Rehabilitation Hospital/Harvard Medical School, Charlestown, MA, United States), Jessica Guibert, PT, DPT, Brian Harris, MA, MT-BC, NMT, Yong-Tae Lee, MD

Disclosures: S. Shih: I Have No Relevant Financial Relationships To Disclose.

Case Description: GT is a 64-year-old man admitted to inpatient rehabilitation following a right cerebellar stroke. He presented with significant ataxia and impairments in balance, coordination, and midline awareness. He was unable to remain standing for greater than 10 seconds with a rolling walker and maximum assistance, and could not tolerate ambulation due to dizziness, nausea, and vomiting. Over the next three weeks, GT’s progress with gait training remained slow and limited. He was only able to ambulate 30 feet with a small base quad cane (SBQC) and moderate assistance, and experienced frequent loss of balance. Both gait training without body weight support and body weight supported treadmill training were trialed during Physical Therapy (PT) without significant improvement. He continued with a coordinated gait with variable cadence and step length.

Program Description: Neurologic Music Therapy (NMT) was consulted to co-treat with PT by instigating rhythmic auditory stimulation (RAS). GT’s gait was entrained to a rhythm using a metronome and live acoustic guitar.

Setting: Inpatient rehabilitation facility.

Results or Clinical Course: GT demonstrated excellent ability to synchronize his gait and cadence to a 3-beat tempo. During his first session, he exhibited improved gait and cadence symmetry and increased his ambulatory distance to 100 feet with SBQC and contact-close guard. During his second session, he ambulated 180 feet with contact-guard minimum assistance without an assistive device. Upon discharge from rehabilitation, he was ambulating household distances independently with a SBQC, and up to 250 feet with close-contact guard and no assistive device.

Discussion: There is a rich network of audio-motor pathways at the level of the brainstem and cerebellum. RAS utilizes these networks to entrain motor output patterns to rhythmic cues. The use of RAS as a gait training intervention has been shown to translate into improved gait patterns in patients with stroke, brain injury, Parkinson’s disease, and multiple sclerosis.

Conclusion: RAS is an effective intervention for improving gait parameters including balance, cadence, step length, and turning for gait impairments after cerebellar stroke.

Poster 31
Urinary Tract Infections in Spinal Cord Injury: Comparison of Urinary Tract Infection Symptomatology and Treatment to a General Rehabilitation Population
Stephanie Ferimer (UPMC, Pittsburgh, PA, United States), Christina Andrzejewski, Pharm D, Mohamed Yassin, MD, PhD, Gary Galang, MD, Kathleen A. Shutt, MS

Disclosures: S. Ferimer: I Have No Relevant Financial Relationships To Disclose.

Objective: Evaluate the criteria for diagnosis of a urinary tract infection (UTI) and antibiotic management using Infectious Diseases Society of America (IDSA) criteria in acute inpatient rehabilitation (IPR) population.
Design: Case-control study using electronic medical records as a quality improvement (QI) initiative between IPR, Antimicrobial Stewardship, and Infection Control Council.

Setting: Acute IPR Units within a University-Affiliated Academic Medical Center.

Participants: Random selection of 165 patients admitted to IPR between November 2011 and August 2014; 81 were diagnosed with spinal cord injury (SCI) and 84 had a general rehabilitation diagnosis.

Interventions: Descriptive review of acute rehabilitation patients focused on practices surrounding urinary testing, diagnosis, and management of UTIs.

Main Outcome Measures: Comparison of SCI vs. general rehabilitation for symptomatology at time of obtaining urinary testing, catheter use and duration, and antibiotic appropriateness.

Results or Clinical Course: Of 81 SCI patients, 80.2% were male and Escherichia coli was the most common urinary pathogen. A trend towards more frequent urine testing was observed among SCI; however, this was not statistically significant (P=0.06). Moreover, a greater number of SCI patients had documentation of signs/symptoms of UTI to justify urine testing and treatment (P<0.001): cloudy or malodorous urine, urinary incontinence or retention, spasm/autonomic dysreflexia, dysuria, urinary frequency, pain, nausea, vomiting, fever, and altered mental status. Of the 46 (56%) SCI patients treated for a presumed UTI, 30 (65%) received unnecessary antibiotics for asymptomatic bacteriuria (ASB) based on IDSA criteria; this practice was analogous to the general rehabilitation population (P=.79).

Conclusion: The differentiation between ASB and UTI among SCI patients is difficult to discern. There is a significant difference in urinary symptoms outlined by IDSA and those considered in IPR clinical practice. This QI project highlights the importance of continued multiplicity involvement to close the gaps in diagnosis and management of this common dilemma.

Poster 32
Can Technology-Assisted Toilets Improve Quality of Life for Rehabilitating Stroke Patients? A Pilot Cohort Study

David Yachnin, BA, Jeffrey Jutai, PhD, Georges Gharib, Undergrad, Hillel M. Finestone, BS, MD (Elisabeth Bruyère Hospital, Ottawa, Canada)


Objective: To investigate whether technology-assisted toilets (TATs, toilets that clean the user with a stream of water) are effective for symptomatology at time of obtaining urinary testing, catheter use and duration, and antibiotic appropriateness.

Methods: Random selection of 165 patients admitted to IPR between November 2011 and August 2014; 81 were diagnosed with SCI and 84 had a general rehabilitation diagnosis.

Design: Case-control study using electronic medical records as a quality improvement (QI) initiative between IPR, Antimicrobial Stewardship, and Infection Control Council.

Setting: Acute IPR Units within a University-Affiliated Academic Medical Center.

Participants: Random selection of 165 patients admitted to IPR between November 2011 and August 2014; 81 were diagnosed with SCI and 84 had a general rehabilitation diagnosis.

Interventions: Descriptive review of acute rehabilitation patients focused on practices surrounding urinary testing, diagnosis, and management of UTIs.

Main Outcome Measures: Comparison of SCI vs. general rehabilitation for symptomatology at time of obtaining urinary testing, catheter use and duration, and antibiotic appropriateness.

Results or Clinical Course: Of 81 SCI patients, 80.2% were male and Escherichia coli was the most common urinary pathogen. A trend towards more frequent urine testing was observed among SCI; however, this was not statistically significant (P=0.06). Moreover, a greater number of SCI patients had documentation of signs/symptoms of UTI to justify urine testing and treatment (P<0.001): cloudy or malodorous urine, urinary incontinence or retention, spasm/autonomic dysreflexia, dysuria, urinary frequency, pain, nausea, vomiting, fever, and altered mental status. Of the 46 (56%) SCI patients treated for a presumed UTI, 30 (65%) received unnecessary antibiotics for asymptomatic bacteriuria (ASB) based on IDSA criteria; this practice was analogous to the general rehabilitation population (P=.79).

Conclusion: The differentiation between ASB and UTI among SCI patients is difficult to discern. There is a significant difference in urinary symptoms outlined by IDSA and those considered in IPR clinical practice. This QI project highlights the importance of continued multiplicity involvement to close the gaps in diagnosis and management of this common dilemma.

Poster 33
Double Disassociation of Anosognosia for Alexia and Simultanagnosia with Quantitative Awareness of Optic Ataxia: A Case Report

Reed C. Williams, MD (Temple University Hospital, Philadelphia, PA, United States), Riadhi Patira, MD, Eric Altschuler, MD, PhD

Disclosures: R. C. Williams: I Have No Relevant Financial Relationships To Disclose.

Case Description: A patient presented after being found down. On examination, cranial nerves were intact sans a right visual-field cut. He was able to identify individual letters but could not read (alexia). He could write and dictate, but could not then read his own writing. Unable to identify an object’s color (color anomia), he could correctly match like-colored objects. His speech was normal. When asked to describe the “Boston Cookie Theft” photo he replied, “a boy, a woman” (simultanagnosia). Asked to reach out and touch an object in space he consistently missed the target by an inch or two (optic ataxia). He had saccadic initiation failure (oculomotor apraxia) assessed by an optokinetic strip. He was aware of his visual-field cut, calling it an “obstruction”, but denied (anosognosia) his alexia and simultanagnosia. When corrected, the patient blamed his errors on the visual “obstruction” - even though both text and figure had been placed in the intact visual field (confabulation). Interestingly, however, the patient was precisely aware of his reaching difficulties reporting he was “slightly off.”

Setting: Tertiary care academic hospital.

Results or Clinical Course: CT scan revealed a left posterior cerebral artery infarct affecting the occipital lobe with hemorrhagic transformation involving the splenium of the corpus callosum.

Discussion: Most commonly patients have anosognosia for basic abilities such as movement (denial of hemiparesis) or vision (denial of cortical blindness or Anton’s syndrome). Here we present a fascinating case where these abilities are preserved but there are gross deficits of higher functions using the basic abilities of vision (alexia and simultanagnosia) and movement (optic ataxia). Remarkably, and fascinatingly there is a double disassociation, the first report of such of which we are aware, wherein the patient has anosognosia for alexia and simultanagnosia, but preserved, quantitative, insight for optic ataxia. This double disassociation thus makes this case informative as to the mechanism that may underlie anosognosia.

Conclusion: Appreciation that a patient has anosognosia for various deficits is crucial in the rehabilitation process. This case is informative on the mechanism of anosognosia and supports the intentional feedback and exemplar reafference models.

Poster 34
Intrathecal Versus Oral Baclofen: A Comparative Matched Cohort Study of Long-term Spasticity, Pain, Sleep, Fatigue and Quality of Life

Danielle Binler, MS (Rush Medical School, Chicago, IL, United States), Zack McCormick, MD, Samuel K. Chu, MD, Daniel Neudorf, DO, Jungwha Lee, PhD, MPH, Sunjay Mathur, MD, Christina M. Marciniak, MD

Disclosures: D. Binler: I Have No Relevant Financial Relationships To Disclose.

Objective: To compare outcomes of long-term intrathecal baclofen therapy with oral baclofen therapy for spasticity. This study aimed to compare health care professionals’ PIADS scores were higher but were lower than participants’ scores. TATs cleaned effectively in almost all cases.

Conclusion: In this population, TATs provided adequate toileting hygiene and enhanced participants’ quality of life compared with standard toileting. Health care decision-makers should consider providing TATs to rehabilitating stroke patients.
spasticity levels, pain, sleep, fatigue, and quality of life between individuals receiving treatment with intrathecal versus oral baclofen.

**Design:** Cross-sectional matched cohort survey study.

**Setting:** Urban academic rehabilitation outpatient clinics.

**Participants:** Adult patients with spasticity, treated with intrathecal or oral baclofen for at least 1 year, matched 1:1 for age, gender, and diagnosis.

**Interventions:** Not applicable

**Main Outcome Measures:** Surveys included the Penn Spasm Frequency Scale (PSFS), Brief Pain Inventory, Epworth Sleepiness Scale, Fatigue Severity Scale, Life Satisfaction Questionnaire, Diener Satisfaction with Life Scale.

**Results or Clinical Course:** 62 matched subjects were enrolled. The mean (standard deviation, [SD]) age was 46 (11) years with a mean duration of intrathecal baclofen or oral baclofen treatment of 10.8 (5.8) and 12.1 (10.4) years, respectively. There were 40 (64%) males and 22 (36%) females. Primary diagnoses included spinal cord injury (SCI) (n=38), cerebral palsy (n=10), stroke (n=10) and multiple sclerosis (n=4). The mean (SD) dose of intrathecal and oral baclofen at the time of survey were 577 mcg (1429) and 86 mg (50), respectively. Patients receiving intrathecal compared to oral baclofen experienced significantly fewer [1.4 (0.9) vs. 2.4 (1.1)] and less severe [1.4 (0.9) vs. 2.2 (0.8)] spasms, respectively, as measured by the PSFS (P<.01; P<.01). There were no significant differences in pain, sleep, fatigue and quality of life between groups. Subanalysis of patients with SCI mirrored results of the entire study sample, with significant decreases in spasm frequency and severity associated with intrathecal compared to oral baclofen (P<.01; P<.01), but no other between group differences.

**Conclusion:** Long-term treatment with intrathecal compared to oral baclofen is associated with reduced spasm frequency and severity.

**Poster 35**

Use of Bromocriptine in Akinetic Mutism after Superior Sagittal Sinus Thrombosis with Hemorrhagic Venous Infarcts: A Case Report

Laura E. Black, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Priya V. Mhatre, MD

**Disclosures:** L. E. Black: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 44-year-old woman initially presented to acute care with headaches and a third ventricle lesion that extended into the suprasellar cistern. She underwent bifrontal craniotomy with biopsy of the mass; pathology results showed pilocytic astrocytoma. Hospital course was complicated by superior sagittal sinus thrombosis with hemorrhagic venous infarcts in the bifrontal, callosal, and cingulated regions requiring decompressive hemisecraniecyttomy. Post-operative imaging showed a new transverse venous sinus thrombosis. After her craniectomy, the patient only uttered short sentences and did not initiate movement, consistent with akinetic mutism.

**Setting:** Acute inpatient rehabilitation (AIR) hospital.

**Results or Clinical Course:** The patient was admitted to acute inpatient rehabilitation, where she initially uttered 1-2 word responses and required significant cuing to initiate speech and movement. She was started on bromocriptine and intensive speech therapy. Her initiation of speech improved, however, she remained impulsive and distractable. She was maintained on bromocriptine throughout her outpatient rehabilitation course with improvement in speech output and fluency.

**Discussion:** Akinetic mutism is a disorder seen after frontal lobe lesions, specifically those that affect the cingulate gyrus, supplementary motor areas, and basal ganglia, and mesencephalic areas. Previous literature theorizes that the disorder is caused by damage to dopaminergic areas in these regions. Since this patient had hemorrhagic lesions affecting the bifrontal lobes and cingulated regions, bromocriptine may have improved dopaminergic transmission in these areas, resulting in clinical improvement.

**Conclusion:** This is the first case of venous hemorrhagic infarcts resulting in akinetic mutism that improved with bromocriptine to our knowledge. Treatment with dopaminergic agonists may enhance rehabilitation outcomes in these patients.

**Poster 36**

AbobotulinumtoxinA (Dysport®) In the Treatment of Adult Patients with Upper Limb Spasticity Due to Traumatic Brain Injury

Michael W. O’Dell, MD (Weill Cornell Medical Center, New York, NY, United States), Heather W. Walker, MD, Steven R. Edgley, MD, Jean-Michel Gracies, MD, PhD, Fatma Gul, MD, Michael Wimmer, MD, Claire Vilain, MD, Allison Brashear, MD

**Disclosures:** M. W. O’Dell: Consulting Fees or Other Remuneration — Ipsen, Ottobach; Research Grants - Ipsen, SPR

**Objective:** To determine the efficacy and safety of abobotulinumtoxinA 4 weeks after injection in patients with upper limb spasticity (ULS) caused by traumatic brain injury (TBI).

**Design:** Sub-analysis in a randomized, placebo-controlled, double-blind clinical trial.

**Setting:** International, multicenter study.

**Participants:** Twenty three of 243 (9.5%) hemiparetic patients with ULS caused by TBI.

**Interventions:** In the initial treatment cycle, 14 subjects received abobotulinumtoxinA (500 U or 1000 U) and 9 received placebo, intramuscularly.

**Main Outcome Measures:** Modified Ashworth Scale (MAS); Disability Assessment Scale (DAS); Tardieu scale (TS); Active range of motion (AROM); Physician Global Assessment (PGA), adverse events (AE).

**Results or Clinical Course:** Mean age (SD) of the 23 patients was 35 (13) years and males represented 65%. They had suffered closed (74%) or penetrating brain injury (26%) 10 years (mean) earlier. The majority (74%) had previously been treated with botulinum toxin. Four weeks after injection, a higher proportion of patients treated with abobotulinumtoxinA compared to placebo were responders in terms of tone reduction (≥1 point improvement in MAS): 64% versus 22%. This improvement was accompanied by improvement in subjective function (≥1 grade decrease from baseline for the principal target of treatment on the DAS scale): 71% versus 22% for placebo. With abobotulinumtoxinA, the angle of catch (XV3 of the TS) improved in finger (+35°), elbow (+22°) and wrist (+12°) flexors, resulting in a gain in active muscle extension of at least 5° (AROM). The overall clinical improvement (mean PGA score reaching at least grade 1) was higher with abobotulinumtoxinA versus placebo (93% versus 33%). 7 of 23 patients experienced a treatment emergent AE, none were unexpected.

**Conclusion:** In this small sub-population of hemiparetic adults with ULS due to TBI, abobotulinumtoxinA improved muscle tone, spasticity, passive function and active movements. Efficacy and safety of abobotulinumtoxinA in patients with ULS after a TBI were consistent with the results observed for the total population (TBI and post-stroke patients) in this international placebo controlled study.

**Poster 37**

Physical Disability Function in Stroke Patients: Validation of the Spanish Language Version of the Stroke Impact Scale-16

Blanca Palomino Aguado, Chief of Section (Ramon Y Cajal Hospital, Madrid, Spain), Lorenzo Jimenez Cosmos, Physical Medicine and Rehabilitation, Jose Acosta Batlle, Radiologist, Pilar Sanchez Tarifa, Physical Medicine and Rehabilitation, Ma Elena Martinez Rodriguez, Physical Medicine and Rehabilitation, Maria Santos Ollete, Physical Medicine and Rehabilitation

**Disclosures:** B. Palomino Aguado: I Have No Relevant Financial Relationships To Disclose.
Objective: SIS-16 is a specific outcome stroke measure used to assess physical disability in acute stroke patients. The aim of this study was to validate the Spanish version of SIS-16 version 3.0, to assess the instrument psychometric properties in a sample of patients with acute ischemic stroke.

Design: Prospective study. The Spanish version of SIS-16 was administrated along with the Barthel Index (BI), that is a widely accepted standard instrument to assess disability, the modified Rankin scale (mRS) and SF-12. The main outcome measure was to assess the psychometric properties of the SIS-16 instrument in a Spanish population.

Setting: Rehabilitation Department of Hospital during last years with a specific program of rehabilitation at discharge from the hospital.

Participants: 149 patients with an acute ischemic stroke during the first three months after stroke with the inclusion criteria: ischemic stroke, aged 18 years or older, previously independent, written informed consent given. The exclusion criteria were known serious illness and unlikely to be available for follow-up.

Interventions: No specific interventions.

Main Outcome Measures: The Spanish validation of the scale SIS-16 (stroke impact scale-SIS-16) and to assess the instrument psychometric properties in the Spanish population.

Results or Clinical Course: The Spanish version of SIS-16 was found to have good sensitivity and specificity, high internal consistency (Cronbach's alfa: 0.940 [95% CI: 0.692-0.847]) and validity with r correlation coefficients ranging 0.769. The test-retest correlation assessed with the intraclass correlation coefficient was 0.995. The total SIS-16 score was significantly correlated with other disability measures assessed (BI; mRS), but less so with the SF-12 scale.

Conclusion: The Spanish version of SIS-16 version 3.0 appears to have good psychometric properties and be a valid tool for assessing physical disability in ischemic stroke patients during the first 3 months post-stroke.

Poster 38
Spastic Scapular Dyskinesia After Stroke: Two Case Reports

Saiyun Hou, MD, PhD (Baylor College of Medicine, Houston, TX, United States), Cindy B. Ivanhoe, MD, Sheng Li, MD, PhD

Disclosures: S. Hou: I Have No Relevant Financial Relationships To Disclose.

Case Description: 1. An 86-year-old right-handed woman sustained a hemorrhagic stroke, resulting in right spastic hemiplegia. She presented 10 months post-stroke with right hemiparesis. She had decreased active range of motion in her right shoulder but normal in her right elbow, wrist and hand. Her right rhomboid muscles have spasticity upon physical examination and needle electromyography study. She was discharged from therapy programs. 2. A 53-year-old right-handed woman developed a left MCA infarct after stenting of the left MCA aneurysm 2 years ago with residual right hemiparesis. The patient has completed a course of outpatient therapies. She was inconsistently able to elevate her right shoulder and reach her mouth for eating. She had adequate passive and active range of motion in her right elbow, wrist and hand. Her right rhomboid and lower trapezius muscles are spastic based on physical examination and needle electromyography study.

Setting: Tertiary care hospital.

Results or Clinical Course: In the first case, a total of 100 units of botulinum toxin A were injected into the right rhomboid muscles (3 sites) under ultrasound imaging guidance. In the second case, patient received 200 units of botulinum toxin injection to rhomboid and lower trapezius (100units each) under ultrasound imaging guidance. Patients did not receive therapy after injection. During the follow-up visit 3 weeks later, both patients showed increased shoulder active range of motion after botulinum toxin injection.

Discussion: Spastic scapular dyskinesia after stroke is rare. To date, there is no report on botulinum toxin injections to spastic periscapular muscles. The results of the two cases report suggest that botulinum toxin injection to spastic periscapular muscles is not likely to cause scapular destabilization in patients with spastic scapular dyskinesia. Rather, it can increase shoulder active range of motion.

Conclusion: Botulinum toxin injection to spastic muscles is promising for management of spastic scapular dyskinesia after stroke.
position for over an hour and was able to get out of the water. He began feeling fatigued, walked back to his hotel where within one hour he began having lower back pain, bilateral lower extremity weakness, urinary retention and difficulty walking. Patient was taken to the local hospital in Honolulu. MRI of the spine showed no fracture, dislocation or ligamentous injury. A signal abnormality at T9 to the conus medullaris tip with questionable restriction diffusion. On manual muscle testing he was noted to have 2/5 strength in his lower extremities. Patient’s light touch sensation and proprioception were intact. He was later discharged to acute inpatient rehabilitation.

**Setting:** Acute Inpatient Rehabilitation.

**Results or Clinical Course:** On initial physical examination patient was noted to be ASIA C. Gait training trial with zero G body weight support (BWS) was used to help the patient ambulate. Patient was provided 35% BWS at a treadmill speed of 1.8. Two days prior to discharge patient was having 5.7% BWS at a speed of 3.0mph and a 2% grade incline. Patient was able to ambulate 150 ft independently indoors and 300ft independently outdoors on uneven surfaces and inclines. Patient was ASIA D at discharge.

**Discussion:** Surfer’s myelopathy is a rare non-traumatic cause of spinal cord injury. The literature has very few reported cases but all presents with very similar onset. Patients have sudden onset lower back pain, lower leg weakness and paralysis within 10-60 minutes. Patients with higher grade ASIA grades on admissions appeared to have worse prognosis. The patient mentioned in this case report had a relatively low ASIA grade at C and made excellent progress to his goals of ambulating independently particularly with the use of BWS ambulation.

**Conclusion:** The use of body weight support in this Surfer’s myelopathy case during his physical therapy sessions allowed the patient to make progress toward his goal of independent ambulation.

**Poster 41**

*Gender Differences in Visceral Adiposity after a Spinal Cord Injury*

**Revati Mummaneni** (Virginia Commonwealth University, Richmond, VA, United States), **Steven D. Jackson**, **Ashraf Gorgey**, **PT, PhD**, **David R. Gater**, **MD, PhD, MS**

**Disclosures:** R. Mummaneni: I Have No Relevant Financial Relationships To Disclose.

**Objective:** The prevalence of spinal cord injury (SCI) in males is greater than females, with a ratio of 4:1. There is limited research involving women with SCI. It is known that visceral adipose tissue (VAT) is an independent risk factor for cardiovascular disease in the general population. However, the cardio-metabolic risk factors are not well defined in women with SCI. The purpose of this study was to investigate cross-sectional areas (CSAs) of VAT and subcutaneous adipose tissue (SAT) in men and women with a chronic (> 1-year post-injury) SCI. This study quantified the VAT and SAT in the upper (liver to umbilicus) and lower (umbilicus to femoral head) trunk region in both genders.

**Design:** Cross-sectional.

**Setting:** Clinical hospital and academic settings.

**Participants:** 16 participants (8 male, 8 female) with a motor complete spinal cord injury.

**Main Outcome Measures:** Sixteen individuals with motor complete, AIS Impairment Scale (AIS) level A/B, SCI were divided into two groups of 8 males and 8 females. A fast spin-echo MRI and Image J software were used to quantify the average CSA of the absolute VAT and SAT. Both groups were closely matched with age, level and time since injury. Mean and SDs were listed and independent t-tests were performed on the studied variables using IBM-SPSS (v.22).

**Results or Clinical Course:** There was a significant difference with a greater SAT in females compared to males in the lower trunk (P = .046) and a greater VAT in males compared to females in the upper trunk (P = .016). There was also a significant difference with a greater adjusted SAT in females compared to males in upper trunk (P = .008) and a greater adjusted VAT in males compared to females in the upper trunk (P = .016).

**Conclusion:** Gender difference plays a significant role in central adiposity in individuals with SCI.

**Poster 42**

*Baclofen Dose Escalation Study: Using Clinical Tolerance and Pharmacokinetics to Predict Dosing Recommendations for IV Baclofen*

**Robert L. Kriel**, **MD** (University of Minnesota, Minneapolis, MN, United States), **Natalie Schmitz**, **Lisa D. Coles**, **PhD**, **Linda E. Krach**, **MD**, **James C. Cloyd**, **PharmD**

**Disclosures:** R. L. Kriel: Research Grants - Paralyzed Veterans of America; Other - Allayxis

**Objective:** 1.) Evaluate the safety profile and pharmacokinetics of oral (PO) and an investigational intravenous (IV) baclofen formulation at clinically relevant doses. 2.) Develop kinetic model to guide substitution of IV formulation for oral dosing.

**Design:** Randomized, open-label, crossover study.

**Setting:** Contract Research Organization (CRO).

**Participants:** 36 healthy adults

**Interventions:** Each subject received either a single dose of oral baclofen (10mg, 15mg or 20mg) or a 10-minute infusion of IV baclofen (7.5mg, 11.5mg or 15mg respectively) followed by the alternate formulation after a minimum 48-hour wash out period. Selection of IV baclofen doses was based on 75% bioavailability determined in a previous low dose study.

**Main Outcome Measures:** Subjects were observed in a CRO for 24 hours following all doses. Blood samples were collected from 0 – 24h for analysis using HPLC-mass spectroscopy. Subjects were assessed for nystagmus, ataxia and sedation (using the Modified Sanford Sleepiness Scale and reported as change from baseline). Differences between PO and IV and time of assessment were analyzed using Two-Way Repeated Measures ANOVA. Pharmacokinetic analysis was performed using the WinNonLin program.

**Results or Clinical Course:** IV baclofen was tolerated at clinically relevant doses. None of the PO or IV doses resulted in significant sedation compared to baseline. All subjects could perform tandem gait after all doses. The most common side effect was transient mild nystagmus affecting 4/36 and 13/36 subjects following PO and IV administration, respectively. After the 10mg PO/7.5mg IV doses, mean maximum concentrations were 120 and 302 ng/ml and half-lives were 5.9 and 5.5 hours for PO and IV, respectively. Mean oral bioavailability was about 90%.

**Conclusion:** All PO and IV doses were clinically tolerated. Results suggest an equivalent IV dose requires about 90 of the oral dose. When oral therapy is interrupted, bridging with IV baclofen should be feasible.

**Poster 43**

*significant Functional Improvement after Spinal Arachnoid Cyst Excision in a Young Adult with Axenfeld-Rieger Syndrome: A Case Report*

**Kathryn Gulfo, MD** (New York-Presbyterian University Hospital of Columbia and Cornell, New York, NY, United States), **Blossom Samuels, C. David Lin, MD**

**Disclosures:** K. Gulfo: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 24-year-old man from Panama with Axenfeld-Rieger syndrome presented with progressive low back pain and gait instability since age 12. Axenfeld-Rieger is a genetic syndrome which primarily affects vision, but this patient had impaired hearing, glaucoma, aortic insufficiency, and neurogenic bladder at baseline, which had all been attributed to this genetic syndrome. The patient was
independent in most activities but by the time of presentation, he reported about 15 falls every 6 months, interfering with his functional independence. Spine MRI showed a thoracic spinal cyst extending from T1-T2 to T9-T10 and measuring 3.3cm transversely \( \times \) 1.9cm anteroposteriorly. He underwent T3-T8 osteoplastic laminectomy, T2 laminectomy, and removal of spinal cyst without major complications. Surgical pathology confirmed the diagnosis of spinal arachnoid cyst.

**Setting:** Academic Tertiary Care Hospital.

**Results or Clinical Course:** After medical optimization, the patient was admitted to inpatient rehabilitation on post-operative day seven. He underwent intensive multidisciplinary therapies, resulting in significant functional improvements in standing balance, activity tolerance, and ambulation. At the time of admission to inpatient rehabilitation, bilateral lower extremity strength was 3/5 diffusely and Timed Up and Go (TUG) was 36 seconds. This prolonged TUG score predicts dependence in ADLs and mobility. By the time of discharge back to Panama, bilateral lower extremity strength increased to 4/5 in hip and knee flexors, he was ambulating 300 feet without an assistive device, and TUG improved to 16 seconds.

**Discussion:** This is the first reported case of a patient with Axenfeld-Rieger syndrome with a symptomatic spinal arachnoid cyst who experienced significant functional improvement after surgical excision of the cyst and intensive inpatient rehabilitation. According to the available literature, early surgical intervention for spinal arachnoid cysts is recommended and generally results in better outcomes. Conclusion: Despite relatively delayed diagnosis and intervention, as well as underlying physical impairments, life-altering improvements in function and independence are possible for motivated patients with spinal arachnoid cysts after excision and intensive rehabilitation.

**Poster 44**

**An Empirical Classification Scheme for Detection of Impossible and Improbable CRS-R Subscore Combinations**

Camille Chatelle, PhD, Yelena Bodien, PhD (Spaulding Rehabilitation Hospital, Charlestown, MA, United States), Cecilia Carlowicz, BSc, Steven Laureys, MD, PhD, Joseph T. Giracino, PhD

**Disclosures:** Y. Bodien: I Have No Relevant Financial Relationships To Disclose.

**Objective:** The Coma Recovery Scale-Revised (CRS-R) is a standardized neurobehavioral assessment measure designed for use in diagnosing and assessing patients with disorders of consciousness. Twenty-three items are divided into 6 subscales that assess auditory, visual, motor, and arousal functions. Despite the CRS-R’s clear criteria for establishing a diagnosis based on subscale scores, many research studies report only the total CRS-R score when discussing patient outcomes and clinicians frequently only consider total score improvements or declines when discussing recovery. The aim of this report is to describe the sensitivity and specificity of CRS-R total scores in detecting conscious awareness.

**Design:** CRS-R scores were retrospectively extracted from the medical record of patients enrolled in the Spaulding Rehabilitation Network Disorders of Consciousness (DOC) program. Sensitivity and specificity analyses were completed with “conscious awareness” (i.e., CRS-R-derived diagnosis of minimally conscious state [MCS] or emerged from MCS) as the condition of interest and total CRS-R score as the “test criterion”.

**Setting:** Specialized DOC Program.

**Participants:** 253 inpatients (157 male, mean age = 49, standard deviation= 19.7; mean days since injury= 48, standard deviation= 53; traumatic brain injury= 127, non-traumatic brain injury= 125).

**Interventions:** NA

**Main Outcome Measures:** Sensitivity and specificity of CRS-R total scores in detecting conscious awareness.

**Results or Clinical Course:** A CRS-R total score of 10/23 provided 100% sensitivity for detecting conscious awareness, but only 64.2% specificity. That is, all patients with a total score of 10/23 or higher demonstrated conscious awareness, and 35.8% of patients scoring less than 10/23 also demonstrated conscious awareness. A total score of 7/23 yielded optimal sensitivity (90.4%) and specificity (90.3%).

**Conclusion:** Examiners should be aware that CRS-R scores in detecting conscious awareness.

**Poster 45**

**Utility of the Coma Recovery Scale-Revised Total Score in Detecting Conscious Awareness**

Yelena Bodien, PhD (Spaulding Rehabilitation Hospital, Charlestown, MA, United States), Cecilia Carlowicz, BSc, Camille Chatelle, PhD, Joseph T. Giracino, PhD

**Disclosures:** Y. Bodien: I Have No Relevant Financial Relationships To Disclose.

**Objective:** The Coma Recovery Scale-Revised (CRS-R) is a standardized neurobehavioral assessment measure designed for use in differential diagnosis, prognostic assessment, and treatment planning in patients with disorders of consciousness. Twenty-three items are divided into 6 subscales that assess auditory, visual, motor, and arousal functions. Despite the CRS-R’s clear criteria for establishing a diagnosis based on subscale scores, many research studies report only the total CRS-R score when discussing patient outcomes and clinicians frequently only consider total score improvements or declines when discussing recovery. The aim of this report is to describe the sensitivity and specificity of CRS-R total scores in detecting conscious awareness.

**Design:** CRS-R scores were retrospectively extracted from the medical record of patients enrolled in the Spaulding Rehabilitation Network Disorders of Consciousness (DOC) program. Sensitivity and specificity analyses were completed with “conscious awareness” (i.e., CRS-R-derived diagnosis of minimally conscious state [MCS] or emerged from MCS) as the condition of interest and total CRS-R score as the “test criterion”.

**Setting:** Specialized DOC Program.

**Participants:** 253 inpatients (157 male, mean age = 49, standard deviation= 19.7; mean days since injury= 48, standard deviation= 53; traumatic brain injury= 127, non-traumatic brain injury= 125).

**Interventions:** NA

**Main Outcome Measures:** Sensitivity and specificity of CRS-R total scores in detecting conscious awareness.

**Results or Clinical Course:** A CRS-R total score of 10/23 provided 100% sensitivity for detecting conscious awareness, but only 64.2% specificity. That is, all patients with a total score of 10/23 or higher demonstrated conscious awareness, and 35.8% of patients scoring less than 10/23 also demonstrated conscious awareness. A total score of 7/23 yielded optimal sensitivity (90.4%) and specificity (90.3%).

**Conclusion:** Examiners should be aware that CRS-R total score cut-offs are associated with marked differences in sensitivity and specificity relative to detection of conscious awareness.

**Poster 46**

**Impact of Earlier Rehabilitation on Outcomes Following Spinal Cord Injury**

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**Disclosures:** K. Herzer: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To evaluate whether earlier rehabilitation improves outcomes following traumatic spinal cord injury (SCI).

**Design:** Retrospective observational study. Inverse-probability weighting (IPW) with propensity scores was used to estimate average treatment effects and reduce confounding.

**Setting:** Acute and post-acute care provided in 6 specialized SCI rehabilitation programs in the United States between 2007 and 2009.
Overall, accuracy improved in all arms over time. Significant dimensional control of cursor movement using a single sEMG sensor. Survivors to control subjects using this novel sEMG system.

Conclusion: (P-value and paretic arms significantly changed over the three sessions time, and the interaction between group and time. The dominant non-dominant arm over three sessions. A two-way repeated measures computer cursor in two dimensions to randomly presented targets on a either at the extensor pollicis longus or biceps brachii to move a either at the extensor pollicis longus or biceps brachii to move a.

Participants: 1,376 participants in the SCIRehab Project; 404 (29%) entered rehabilitation within 2 weeks of injury and 972 (71%) received rehabilitation after 2 weeks. (Use of 2 weeks to mark “early” rehabilitation is consistent with prior research.)

Interventions: Not applicable


Results or Clinical Course: IPW using propensity scores rendered the earlier vs. later groups comparable on several dozen demographic and clinical characteristics, including severity of illness and the American Spinal Injury Association (ASIA) Impairment Scale at admission. Mean time-to-rehabilitation from injury was 30 days (standard deviation, 27). Earlier rehabilitation was associated with 5.74 (95% confidence interval [CI], 3.54 to 7.93) and 7.31 (95% CI, 4.50 to 10.12) higher FIM Motor Scores at discharge and 1-year post-injury, respectively, and a 13.00 (95% CI, 8.70 to 17.25) higher CHART Physical Independence score. Self-rated health and satisfaction with life were not significantly different across groups (P > .05).

Conclusion: Comparing otherwise similar patients with traumatic SCI, earlier rehabilitation was associated with improvements in functional status at discharge from rehabilitation and at 1-year post injury.

Poster 47
A Single Surface EMG Interface to Control Multiple Degrees of Freedom in Stroke Survivors

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Objective: To test the use of a novel sEMG (surface electromyography) interface for controlling a computer cursor in two dimensions from a single surface electrode by individuals with hemiparesis after stroke.

Design: Feasibility study.

Setting: Outpatient medical center.

Participants: A total of 14 subjects (n=8 stroke, n=6 control).

Interventions: Subjects used the interface with electrode placed either at the extensor pollicis longus or biceps brachii to move a computer cursor in two dimensions to randomly presented targets on a tablet screen. Each subject was tested over three sessions, consisting of 90 cursor-to-target trials with each arm (180 total trials per session). Both paretic and non-paretic arms (stroke) were compared to dominant and non-dominant arms (control).

Main Outcome Measures: Accuracy (% of targets achieved) was calculated for each session and analyzed over time.

Results or Clinical Course: The mean accuracy improved 50±7 to 55±11% for the paretic arm, 63±11 to 66±10% for the non-paretic arm, 54±11 to 67±12% for the dominant arm, and 64±13 to 74±8% for the non-dominant arm over three sessions. A two-way repeated measures ANOVA was used to determine the differences between groups, over time, and the interaction between group and time. The dominant and paretic arms significantly changed over the three sessions (P-value=.05). Significant differences were also noted between the paretic and non-paretic groups as a whole (P-value=.002).

Conclusion: This is the first study comparing performance in stroke survivors to control subjects using this novel sEMG system. Using this interface, healthy subjects and stroke survivors demonstrated multidimensional control of cursor movement using a single sEMG sensor. Overall, accuracy improved in all arms over time. Significant differences in accuracy were noted between groups; however, with the current model and design only the non-dominant arm of the control group was able to reliably reach the 70% accuracy standard by session 3. Additional research is warranted to evaluate utility of this technology for enhancing functional independence in individuals with motor impairments.

Poster 48
Treatment of Susac’s (Retinocochleocerebral Vasculopathy) Syndrome in Rehabilitation: A Case Report

William Wagner, MD (University of Utah, Salt Lake City, UT, United States), Steven R. Edgley, MD

Disclosures: W. Wagner: I Have No Relevant Financial Relationships To Disclose.

Case Description: Ms. X is a 27-year-old woman with history of depression, migraines, hypothryoidism, HLD, pre-diabetes who presented with headaches, blurriness of vision and increased confusion. She was admitted to Neurology with initial concern for stroke, although the work up was negative. MRI revealed numerous areas of high diffusion signal within the supratentorial and infratentorial parenchyma, with the majority of the lesions centered around or within the corpus callosum and thalami. Ophthalmology was consulted for the vision changes and she was found to have a left superior temporal branch retinal artery occlusion and evidence of Gass plaques. These combined findings were very suggestive of Susac’s syndrome, which is often characterized by a vision loss, low frequency hearing loss and personality change. She was admitted to acute inpatient rehabilitation for treatment of her cognitive deficits.

Setting: Primary/Acute care hospital.

Results or Clinical Course: Ms. X had deficits primarily in cognition and had an initial MOCHA of 10/30. She would also experience regular delusions and hallucinations. She was treated with a course of IV Solumedrol, followed by Prednisone and Cellcept. She improved cognitively with speech therapy and her discharge MOCHA was 19/30, but still had deficits specifically in the delayed recall and executive/visuospatial tasks. Unfortunately, she continued have intermittent delusions leading up to discharge. She was discharged on Prednisone and Cellcept. She continued therapies as an outpatient and had further cognitive testing, which will be fully detailed in the complete case. She followed up with Neurology and Physical Medicine and Rehabilitation.

Discussion: Susac’s syndrome is rare condition and this is the first case report outlining specific treatment challenges of the condition.

Conclusion: Susac’s syndrome introduces interesting challenges to inpatient rehabilitation, specifically in regards to cognitive deficits. Our patient presented with strong cognitive deficits and benefited from a rehabilitation program that was focused on cognitive recovery.

Poster 49
Moral Injury, Spiritual Health, and PTSD in OEF/OIF Veterans with Mild TBI

Ryan O. Stephenson, DO (Denver VAMC- University of Colorado, Denver, CO, United States), Holly R. Gerber, BA, Lisa Brenner, PhD


Objective: This study aims to explore psychological, moral, and spiritual health factors that may contribute to the maintenance of post-concussive symptoms (PCS) in Veterans with mild traumatic brain injury (mTBI).

Design: This is an observational study of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) Veterans with mTBI.

Setting: All participants were recruited from the Veterans Health Administration Eastern Colorado Health Care System.
Participants: OEF/OIF Veterans with mTBI (N=57). The majority of participants were male (89.5%) with a mean age of 32.5 and two combat deployments.

Interventions: Not applicable

Main Outcome Measures: Clinical interviews were used to assess lifetime history of mTBI and PTSD. Questionnaires included the Moral Injury Events Scale (MIES), Spiritual Health and Life-Orientation Measure (SHALOM), and Brief Multidimensional Measure of Religiousness/Spirituality (BMHRS).

Results or Clinical Course: Participants reported high levels of perceived moral transgressions (M=20.8, SD=8.1) and perceived moral betrayals (M=11.1, SD=4.5), as well as high rates of PTSD diagnoses (86%). Discrepancies were found between ideal (M=16.2) and current (M=12.5) levels of spiritual health. Preliminary results suggest a preference for individuals to identify as spiritual rather than religious (M=2.5, 3.1, respectively, SD=1). Further, 33.4% of the sample identified as atheist, agnostic, or as having no religion, while 50.8% identified as Christian.

Conclusion: Preliminary data reveal rates of moral injury, spiritual health, and post-traumatic stress disorder. Veterans with mTBI reported greater moral injury than has been previously reported in other military samples. Discrepancies found between ideal and current states of spiritual health highlight unsatisfactory spiritual well-being. Religious preferences (or rejection thereof) were noteworthy. These findings call attention to potential factors associated with PCS maintenance, and reinforce the need for continued exploration of moral injury and spirituality.

Poster 50
Progressive Lower Extremity Weakness Due to Nitrous Oxide Induced Myelopathy: A Case Report

Matthew Jones, MD (William Beaumont Hospital, Royal Oak, MI, United States), Julie A. Ferris, MD, Ronald S. Taylor, MD

Disclosures: M. Jones: I Have No Relevant Financial Relationships To Disclose.

Case Description: An 18-year-old female presented to the Emergency Department with hand numbness, progressive lower extremity weakness, and bilateral foot drop. Her symptoms began 2-3 weeks prior to presentation and had been getting worse. She denied bulbar symptoms or bowel and bladder dysfunction. On examination, she was found to have 4/5 (Medical Research Council) bilateral proximal lower extremity muscle strength and 2/5 distal strength. Upper extremity strength was normal. Reflexes were absent in the upper extremities, 2+ for the patellar, and 1+ for the achilles. Her gait was ataxic. On discussion with the patient, she revealed that she was a frequent recreational nitrous oxide user.

Setting: Tertiary Care Hospital.

Results or Clinical Course: Magnetic resonance imaging (MRI) demonstrated extensive, non-enhancing increase of T2 signal involving the dorsal columns of the cervical spinal cord and scattered areas within the dorsal columns of the thoracic cord. Vitamin B12 and methylmalonic acid levels were drawn which were normal, although the patient had been supplemented with vitamin B12 at an outside hospital prior to her presentation at our institution. Other causes of posterior column degeneration including HIV, syphilis, and heavy metals were ruled out. The patient was diagnosed with nitrous oxide induced myelopathy. She was admitted to inpatient rehabilitation (IPR) where her course was complicated by ataxia and lower extremity weakness. At the time of discharge, she was able to ambulate 100 ft with bilateral AFOs.

Discussion: Nitrous oxide induced myelopathy is a known consequence of nitrous oxide abuse due to irreversible oxidation and thus inactivation of vitamin B12. Although vitamin B12 levels are frequently low in this condition, this is not always a requirement.

Conclusion: Nitrous oxide is a commonly used recreational drug that can result in devastating consequences. Screening for nitrous oxide use should be performed in young patients presenting with symptoms of myelopathy.

Poster 51
Electrodiagnostic Findings in Anterior Spinal Cord Syndrome: A Case Report

Hana F. Azizi, MD (Montefiore Medical Center, New York, NY, United States), Pegah Dehghan, Dennis D. Kim, MD

Disclosures: H. F. Azizi: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 75-year-old woman with history of DM, hypertension, and hypercholesterolemia, developed sudden onset of weakness in lower extremities, with severe pain in lower back and lower extremities without numbness. MRI showed severe lumbar stenosis and a questionable area of gray matter ischemia between T10 level and conus medullaris. Patient received conservative treatment including steroids with no significant improvement. Five months later, she was referred for electrodiagnostic evaluation of weakness in bilateral lower extremities. Physical examination revealed severe distal weakness in lower extremities with left foot drop. There was decreased appreciation of light touch in lower extremities with preserved vibration and position sense.

Setting: Electrodiagnostic laboratory at teaching hospital.

Results or Clinical Course: Electrodiagnostic study showed unobtainable bilateral sural sensory nerves action potentials (SNAP), unobtainable left tibial and peroneal nerves compound muscle action potentials (CMAP), and very low CMAP amplitude in the right tibial and peroneal nerves with decreased conduction velocities. F responses were recorded only from the right gastrocnemius-soleus complex. The amplitude was slightly decreased in the left ulnar SNAP with mild prolonged latency. Needle EMG showed very small fibrillation potentials with no voluntary motor units in left gastrocnemius, and small fibrillation potentials, positive sharp waves and 1-2 voluntary motor units of high firing rate in left peroneus longus muscle. Needle insertion in these muscles was associated with a gritty feeling signifying fibrotic changes. There was no significant abnormal EMG findings in other muscle groups including para spinal muscles.

Discussion: These findings were most likely consistent with anterior spinal cord ischemia. Unobtainable bilateral sural nerves SNAP and decreased SNAP in ulnar nerve could be explained by old age and diabetes. Anterior spinal cord syndrome results from compression of the anterior spinal artery and often occurs in the absence of traumatic injury. It is frequently asymmetrical and may spare the dorsal columns.

Conclusion: Anterior spinal cord syndrome has the worst prognosis among incomplete spinal cord injuries. The chance of motor recovery is low, and supportive devices such as ankle foot orthosis should be considered.

Poster 52
Remarkable Motor and Neurocognitive Recovery in H1N1 Hemorrhagic Encephalitis after Acute Rehabilitation

Steven Ross, DO (NYU, New York, NY, United States)

Disclosures: S. Ross: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 38-year-old previously healthy man presented to the ER with new-onset tonic-clonic seizures. History was significant for a recent visit to Nepal. MRI revealed increased T2/FLAIR signal with bilateral hemisphere involvement with associated hemorrhage in the temporal lobes and thalami consistent with hemorrhagic encephalitis. A positive nasal swab for H1N1 RNA confirmed the diagnosis of H1N1 hemorrhagic encephalitis. Though the acute hospital course was
significantly complicated including the requirement for tracheotomy, the patient responded to acyclovir. Nearly two months after initial presentation, he was transferred to the traumatic brain injury unit for acute inpatient rehabilitation. Upon admission, the patient’s cognition was globally impaired with transcortical sensory aphasia and generalized weakness. Functionally, he required total assistance for all activities of daily living (ADL) and maximum assistance for transfers.

Setting: Inpatient

Results or Clinical Course: A program for low arousal brain injured patients was initiated including sensory stimulation and neuropharmacological intervention with amantadine. During the course of recovery, Valproic acid was added to the regimen to control his impulsivity and disinhibition. He was successfully decannulated and at the time of discharge home, he was modified independent with ambulation and ADLs though still required 24 hour supervision for his residual memory deficit and poor safety awareness. He received continued PT/OT as an outpatient after discharge. 24 hour supervision was weaned off and at most recent follow-up 10 months after initial presentation, the patient began to volunteer at a hospital with the goal of eventually returning to work.

Discussion: There are few international case reports detailing patients with H1N1 encephalitis with variable functional improvement after acute rehabilitation. To our knowledge, this is the first case report of a patient with H1N1 encephalitis with good functional recovery in multiple domains after acute rehabilitation in the United States.

Conclusion: H1N1 hemorrhagic encephalitis can cause serious cognitive and functional impairment despite proper medical treatment. A course of inpatient rehabilitation is appropriate for these patients and can lead to significant neurologic recovery.

Poster 53

The Shape/Texture Identification Test is a Reliable Measure to Assess Active Touch after Stroke

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Disclosures: C. Brogardh: I Have No Relevant Financial Relationships To Disclose.

Objective: To evaluate the test-retest reliability of the Shape/Texture Identification test (STI-testTM) in persons with chronic stroke.

Design: A test-retest design.

Setting: A university hospital outpatient clinic.

Participants: A convenience sample of 45 men and women (mean age 65 years) with mild to moderate impairments in the upper extremity at least 6 months post stroke.

Interventions: Not applicable.

Main Outcome Measures: The STI-test was used to assess active touch of the hands. Active touch of the hand is important to be able to explore shapes, textures, to identify different objects and materials, as well as for the ability to grasp and manipulate objects. The STI-test consists of two different subtests: identification of shapes and textures. There are three different shapes and three textures, each in three different sizes, which should be identified without any help of vision. Both hands were assessed twice, one week apart. The reliability of the data from the two test occasions was evaluated for the total sum score (using weighted kappa statistics and percentage agreement, PA) and for the two subtests (using the Svensson rank-invariant method).

Results or Clinical Course: The median total score of the STI-test was 5 points (min-max 0 to 6) for the more affected hand and 6 points (min-max 3 to 6) for the less affected hand at both test occasions. The weighted kappa coefficient was 0.98 for the more affected hand and 0.76 for the less affected hand. The PA (the same score at both test occasions) for the subtest ‘identification of shapes’ was 69% for the more affected hand and 62% for the less affected hand. Corresponding figures for the subtest ‘identification of textures’ were 82% and 91%, respectively. There were no systematic or random disagreements for any of the subtests.

Conclusion: The STI-test is reliable to assess active touch (identification of shapes and textures) for both the more and the less affected hand in persons with chronic stroke. It can be recommended for the evaluation of changes in somatosensory function over time or effects of different somatosensory rehabilitation interventions.

Poster 54

Efficacy and Safety of Repeated IncobotulinumtoxinA Injections for Upper-Limb Post-Stroke Spasticity

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Disclosures: M. C. Munin: I Have No Relevant Financial Relationships To Disclose.

Objective: To investigate efficacy and safety of repeated incobotulinumtoxinA (Xeomin®) injections for upper-limb post-stroke spasticity.

Design: 36-week open-label extension (OLEX) of a randomized placebo-controlled Phase 3 trial (NCT01392300)

Setting: 46 study sites worldwide.

Participants: Subjects (18–80 years) with upper limb post-stroke spasticity, who completed the 12-week randomized placebo-controlled main period (MP).

Interventions: Three treatments with incobotulinumtoxinA (fixed total dose 400 U), injected into the affected muscles of one upper limb at fixed 12-week injection intervals.

Main Outcome Measures: Evaluation of muscle tone (Ashworth Scale; AS), Disability Assessment Scale (DAS), Carer Burden Scale, and incidence of adverse events (AEs).

Results or Clinical Course: Nearly all subjects (296/299) who completed the MP received incobotulinumtoxinA in the OLEX; 248 subjects completed the OLEX. The proportion of subjects with ≥1 point improvement in AS score from each incobotulinumtoxinA treatment to the respective 4-week post-injection control visit was 52.3–59.2% for wrist flexors, 49.1–52.3% for elbow flexors, 59.8–64.5% for finger flexors, 35.5–41.2% for thumb flexors, and 37.4–39.9% for forearm pronators (P<.0001 for all). The mean DAS score for the principal target domain significantly improved from each incobotulinumtoxinA treatment to the respective 4-week assessment (P<.0001 for all). From the MP baseline to the study-end visit, significant improvements in Carer Burden Scale scores were seen for ‘cleaning palm’ (58/108 subjects, 53.7%; P<.0001), ‘cutting fingernails’ (65/125 subjects, 52.0%; P<.0001), ‘cleaning armpit’ (50/112 subjects, 44.6%; P=.0023), and ‘putting arm through sleeve’ (59/116 subjects, 50.9%; P<.0001). ‘Applying splint’ improved in 8/14 subjects (57%; P=.1484).Treatment-related AEs were reported by 9/296 subjects (3.0%) during the OLEX, most frequently pain in the extremity (n=2, 0.7%) and constipation (n=2, 0.7%). Serious AEs were reported by 22 subjects (7.4%); none were related to treatment.

Conclusion: Repeated incobotulinumtoxinA injections were a well tolerated treatment for upper-limb, post-stroke spasticity and led to reductions in muscle tone that translated into meaningful clinical improvements in disability and carer burden.

Poster 55

Switching Botulinum Toxin Formulations from OnabotulinumtoxinA to IncobotulinumtoxinA: Experience from a Spasticity Outpatient Clinic

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Disclosures: P. K. Datta: Research Grants - MERZ Pharmaceuticals

Objective: To evaluate outcomes, doses and treatment intervals after switching between botulinum neurotoxin type A (BoNT-A) formulations for patients with spasticity.
Results or Clinical Course: Results of the fMRI and Coma Recovery Scale-Revised (CRS-R) assessment were in agreement for both command-following and communication. fMRI data showed significant activation at the left occipito-temporal junction and in the right fusiform gyrus in response to visual discrimination commands consistent with CRS-R performance indicating behavioral evidence of command-following (auditory subscale score = 4). There was also significant activation at the left occipito-temporal junction and in the right fusiform gyrus during communication of yes/no answers, consistent with CRS-R performance indicating behavioral evidence of functional communication (communication subscale score = 2).

Conclusion: fMRI findings from this novel visual cognition paradigm were concordant with findings on the CRS-R (criterion standard). This paradigm may have diagnostic utility in patients with severe impairments in speech and motor function who might otherwise be misdiagnosed as unconscious.

Poster 57
Transcranial Direct Current Stimulation for Minimally Conscious State: A Case Report
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Disclosures: N. Burns: I Have No Relevant Financial Relationships To Disclose.

Case Description: 23 y/o female with severe traumatic brain injury (TBI) in a minimally conscious state (MCS) two months status post motor vehicle accident on admission to the IRF. Despite trials of neuro-stimulants including amantadine, methylphenidate, modafinil, and bromocriptine, she had not emerged to consciousness. Using a protocol adapted from a previous case series, we initiated Transcranial Direct Current Stimulation (tDCS). We applied 2 mA of direct current to her left pre-motor cortex for 20 minutes every day for 15 consecutive days.

Setting: Academic Inpatient Rehabilitation Facility (IRF).

Results or Clinical Course: After completion of tDCS, she improved in ADLs, communication, and mobility. She improved 19 FIM points between initiation of tDCS and discharge. Her coma recovery scale - revised (CRS-R) improved from 7/23 to 23/23 points. All of these improvements were consistent with emergence of consciousness.

Discussion: We obtained results similar to the previous case series in terms of how quickly she responded to the therapy, her functional improvements and continued improvements after the tDCS therapy was complete. TDCS is a non-invasive means of applying direct current through the scalp to a targeted region of the brain. This intervention has been used for motor recovery after stroke, as well as for wakefulness and attention in military personnel. We believe that TDCS was an important aspect of her rehabilitation plan of care among other interventions that contributed to her improvement.

Conclusion: TDCS has been shown to aid in neuro-recovery in minimally conscious state after TBI in previous case series. Our case report is consistent with previous findings. A randomized controlled trial is needed to further investigate this treatment in MCS after TBI to determine the effect size of contribution of tDCS to recovery as well as patient selection.

Poster 58
Use of Surface EMG in the Evaluation of Pelvic Floor Strength and Muscle Tone in Female Patients with Multiple Sclerosis
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Disclosures: M. Lopes de Carvalho: I Have No Relevant Financial Relationships To Disclose.
Objective: The aim of the study is to evaluate the usefulness of electromyography performed with vaginal probe in the evaluation of pelvic floor muscle recruitment. A further objective is to find the threshold values of the electrical muscle activity that could identify the symptomatic subjects.

Design: Cross-sectional study.

Setting: Surface EMG of pelvic floor muscles.

Participants: 50 women including 25 healthy and 25 with MS and urinary disorders.

Interventions: Evaluation of muscle recruitment with PC test (Pubo Coccygeal muscle manual test) and EMG performed with a vaginal probe through the equipment Myomed632.

Main Outcome Measures: EMG assessment measures: minimum electrical voltage (VMIN), maximum (VMAX), medium (VMED) and differential value between the minimum and maximum voltage (VMAX-VMIN) for a phasic contraction, tonic contraction and at rest. PC Test measures: Phasic score and Tonic Score.

Results or Clinical Course: The group of healthy women have a mean age of 37.76 years ± 7.44 and includes 11 nulliparous. The group of women with MS have a mean age of 43.76 years ± 8.87, mean EDSS score of 4.48 ± 1.85 and have 80% of patients with an RR disease course, 16% SP and 4% PP. This group includes 9 nulliparous. The PC test and EMG assessment correlate in a statistically significant manner. The significant difference between the two groups concern parameters "VMIN" and "VMAX-VMIN" during the phasic contraction in EMG assessment and PC test with P < .01. Statistical analysis showed that the value threshold (cut-off) EMG with greater sensitivity and specificity for discriminating healthy subjects from symptomatic is a "VMIN" = 2.5 μV and a VMAX-MIN = 25.5 μV during a phasic contraction.

Conclusion: The surface EMG seems to be a valuable tool to assess the pelvic floor strength and seems to have a predictive power of pelvic floor dysfunction.

Poster 59
Minimal Detectable Change and Clinically Important Difference of the Stroke Impact Scale 16 in Stroke Patients

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Disclosures: B. Palomino Aguado: I Have No Relevant Financial Relationships To Disclose.

Objective: The purpose of this study was to establish the minimal detectable change (MDC) and clinically important differences (CIDs) of the physical domains of the Stroke Impact Scale (SIS-16) after stroke rehabilitation.

Design: 149 patients received specific rehabilitation and underwent clinical assessment at 1 -3 months after treatment. The MDC was calculated from the standard error of measurement to indicate a real change with 95% confidence for individual patients (MDC95). Anchor-based and distribution-based approaches were adopted to triangulate the ranges of minimal CIDs. The percentage of patients exceeding MDC95 and minimal CIDs were also calculated.

Setting: The study recruited 149 stroke patients from the department of rehabilitation. The inclusion and exclusion criteria were defined.

Interventions: The study was approved by the ethics committees of the participating sites. Written informed consent was obtained from each participant after the nature of the study was explained. Therefore, patients in the current study were classified into the Cid group if a 10% to 15% change was documented on their perceived overall recovery from pretreatment to post-treatment on this question and were considered as having experienced a clinically important change. The MDC is calculated by multiplying the SEM by 1.96 to correspond to the 95% confidence interval and the square root of 2 to adjust for sampling from 2 different measurements.

Main Outcome Measures: Quantified the MDC and achieved values and identify a reliable improvement clinical important change in stroke patients who underwent rehabilitation.

Results or Clinical Course: The MDC95 of SIS 16 were 17,737 and 14,850 points, the medium 16 points.

Conclusion: The change score of an individual patient has to reach 16 points to indicate a true change to be regarded as clinically important changes. Future research with larger sample sizes is warranted to validate these estimates.

Poster 60
Pressure Ulcer Prevention System Using Accelerometers

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Disclosures: V. Jayawardena, Inventor of device, Other

Objective: Inform health care professionals of pressure ulcers and of a new device to prevent them, using electronic sensing and caregiver notification.

Design: Through advances in the miniaturization of static accelerometer technologies, the positioning of a patient relative to vertical axis and two horizontal axes can be determined almost instantly with a high degree of accuracy, with a minimal burden on that patient. This combined with advancements in miniaturized low energy radio transmitters permit that positioning information of a patient to be wirelessly transmitted. Such low energy wireless transmissions can be captured by a “base station” such as smartphones, or through low cost platforms such as the Raspberry Pi. These base stations can then either activate a call button to alert a caregiver of the patient’s pressure relief activity, or maintain a record of events either locally or remotely on a computer database.

Setting: Acute rehabilitation units and long term care settings.

Interventions: SCI patients will be attached to one or more electronic “accelerometer” devices that resembles a band-aid applied to the skin, or used as an intra-dermal implant. A “base station” at the SCI patient’s bedside will continuously obtain position information from the patient’s accelerometer(s). If the patient has not moved his position or is not turned within a specified time period, then an alarm will notify the caregiver and record that event. Multiple 3-axis accelerometers are attached to a patient’s body at strategic locations. They will measure gravity in every axis, send data wirelessly, that will determine the body posture and length of time for that posture. An alarm will trigger after a programmed threshold is reached for caregivers to respond accordingly. Information will be aggregated, via histograms and text, for doctors to modify protocols. It will also measure the shear stress on a patient’s skin, and can sound alarms to generate remedial actions preventing skin damage.

Main Outcome Measures: This relatively inexpensive novel system is feasible with current technology and will reduce pressure ulcer incidence.

Results or Clinical Course: Not applicable.

Conclusion: This new invention by a Spinal Cord Physician and engineers at MIT would prevent ulcer occurrence in patients who are prone to ulcers by improving compliance.

Poster 61
Effective Treatment of Decompression-Related Spinal Cord Injury with a Novel Hyperbaric Oxygen (HBO) Treatment Paradigm: A Case Report

Kerri Chung, DO (University of Minnesota, Minneapolis, MN, United States), Diane Mortimer, MD, MSN

Case Description: A 64-year-old male expert scuba diver suffered decompression sickness due to a 220-foot dive in under two minutes. Spinal cord perfusion was compromised by inert nitrogen gas bubbles in blood vessels and tissues. MRI demonstrated ischemic abnormalities at C2-7, T3-4, and T7-8. Medical management included a two-week course of HBO re-compression therapy. A specialized team increased chamber air pressure and oxygen levels to facilitate the safe escape of injurious bubbles. On post-injury day four, his neurological status had not yet stabilized. He was taken for an unprecedented 53-hour HBO session with pressures simulating a depth of greater than 165 feet. Additional treatments involved durations of one to two hours and simulated depths of up to 100 feet. Traditional treatment depth is less than 60 feet.

Setting: Academic Health Center, Acute Rehabilitation Unit.

Results or Clinical Course: Prior to his prolonged and deep HBO treatment, this patient was only able to weakly shrug his shoulders and had patchy sensation in the left upper limb. Afterward, motor and sensory function steadily improved. He worked closely with the spinal cord injury rehabilitation team. His American Spinal Injury Association Impairment Scale classification progressed from C6-B at one week post-injury to T1-C five weeks later. At discharge, he could move his upper and proximal lower limbs, had intact sensation in most dermatomes, self-propelled a manual wheelchair, and was independent with upper body activities.

Discussion: Ischemic spinal cord injury in scuba divers who develop decompression sickness during rapid ascent is often catastrophic. Survival and recovery are not assured even when widely accepted treatment protocols are implemented. In this case, prolonged and deep HBO therapy helped treat this injury in a manner that, to our knowledge, has not been previously described.

Conclusion: Rehabilitation clinicians collaborated with numerous other providers to administer individualized care throughout this patient’s complex course. Consequently, he survived, began healing, and regained some functional independence.

Poster 62
Safety, Tolerability, and Effectiveness of Dextromethorphan/Quinidine for Pseudobulbar Affect in Patients with Traumatic Brain Injury: PRISM-II
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Disclosures: F. Hammond, Avanir Pharmaceuticals, Inc., Other
Objective: A multicenter, open label study (PRISM-II) was conducted to assess effectiveness, safety, and tolerability of dextromethorphan and quinidine (DM/Q) combination for the treatment of pseudobulbar affect (PBA) in patients with stroke, dementia, or traumatic brain injury (TBI). Enrollment has now completed for the cohort of patients with PBA secondary to dementia (results already reported), stroke, and TBI; results for the TBI cohort will be presented.
Design: 12-week, open-label, single active treatment arm. Setting: U.S. multicenter trial.
Participants: Eligible patients had a clinical diagnosis of PBA, a Center for Neurologic Study-Lability Scale (CNS-LS) score ≥13 (range 7-35), and a clinical diagnosis of non-penetrating TBI which was stable and non-evolving. Patients with unstable medical illness or contraindications to DM/Q were excluded.
Interventions: Enrolled patients received DM 20 mg/Q 10 mg twice daily for 12 weeks (once daily in week 1). Concomitant mood/behavioral medications were allowed if stable for ≥2 months.
Main Outcome Measures: Primary endpoint was change in CNS-LS from baseline to Day 90/early withdrawal. Additional endpoints included the change in PBA episodes/week, QOL VAS, Clinical and Patient Global Impression of Change (CGI-C and PGI-C), MMSE, the TBI Neurobehavioral Functioning Inventory (NFI), patient treatment satisfaction, and the Patient Health Questionnaire (PHQ-9) assessing depressive symptoms. Vital signs and adverse events were monitored throughout.
Results or Clinical Course: Enrollment in the PRISM II TBI cohort completed on January 30, 2015, with 120 patients. The last patient will complete the trial in April 2015. Final results will be available July 2015 and will be presented.
Conclusion: PRISM-II is the first prospective open-label study to systematically evaluate DM/Q safety, tolerability, and effectiveness in patients with PBA secondary to TBI as well as the impact of symptom relief on other patient reported measures.

Poster 63
Charcot Spine as an Early Complication of Traumatic Spinal Cord Injury: A Case Report
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Disclosures: M. M. Ma: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 26-year-old woman T6 AIS A presented to an outpatient rehabilitation clinic for evaluation of persistent back pain. She had a motor vehicle accident resulting in fractures to C4, T6, T7, L3 and L4 requiring fusion from C3 to L5. She was lost to follow-up and presented to our clinic 17 months post injury complaining of a growing mass on her lumbar spine accompanied by worsening neuropathic back pain, spasticity and incontinence. Symptoms started 10 months post injury. Examination was significant for a 3 centimeter in diameter lumbar mass just left of midline and spasticity of bilateral lower extremities. Imaging revealed Charcot arthropathy at the lumbo-pelvic junction with complete dissociation of lumbar spine from sacrum.
Setting: Outpatient clinic and acute inpatient facility of a rehabilitation hospital.
Results or Clinical Course: The patient was transferred to an acute inpatient rehabilitation hospital following a revision and a posterior spinal interbody fusion of L4 to pelvis. Her examination was remarkable for T7 AIS A and modified Ashworth score of 0. On discharge, she did not require prescription for pain medication and was able to resume intermittent catheterization without incontinence.
Discussion: Charcot spine is a late complication of spinal cord injury (SCI), usually seen 10 to 20 years post injury. It occurs in the lower thoracic or lumbar spine or within two spinal segments distal to the caudal end of a fusion. Presenting symptoms are back pain, spinal deformity, an audible “crunching” noise with trunk motion, and neurological changes such as flaccidity or spasticity, weakness, or changes in bowel or bladder function.
Conclusion: This case highlights the importance of regular follow-up of SCI individuals post discharge. Regardless of timeframe, Charcot spine should be considered when SCI individuals with history of spinal instrumentation present with back pain, spinal deformity, and neurological changes.

Poster 64
Post-Traumatic Syringomyelia with Holocord Involvement: A Case Report
Gavriil Ilizarov, DO (New York University, New York, NY, United States), Shailaja Kalva, MD
Disclosures: G. Ilizarov: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 57-year-old man evaluated in the emergency department due to progressive pain in his left neck over 4 months and worsening weakness, over 1 month, in his left hand. History pertinent for a motorcycle accident 30 years prior with residual bilateral foot drop, and baseline ambulation utilizing bilateral Lofstrand crutches. The patient was referred to neurology who ordered...
an MRI of the cervical and thoracic spine, EMG/NCS and PM&R evaluation.

**Setting:** Outpatient rehabilitation clinic.

**Results or Clinical Course:** Patient evaluated in PM&R clinic after MRI was performed, with results noting T2 hyperintense signal from C1 until at least T12, consistent with spinal cord syrinx. Physical examination notable for atrophy of the FDI, thenar, and hypothenar eminences and weakness at the elbow, wrist and hand; lower extremity examination with trace contraction of the dorsiflantar flexors. MRI L spine was ordered to evaluate extent of syrinx, which was found as caudal as the conus (L1-L2). Neurosurgical plan was to proceed with placement of a syringosubarachnoid shunt. Further rehabilitation needs would be addressed postoperatively.

**Discussion:** Syringomyelia is a serious condition in which the usual cerebrospinal fluid (CSF) mechanics are disturbed, and can be seen in as many as 3-4% of patients after traumatic spinal cord injury, with an interval of occurrence from several months to many years. Normally, this is a benign prognosis, likely representing an area of liquefaction necrosis of cord tissue, but may progress to worsened or new neurological symptoms, as seen in this case. Holocord involvement had been noted in 1 recent case report, and other studies identified patients with as many as 19 segments involved, though this was in the significant minority (1-3). This study noted that patients appeared to have more desirable outcomes when opting for duraplasty and arachnoidysis vs shunting.

**Conclusion:** Spinal cord injury can cause a myriad of consequential conditions that affect a patient’s functional mobility and ADLs. Syringomyelia can be a potentially serious sequela in SCI patients and it is important to be aware of in that patient population as the dysfunctional CSF mechanics may continue to expand the syrinx, both proximally and distally, to a level distant from the original injury.

**Poster 65**

**Misdiagnosis of Todd’s Paralysis Leading to Delayed Diagnosis of Spinal Cord Injury: A Case Report**

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**Disclosures:** R. Andrews: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 30-year-old man with past medical history significant for seizure disorder and vagus nerve stimulator presented to the hospital with new onset weakness in his bilateral upper and lower extremities associated with sensory loss in the hands and feet.

**Setting:** Acute inpatient rehabilitation.

**Results or Clinical Course:** The patient was diagnosed with Todd’s paralysis and was discharged with persistent tetraparesis. The patient saw a private neurosurgeon and was urgently sent to the hospital to rule out spinal cord injury. Due to vagal nerve stimulator the patient could not receive an MRI and instead had a CT scan of cervical spine. CT showed cervical canal stenosis, cervical myelopathy and cord compression. Patient then underwent emergent cervical discectomy and fusion.

**Discussion:** Todd’s paralysis is a disorder presenting as paresis or paralysis following a seizure. In most cases the symptoms resolve within 36 hours. However in some cases the symptoms can last longer. Due to the patient’s history the provisional diagnosis was made and the patient was discharged. This presumption delayed diagnosis of canal stenosis, cervical myelopathy and cord compression which could have been treated earlier. Had the initial hospital performed further work up to rule out significant diagnoses, the spinal cord injury may have been discovered earlier. The patient subsequently underwent acute rehabilitation in our facility and had significant functional improvement. On admission, transfers and ambulation required moderate/maximum assistance with the ability to walk only 5 feet. Upon discharge the patient could ambulate independently in excess of 150 feet.

**Conclusion:** This case illustrates that an incorrect diagnosis can lead to a delay in definitive treatment. As physicians, it is important that all possible causes for symptoms are fully explored before being ruled out, especially those etiologies that are life altering to the patient. In a patient presenting post-seizure with persistent weakness, one should exclude traumatic etiologies before assuming the symptoms are due solely to the seizure.

**Poster 66**

**Spinal Epidural Lipomatosis in the Setting of Chronic Steroid Use: A Case Report**

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**Disclosures:** K. F. Cruz: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient presented with a three-year history of chronic oral steroids for chronic obstructive pulmonary disease (COPD) management. She presented with lower extremity weakness. CT scan revealed right femoral head fracture and compression fracture of the T6 vertebra; surgical intervention was not necessary. Several days into her admission she developed worsening of her lower extremity weakness progressing to paraplegia with loss of rectal tone and sensation. Urgent MRI of the spine demonstrated prominent epidural lipomatosis impinging on the spinal cord at levels T3-T7. She underwent thoracic decompressive laminectomy. Lower extremity strength improved postoperatively, but remained less than antigravity.

**Setting:** Acute Care Hospital and Free-Standing Rehabilitation Hospital.

**Results or Clinical Course:** In acute inpatient rehabilitation for non-traumatic spinal cord injury, lower extremity strength improved to antigravity. Her rehabilitation course was complicated by worsening lower extremity strength two weeks in to her admission with MRI of the spine negative for acute change. She continued with home therapy and at 1 year from her surgery she had 4/5 bilateral lower extremity strength despite occasional steroid burst treatment for COPD.

**Discussion:** Spinal Epidural Lipomatosis (SEL) is a rare cause of spinal cord compression where normal, unencapsulated fat is deposited in the epidural space. As occurred in this particular case, three-fourths of SEL cases are most often associated with chronic exogenous steroid use with more than half of cases occurring in the thoracic spine. Literature search revealed at least 20 cases of steroid induced epidural lipomatosis with partial to complete resolution of symptoms post-operatively or after discontinuation of exogenous steroids.

**Conclusion:** SEL is a rare cause of cord compression with good prognosis if intervention can be applied. SEL should remain in the differential diagnosis in patients with the risk factor of chronic exogenous steroid use who present with progressive lower extremity weakness.

**Poster 67**

**Best Practices in Intrathecal Baclofen Therapy: Dosing and Long-Term Management**

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**Disclosures:** M. Saulino: Research Grants - Medtronic, Jazz Pharmaceutical; Consulting Fees or Other Remuneration - SPR Therapeutics.

**Objective:** To describe the consensus opinions of expert clinicians regarding the best practices for dosing and long term management in intrathecal baclofen therapy.

**Design:** Expert consensus.

**Setting:** Clinical practice.

**Participants:** 22 clinicians practicing for a mean of 13 years.
Interventions: Intrathecal baclofen (ITB) therapy for severe spasticity.

**Main Outcome Measures:** Spasticity control.

**Results or Clinical Course:** Initiate with the 500 mcg/mL concentration to maximize dosing flexibility. The starting daily dose should be twice the effective bolus screening dose, or the screening dose if the patient had a prolonged response (>8 hrs) or negative reactions. Monitor the patient for at least 8 hrs after pump fill. Wean oral anti-spasmodics, one drug at a time beginning with oral baclofen. Decrease oral baclofen doses by 25%-50% at one time. Have oral baclofen available during titration. For adults, daily dose increases may be 5%-15% once every 24 hrs for cerebral origin spasticity and 10%-30% once every 24 hrs for spinal origin spasticity. Daily dose increases can be 5%-15% once in 24 hrs for children. Assess response at least every 24 hrs for inpatients. Outpatient adjustments can happen weekly, bi-weekly, or daily. Step dosing (constant daily dosing for a set number of days before starting a higher continuous dose) can be used, but should be used cautiously if tone is used for function. Evaluation includes subjective, objective, and therapy goal measurements. Dosing options include simple continuous, variable 24/hr cycle, or scheduled boluses. Patients/caregivers should understand treatment goals and responsibilities, including possible side effects (e.g., over- and under-dose). A higher concentration at refill will extend refill intervals. A bridge bolus must be programmed, after which the pump will automatically adjust the new flow rate. The pump should be checked after MRI exposure. Pump replacement should be scheduled 3-6 mos before the replacement interval. In suspected catheter malfunctions, ITB should be weaned preoperatively. In verified malfunctions, the dose should be reduced to the starting dose before revision.

**Conclusion:** ITB dosing is multistep and individualized.

**Poster 68**

**Unusual Presentation of Intramuscular Hemorrhage in a Spinal Cord Injury Patient: A Case Report**

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David Powell, BS, Dominic Foo

**Disclosures:** M. Mian: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** Intramuscular hemorrhages are uncommon complications of anticoagulation therapy, trauma being the most common cause. Anticoagulation medications increase the potential of hematomata expansion, as vasculature repair is slowed. Here we report a case of a quadriplegic receiving warfarin therapy and anticoagulation medication.

**Results or Clinical Course:** A 43-year-old man presented to inpatient rehabilitation (IR) with left hemiparesis after resection of a right frontal meningioma. The patient was discharged home at a supervised level. Discharge BBS score was 54/56. Case 2: The patient was discharged to the acute hospital to treat a relapse of West Nile encephalitis. Her admission BBS score was 34/56. By Day 7, she noted increased fatigue. Strength, sensation and gait were unchanged, but her BBS score declined to 26/56.

**Setting:** Inpatient acute rehabilitation unit of a tertiary care hospital.

**Results or Clinical Course:** Case 1: MRI revealed increased fluid in the meningioma resection site. The patient had surgical drainage of an abscess. He was discharged home at a supervised level. Discharge BBS score was 54/56. Case 2: The patient was discharged to the acute hospital to treat a relapse of West Nile encephalitis. She was discharged home at a supervised level. In both cases, the BBS score was greater than the minimal detectable change with 95% confidence (MDC95) of between 4 and 7 points for a variety of neurologic conditions, indicating true changes in balance.

**Discussion:** The Berg Balance Scale is a validated, reliable assessment of static and dynamic balance in older adults. It is typically used to assess risk for falls, and to determine the need for various gait aids, but it is not described as a monitor of neurologic status. These two cases highlight an application for the BBS not previously described. In both cases, neurologic assessments of strength, sensation and gait failed to document decline. Only the BBS identified an objective decline, leading to further diagnostic evaluation and treatment.

**Conclusion:** The BBS is a useful tool to monitor neurologic status during IR. Because it tests elements of dynamic function, the BBS may detect neurologic changes not apparent on physical examination or routine gait assessment, and can therefore facilitate more timely medical intervention. The cases presented support use of the BBS on IR admission, with reassessment if clinically indicated. Use of objective assessments such as the BBS, facilitates clinical decision making and best practices in neurorehabilitation.
Case Description: A 66-year-old previously independent man presented with sudden onset severe left shoulder pain that radiated down his left arm, across the lower neck and upper back, and to the right shoulder. Within 4 hours, he gradually developed upper and lower extremity weakness, diffuse paresthesia, and truncal ataxia. Electrocardiography, magnetic resonance imaging of the cervical and lumbar spine, computed tomography scan of the chest and abdomen, and lumbar puncture were non-revealing. A spinal angiogram revealed stenosis of L2 radicular artery caused by compression from the right diaphragmatic crus. Steroids, heparin, and phenylephrine were initiated. Dissection of the diaphragmatic crus via a right peritoneal lumbar puncture were non-revealing. A spinal angiogram revealed dissection of the diaphragmatic crus via a right peritoneal approach was done to revascularize the spinal cord. He was admitted to acute inpatient rehabilitation (AIR) hospital for interdisciplinary rehabilitation care.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: Upon discharge from AIR, he was able to walk 20 feet on the zero G suspension system using 20 percent body weight support, propel a wheelchair 500 feet using bilateral upper extremities, perform activities of daily living with minimal assistance, and use sliding board for transfers.

Discussion: This report adds to the few documented cases of a spinal cord injury caused by compression of a diaphragmatic crus on a radicular artery.

Conclusion: Spinal cord ischemia may be caused by compression of the radicular artery by the diaphragmatic crus. Diagnosis is made via spinal angiography and definitive cure is via resection of the diaphragmatic crus. It is important to have a high level of suspicion that would lead to early diagnosis and treatment to improve functional outcomes.

Poster 71
The Body Function, Activity Limitation, and Participation Restriction of Individuals with Mild Traumatic Brain Injury
Armando Miciana, MD (Nevada Rehabilitation Institute, Las Vegas, NV, United States), Chad Cross, PhD, PStat(R)

Disclosures: A. Miciana: I Have No Relevant Financial Relationships To Disclose.

Objective: To quantify the body function (BF), activity limitation (AL), and participation restriction (PR), as described by the International Classification of Functioning, Disability and Health (ICF) as components of disablement, for individuals with mild Traumatic Brain Injury (mTBI); to determine the relationship between the three ICF components; and, to investigate the correlation between PRO scores and the AMA Guides' WPI percentage rating.

Design: Retrospective cross-sectional study.

Setting: Outpatient physical medicine and rehabilitation clinic.

Participants: 100 individuals completed the Self-Administered Morbidity Questionnaire, and 26 subjects were found to have mTBI greater than two years.

Interventions: Not applicable

Main Outcome Measures: The Neurobehavioral Symptom Inventory (NSI) and Rivermead Post-concussion Questionnaire (RPC) quantified the BF component i.e. cognitive, emotional, and behavioral symptoms. The Rivermead Head Injury Follow-up Questionnaire (RHF) assessed the AL. The PROMIS-physical function (PPF) and PROMIS-satisfaction with social role (PSR) measured the PR.

Results or Clinical Course: No gender differences were detected (Mann-Whitney tests, P > .15). Therefore, results for all data were combined. The mean [SD] scores were: NSI 46.5 [20.87]; RPC 35.9 [14.89]; RHF 29.33 [11.71]; PPF 35.83 [5.26]; and, PSR 37.61 [7.69]. Pearson’s correlation coefficient was used for all correlations, which did not differ in terms of significance from Spearman’s: NSI correlated with PSR (r = .576, P = .031); RPC with RHF (r = .530, P = .009); and, RHF with NSI (r = .602, P = .013), PPF (r = .601, P = .011) and PSR (r = .555, P = .021). WPI showed a statistical significance with PPF (r = -.491, P = .063) and PR (r = -.656, P = .008).

Conclusion: Most subjects with mTBI greater than two years still had moderate post-concussion symptoms, extensive AL, and high PR. The study supports that the three ICF outcome components encompass a continuum of disability for an individual with mTBI and can be assessed via PROs. Yet however, the AMA Guides’ WPI system correlates best with PR. Future studies should focus on how personal and environmental factors affect the ICF components’ multi-dimensionality.

Poster 72
Retraining the Elbow in Chronic C4 Complete Spinal Cord Injury (cSCI) Using a Myoelectric Upper Limb Orthosis: A Case Report
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Disclosures: P. Cabahug: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient is a 27-year-old man with a C4 ASIA Impairment Scale (AIS) A SCI secondary to a C4-C5 facet dislocation following a fall in 2008. He had several bouts of rehabilitation in the past, with no documented improvement in function of his elbow flexors/extensors. A myoelectric upper limb orthosis (Myomo®, Myomo, Inc) was utilized over the course of the past 17 months as part of his rehabilitation program. Training with the Myomo while patient was in active therapy used the following protocol: 45-60 minutes 3 times a week for 24 sessions. After 1 month, he received bilateral Myomo units for home use. He presently uses them daily for 45 minutes.

Setting: Outpatient Spinal Cord Rehabilitation Center.

Results or Clinical Course: We reviewed his initial and latest AIS scores, active elbow flexion range of motion, Spinal Cord Independence Measures (SCIM), patient subjective report and Capabilities of Participation (CUE-Q) scores. He showed improvement in elbow flexor strength and elbow active range of motion against gravity without the orthosis. He was able to demonstrate modified independence with light grooming, self-feeding and leisure pursuits with the orthosis donned.

Discussion: Upper extremity recovery in those with tetraplegia is ranked as most likely to improve quality of life and is the highest priority for functional recovery next to bowel and bladder. Upper limb retraining of the musculature controlling the elbow joint is crucial for maximizing independence. Advancements in biofeedback and robotic training enables myoelectric training to improve function without surgical intervention or constant monitoring of a care provider/therapist.

Conclusion: The use of a myoelectric upper limb orthosis in both clinical and home rehabilitation setting is potentially an effective therapeutic aid to facilitate recovery and improvement in elbow function in patients with chronic tetraplegia.

Poster 73
Gait Training with the Newly Developed Active-Assistive System for Gait is Feasible for Hemiplegic Patients after Stroke
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Disclosures: Y. Yoon: I Have No Relevant Financial Relationships To Disclose.
Objective: To evaluate the feasibility of using a newly developed active-assistive gait device (AAGAD) for locomotion training in hemiplegic stroke patients.

Design: Randomized, controlled study.

Setting: Gait training with active-assistive system at therapeutic room.

Participants: 20 subjects randomly assigned to the AAGAD (n=10) or control (n=10) group.

Interventions: Both groups were treated with a standard rehabilitation program, and 20 min of gait training on treadmill for 5 days a week during 4 weeks with AAGAD and without AAGAD in control group.

Main Outcome Measures: The 10 m walking test, walking speed (m/s), step cycle (cycle/s), and step length (m) were measured as a gait parameter on a treadmill (Gait Trainer, Biodex, USA) before and after gait training. The angle of ankle dorsiflexion in swing phase was also measured (MotionTwin, Simi, Germany). Clinical parameters measured before and after gait training included Korean Modified Barthel Index (K-MBI), Manual Muscle Test (MMT), and Modified Ashworth Scale (MAS) of hemiplegic ankle.

Results or Clinical Course:
1) The 10 m walking time was improved in both groups (P<.05), but step length and step cycle were not. Walking speed and angle of dorsiflexion were improved in AAGAD group (P<.05). K-MBI and MMT were improved after gait training except ankle power (P<.05), but MAS was not in both groups. 2) The 10 m walking test, Walking speed, angle of dorsiflexion, and step length were greater in AAGAD group (P<.05).

Conclusion: AAGAD increases speed and posture of gait in hemiplegic patients. It can be a useful device for gait training in hemiplegic patients.

Poster 75 Comparison of Tonic Stretch Reflex Activity of the Biceps and Brachioradialis in Hemiplegic Stroke Patients: Implications for Muscle Selection in Treatment of Elbow Flexor Hypertonia with Focal Chemodenervation

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Disclosures: D. Moon, Advanced Studies in Medicine, Other

Objective: To compare electromyographic (EMG) activity in the biceps and brachioradialis during passive stretching of the elbow flexors in consideration for injection with botulinum toxin.

Design: Retrospective cross-sectional study.

Setting: Tertiary rehabilitation hospital.

Participants: 18 adults (Age 59.4±14.7 years) with unilateral stroke; evaluated between 2009 to 2013; at least 4 months after onset; no prior chemodenervation to the arm; Modified Ashworth score equal to 3 at the elbow; and dynamic EMG recordings of the biceps and brachioradialis during passive stretching by a clinician.

Interventions: Surface EMG data were recorded from the biceps and brachioradialis during slow, moderate and fast rates of stretch with the forearm in the neutral position. An electrogoniometer simultaneously tracked elbow joint angular motion.

Main Outcome Measures: Root mean square (RMS) surface EMG activity of the biceps and brachioradialis during slow, moderate and fast stretching was calculated between 20% and 80% of the stretch interval. Repeated measures ANOVA were used to compare RMS activity and stretch rate for each muscle. Post hoc tests were performed using Bonferroni correction to make pairwise comparisons.

Results or Clinical Course: Mean angular velocity of slow stretching was 24.6±10.5 degrees/second, moderate stretching 58.5±25.1 degrees/second and fast stretching 133.9±109.5 degrees/second within the 20% to 80% stretch interval. Comparison of RMS values reveals significantly increased muscle activity with increased stretch velocity in both the biceps (P<.05) and brachioradialis (P<.05).

Conclusion: Both muscles were found to exhibit significantly increased velocity dependent EMG activity with passive stretch. Recent literature review shows that the biceps is injected two to three times more frequently than the brachioradialis with botulinum toxin in the treatment of elbow flexor hypertonia. The results of this study suggest that chemodenervation of the brachioradialis, in addition to the biceps, should be strongly considered for treatment of severe post stroke elbow flexor hypertonia.

Poster 76 Prevention of Pressure Ulcers Among People with Spinal Cord Injury: A Systematic Review

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Disclosures: C. Pineda: I Have No Relevant Financial Relationships To Disclose.

Objective: To evaluate the literature on the effectiveness of bed and wheelchair positioning and repositioning in the prevention of pressure ulcers (PU) in both the spinal cord injury (SCI) and non-SCI populations.

Design: Systematic review.

Setting: Free standing academic rehabilitation hospital.
Interventions: PubMed, CINAHL, PsycINFO and EMBASE were queried with the subject heading terms "pressure sore," "pressure ulcer," "position or turn in bed, wheelchair," "pressure relief," and "pressure release."

Results or Clinical Course: We identified 2820 publications, of which 49 met inclusion criteria. Of these the subject population was 2834 (923 persons with SCI, 717 non-SCI patients, 1194 healthy controls). Procedures for measuring skin pressure and metabolism were highly variable by anatomic location, measurement technique, outcome measure, study site, participant characteristics, description of positioning/turning for bed and seated interventions. Several studies suggest that skin response to pressure differs between SCI and non-SCI subjects. No clear optimal bed positioning or turning frequency could be determined beyond the 90 degree lateral position resulting in high pressure over the trochanters. Conflicting results and insufficient evidence for optimal bed and seated positioning, and turning and pressure reliefs to prevent pressure ulcers in both SCI and non-SCI populations were limiting factors.

Conclusion: Based on the existing evidence, current "guidelines" cannot be considered evidence-based and consideration should be given to reevaluating existing guideline-based turning intervals and related policy implications for this high-risk population. We conclude that PU risk is highly individualized, with the SCI population at a higher risk, which demands flexible PU prevention strategies for bed/seated positioning and pressure reliefs.

Poster 77
Device to Enable Person with Disability To Hold Pants
Out of Way When Performing Self-Catheterization

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Objective: To create a device that enables the user (person with spinal cord injury) to pull pants sufficiently away from waist in order to free both hands to perform intermittent self-catheterization. The device satisfied the criteria to be sufficiently portable for use in public restrooms.

Design: The complete breakdown of steps necessary to perform the task of self-catheterization toiletting were gathered in a focus group session with five senior engineering students, a C5 tetraplegic individual, a nurse-specialist, an occupational therapist specializing in assistive technology, and a physiatrist. Engineering specifications were created to determine the best direction and necessary force to pull the pants away from the waist. Working prototypes were manufactured from suitable plastic materials using 3D printers. Further roundtable discussions with tetraplegic individuals were used to provide feedback for the final design.

Setting: Free-standing rehabilitation hospital and industrial machine shop in a college of engineering.

Participants: Five senior engineering students, C5 tetraplegic man, nurse-specialist with advanced certification in rehabilitation nursing, occupational therapist, and physiatrist.

Interventions: Designs were tested by the tetraplegic individual and feedback was used for modifications.

Main Outcome Measures: User satisfaction.

Results or Clinical Course: A working prototype was created that was able to produce sufficient pants-to-waist separation to permit the user to independently perform a simulated self-catheterization.

Conclusion: Current devices marketed for assisting patients with toiletting are made to be used by patients with normal to near-normal hand dexterity. This device was made to help the individual with tetraplegia remove clothing safely and consistently, thereby freeing up the hands to perform the self-catheterization portion of the task without accidents. The device is portable and can be used in public restrooms, thereby providing a higher measure of freedom and independence for the user.

Poster 78
Physiologic Mechanisms of Emotional Impairment in Traumatic Brain Injury

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Disclosures: P. X. Amorapanth: I Have No Relevant Financial Relationships To Disclose.

Objective: To test the hypotheses that 1) emotional impairments in patients with traumatic brain injury (TBI) are characterized by alterations in autonomic activity, and 2) these impairments are correlated with impairment in executive attention, reflecting damage to a common underlying neural substrate.

Design: TBI patients and age-matched controls were tested on an emotional function battery where they watched a series of film clips normed to elicit specific emotions. Surface electrodes measured cardiac and respiratory signals to compute heart rate variability (HRV), from which measures of parasympathetic activity (RSA, Respiratory Frequency Area) and sympathetic activity (LFA, Low Frequency Area) were derived. The intensity of the emotional response to the film-clips was captured via questionnaires. Subjects were also tested on the Attention Network Test to measure impairment in attention.

Setting: Outpatient

Participants: Patients six months post TBI and healthy age-matched controls.

Main Outcome Measures: Measures of parasympathetic activity and sympathetic activity. Attention Network Test (ANT).

Results or Clinical Course: While TBI patients showed normal autonomic output at baseline, the output was decreased when viewing emotional stimuli. Parasympathetic activity was significantly decreased for sad stimuli and sympathetic activity was significantly decreased for amusing stimuli. There was a general decrease in autonomic output for fear and sexual amusement. Orienting and executive, but not alerting attention, were impaired on the ANT. There was a correlation between impairments of executive attention and autonomic output in TBI patients.

Conclusion: Emotional impairments in TBI are characterized by decreased autonomic output. These autonomic changes are associated with impairments in executive attention, possibly reflecting impairment of a common underlying neural substrate in the prefrontal cortex. These data suggest a possible target for focused intervention in this population via anatomically targeted interventions, such as transcranial electrical stimulation.

Poster 80
60-Year-Old-Man with C6 (AIS A) Tetraplegia More Than 40 Years Ago Developed Autonomic Dysreflexia from Charcot Spine Arthropathy: A Case Report

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Disclosures: L. John: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 60-year-old man with C6 (AIS A) tetraplegia who developed autonomic dysreflexia from Charcot Spine arthropathy of the lumbar spine more than 40 years after injury.
Setting: Neurological Rehabilitation Center (Stroke, TBI, SCI)

Results or Clinical Course: A 60-year-old man with C6 (AIS A) tetraplegia due to spinal cord injury (SCI) in 1973 presented to the SCI unit with non-remitting severe autonomic dysreflexia (AD) manifesting as uncontrolled diaphoresis and hypertension. Common etiological workup was negative. In addition to conservative management, pharmacological agents such as Diazepam and Baclofen failed to control his AD. Radiographic CT imaging showed expansion of the L1-L2 disc space with erosion of adjacent endplates at L1 and L2, consistent with Charcot spine. Patient underwent extracavitary L1-L2 corpectomy with interbody fusion and posterior fusion instrumentation from T8 to S1. Post-operatively, he had immediate improvement of his symptoms and had no further episodes of AD.

Discussion: Charcot spine should be considered as a differential diagnosis for AD, especially in patients developing new onset persistent AD after twenty years post SCI. Literature review shows several supporting cases of Charcot spine leading to AD. Often times surgical intervention has shown to be the definitive resolution of AD symptoms.

Conclusion: We must consider Charcot spine in patients who develop autonomic dysreflexia more than 20 years after their initial spinal cord injury.

Poster 81
Paroxysmal Autonomic Instability in a Patient with a Basilar Artery Ischemic Stroke: A Case Report

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Disclosures: H. M. Ma: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 43-year-old otherwise healthy man was found unresponsive for an unknown duration. MRI/MRA showed isolated infarction to the pons from a basilar artery occlusion. Etiology presumed infarctionembolism from unknown source, arterial dissection suspected. His acute hospital course was complicated by fever, with negative infectious work-up. He also had episodes of decreased responsiveness, tachycardia, tachypnea without hypoxemia, and diaphoresis, with a corresponding normal EEG. Eventually, his fevers were thought to be of central origin consistent with paroxysmal autonomic instability disorder (PAID), found to occur in the presence of noxious stimuli. He was discharged on multiple medications to control PAID including propranolol, buspirone, gabapentin and alprazolam. On arrival to acute rehabilitation, he was alert and responded to yes/no questions with looking up/down, respectively.

Program Description: Stroke Rehabilitation Program.

Setting: Rehabilitation Institute of Chicago inpatient acute rehabilitation.

Results or Clinical Course: The day after his admission to acute rehabilitation, he became acutely unresponsive, tachypneic but not hypoxemic, as well as tachycardic, despite maintaining normotension and remaining afebrile. He returned to the Intensive Care Unit, where his condition spontaneously resolved the next morning. Extensive infectious work-up was, again, negative. After returning to rehabilitation, he experienced 2 episodes of isolated fevers with negative infectious work-up, and many episodes of diaphoresis with tachycardia, especially in therapy. His extensor posture interfering significantly with positioning in his wheelchair. Baclofen and bromocriptine were given. After a successful intrathecal baclofen (ITB) trial, he had an ITB pump implanted. Low rate infusion of ITB resulted in reduced episodes of autonomic instability, less tachycardia/hypertension, and less severe posturing. As pump infusion rate was slowly increased, other medications were successfully weaned.

Discussion: PAID is less common following ischemic stroke than traumatic head injury. This is the first-reported case, to our knowledge, of PAID in a locked-in patient following ischemic stroke.

Conclusion: Although rare in patients with Locked-In Syndrome, paroxysmal autonomic instability can occur and may be best managed with ITB pump.

Poster 82
Delayed Tension Pneumocephalus after Head Trauma: A Case Report

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Disclosures: M. Pun: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 47-year-old man sustained severe head and facial trauma after being hit by a falling tree. CT scan of the head showed open traumatic brain injury (TBI) with herniation of the right frontal lobe, collapsed right globe, and complex facial bone fractures involving all walls of the right maxillary sinus and right orbit extending into the right frontal bone and frontal sinus. He underwent emergent right craniectomy and duraplasty. The patient was admitted to acute rehabilitation on postoperative day 16. 4 days into his TBI rehabilitation, he developed acute worsening of headaches, nausea and had multiple episodes of emesis. Despite those symptoms, his orientation and neurologic examination was unchanged. A repeat CT of the head showed a large right frontal tension pneumocephalus with a 1.2 cm midline shift including transfalcine and uncal herniation. Neurosurgery performed a bedside needle decompression with removal of 60 milliliters of air. He was laid supine and put on a nonrebreather mask. 2 weeks later he underwent a cranioplasty with replacement of the bone flap, exenteration of the frontal sinuses, and pericranial patch grafting over the cranial defect.

Setting: Acute rehabilitation hospital.

Results or Clinical Course: Serial CT/MRIs showed resolution of pneumocephalus. At 4 months post-injury the patient continues to be at his neurological baseline.

Discussion: Tension pneumocephalus secondary to trauma can have varied symptom severity and should be considered in TBI rehabilitation patients with severe cranio-facial injuries who experience new or increased headache pain and emesis consistent with increasing intracranial pressure.

Conclusion: Tension pneumocephalus is a rare but life-threatening condition that requires immediate neurosurgical intervention. Patients with TBI who suffered cranio-facial trauma should be monitored closely as new onset pneumocephalus may present subtly rather than with obvious neurologic changes.

Poster 83
Electromyographic Biofeedback to Improve Muscle Strength in a Pediatric Patient with a Complete Spinal Cord Injury: A Case Report

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Disclosures: N. Varghis: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 17-year-old girl with a C5 ASIA impairment scale (AIS) A spinal cord injury (SCI) following a rollover motor vehicle accident. The patient spent 3 weeks in the acute hospital and subsequently was transferred to the acute inpatient rehabilitation ward. She was found to have a C5 AIS A SCI, with bilateral 3/5 biceps strength, but impaired deltoid strength of 0/5 bilaterally.
She was unable to tell if she was properly activating her deltoids during testing, and was noted to be firing many surrounding muscles instead.

**Setting:** Acute pediatric inpatient rehabilitation unit.

**Results or Clinical Course:** The patient was unable to voluntarily abduct her shoulders, despite having good biceps strength. Electromyography (EMG) of the deltoid was used to provide her with visual and auditory biofeedback during muscle activation, which allowed her to selectively utilize the muscle. Using this technique, her bilateral deltoid strength improved to 2/5 in 5 days.

**Discussion:** Using visual and auditory biofeedback from the EMG needle inserted into her deltoid muscles, the patient was able to determine exactly when she was activating this muscle. This, combined with repetition, resulted in rapid improvement in the strength of the deltoid. After five days of training, she was able to abduct her shoulders with 2/5 strength, without activating surround muscles. This, combined with her biceps strength, allowed her to have improved functional use of her arms, which translated to increased independence with activities of daily living.

**Conclusion:** Using EMG for biofeedback is an effective way to help patients selectively improve muscle strength via visual and auditory cues. This is most useful in cases when certain muscles in a selected myotomal distribution are functioning, while others in the same myotome cannot be selectively activated. This technique can improve functional outcomes in patients attempting to regain strength following an SCI.

**Poster 84**

**Bickerstaff Encephalitis Associated with Cortical Features: A Case Report**

**Beverly Hon, MD (Rutgers University- New Jersey Medical School, Newark, NJ, United States), Radhika Bapineenu, MD**

**Disclosures:** B. Hon: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** 18-year-old female with no significant past medical history was admitted with progressively slurred speech, drooling, difficulty walking, and right-sided facial droop. 2 days prior, the patient was found to be Influenza A positive and started on Tamiflu. Initial head MRI with and without contrast remained unremarkable. She presented again to the hospital when her symptoms worsened. Over the next 24 hours, the patient developed areflexia in her lower extremities bilaterally. She was transferred to the intensive care unit where she received five cycles of intravenous immunoglobulin therapy. The patient exhibited features of encephalitis of the brainstem, ophthalmoplegia and cerebellar-like ataxia. Antibody testing revealed the presence of serum anti-GG1b immunoglobulin G (IgG) antibody, the diagnostic marker for Bickerstaff brainstem encephalitis (BBE). Lumbar puncture showed no elevated protein or white blood cells. Video electroencephalogram (VEEG) was unremarkable.

**Setting:** Acute care rehabilitation hospital.

**Results or Clinical Course:** In acute rehabilitation, the patient demonstrated impaired cortical regulation with hypersensitivity to all sensory stimuli, autonomic sympathetic dysfunction as evident by her tachycardia, hypertension, and anxiety, and pseudobulbar affect. The patient was started on propanolol for autonomic dysfunction, prednisone for flare in symptoms, and nuedexa for pseudobulbar affect. Ongoing evaluation by psychiatry revealed features consistent with an organic process related to the encephalitis rather than an underlying psychiatric process. The patient’s cortical and autonomic dysfunction gradually improved. The patient was discharged several weeks later on propanolol and prednisone with plan for slow taper as well as close clinical follow up.

**Discussion:** BBE is a rare disorder with incidence presumed less than 0.1 per 100,000 in Western countries. Review of the few case reports of BBE, while showing waxing and waning features of brainstem involvement in the recovery phase, failed to reveal any other cases of cortical dysregulation. We present a unique case of cortical involvement associated with the recovery phase of BBE.

**Conclusion:** Possible mechanisms for the presence of cortical features may be related to activation of the reticular activating system or a more diffuse cortical process.
lymphocytic inflammation. He was treated with steroids, plasmapheresis, and IVIG. After which, he underwent acute inpatient rehabilitation. On admission, the patient’s Functional Independence Measure (FIM) scores for motor and cognitive were 25 and 23, respectively; for a total of 48. Length of stay was 15 days and discharge FIM scores for motor and cognitive were 32 and 27, respectively; for a total of 59. He returned to inpatient rehabilitation after being treated with rituximab. On admission, FIM scores were: motor 27, cognitive 28, for a total of 55. Upon discharge FIM scores were: motor 52, cognitive 34, for a total of 86; length of stay was 15 days.

**Setting:** Acute inpatient rehabilitation hospital.

**Results or Clinical Course:** Rituximab in conjunction with inpatient rehabilitation saw the greatest benefit in treating sporadic adult-onset ataxia of unknown etiology. Gains in patients FIM after Rituximab and inpatient rehabilitation was 37 compared with previous treatments: plasmapheresis, steroids and IVIG patients FIM gains were only 11.

**Conclusion:** Sporadic adult-onset ataxia of unknown etiology has a prevalence of 2.2-8.4 per 100,000. Clinically, one third of patients have polyneuropathy or pyramidal tract involvement accompanying cerebellar ataxia. There is no established therapy for these patients. Rituximab belongs to the monoclonal antibodies class. Proposed mechanism of action is an anti-CD20 monoclonal antibody where it targets B cells resulting in cell lysis or apoptosis. More research is necessary to determine the cause of sporadic adult-onset ataxia of unknown etiology as well as the use of Rituximab in these patients.

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**Poster 88**

**Spontaneous Galactorrhea Status Post Spinal Cord Injury: A Case Report**

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**Disclosures:** A. Patel: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 32-year-old woman presented to the hospital as a traumatic T12 American Spinal Injury Association (ASIA) B. The patient also sustained wrist, maxilla, rib, and knee trauma. She underwent T9-T12 fusion and wrist pinning. In the inpatient rehabilitation unit, she was noted to have anxiety, sequelae of an upper motor neuron lesion in the lower extremities, and depression (received fluoxetine). During her admission, she started to have spontaneous galactorrhea from both of her nipples. Upon further questioning, the patient noted mild, intermittent serous discharge only when expressed for the past sixteen years. However, now the consistency and color had changed and milk expression was spontaneous. In addition, the patient complained of breast tenderness and engorgement. She noted regular menstrual cycles and denied any other associated symptoms.

**Setting:** Spinal cord injury unit in an inpatient rehabilitation center.

**Results or Clinical Course:** The patient tested negative for beta-human chorionic gonadotropin and her thyroid stimulating hormone and free T4 were normal. However, she had hyperprolactinemia. Magnetic resonance imaging (MRI), which was limited due to the patient’s anxiety, was relatively unremarkable. Despite reviewing her medications with pharmacy and discontinuing fluoxetine, her symptoms persisted. Endocrinology was consulted and recommended bromocriptine, which improved the patient’s symptoms. The patient did not follow up with Endocrinology or in spinal cord injury (SCI) clinic after discharge. She was contacted by phone at a later date and noted that her galactorrhea resolved six months post injury.

**Discussion:** Isolated cases of galactorrhea in SCI patients (typically involving thoracic spine injury) have been reported. More common secondary causes, including pregnancy, prolactinoma (commonly a macroadenoma), medication side effects (particularly antipsychotics), and hypothyroidism should be ruled out first (as was done in this case). Chest wall trauma, which is often concomitant with SCI, could not be excluded as a potential etiology however.

**Conclusion:** It should be appreciated that SCI, especially in the thoracic spine, may independently cause spontaneous galactorrhea.

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**Poster 89**

**Ultrasongraphic Assessment of Median Nerve in Patients with Spinal Cord Injury**

Serdar Kesikburun, MD, Yasin Demir (Turkish Armed Forces Rehabilitation Center, Ankara, Turkey), Tugce Hatipoglu, MD, Guray Koc, MD, Bilge Yilmaz, Professor

**Disclosures:** Y. Demir: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To assess changes in hip adductor spasticity after phenol injections to obturator nerves, and to identify post-injection complications.

**Design:** A retrospective assessment of phenol injections to obturator nerves, and to identify post-injection complications.

**Main Outcome Measures:** Change in spasticity with a Modified Ashworth Scale from 0 (no spasticity) to 4 (severe spasticity) pre- and post-injections, and spasticity was assessed with a Modified Ashworth Scale from 0 (no spasticity) to 4 (severe spasticity) pre- and post-injections, and analyzed with a t-test.

**Setting:** Tertiary care hospital.

**Participants:** 14 paraplegics and 11 healthy volunteers.

**Interventions:** Phenol injections to obturator nerves with phenol 5% in sterile water.

**Main Outcome Measures:** Cross-sectional area (CSA) of the right and left median nerves were assessed with ultrasound at the carpal tunnel.

**Results or Clinical Course:** Mean CSA of the right median nerve in patients and controls were 0.13 ± 0.03 and 0.10 ± 0.02 mm², respectively (P = 0.013). Mean CSA of the left median nerve in patients and controls were 0.13 ± 0.03 and 0.10 ± 0.02 mm², respectively (P = 0.018).

**Conclusion:** These preliminary results revealed that paraplegic patients have larger CSA of the median nerve, which may indicate a higher risk for carpal tunnel syndrome.
significantly less (P<0.05) than pre-injection with a t-statistic 20.47. Of 376 obturator nerve injections with phenol, no patient had paresthesias in the distribution of the obturator nerve; one patient had transient numbness at the medial leg in the area of the saphenous nerve.

Conclusion: Phenol injections to obturator nerves are an effective and safe approach to decreasing hip adductor spasticity for post-stroke patients.

Poster 91
Spinal Cord Compression Secondary to a Solitary Fibrous Tumor: A Case Report

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Case Description: A 67-year-old woman presents to Jackson Memorial Hospital (JMH) with a left cervical spine solitary fibrous tumor. Prior to this she had the tumor removed twice, in Venezuela and once at JMH in 2010. In 2010 she underwent tumor resection and was subsequently admitted to JMH Inpatient Rehab. At that time, gross movement in her left upper extremity was 3/5 and 4/5 in her left lower extremity; she was max assist for ambulation. By 2011 she regained independent ambulatory function. Over the next few years her tumor regrew; reaching a size of 13.3 x 11.0 x 11.8 cm. During her current admission she had significant myelopathic signs: hyperreflexia, incontinence and pain. She also had trouble breathing, speaking and dysphagia. MRI showed cervical spinal cord compression and displacement secondary to tumor. She underwent repeat tumor decompression and partial resection. Residual tumor in the lateral neck will be removed with a future surgery. On physical examination she had 1/5 motor strength corresponding with the left C7, C8, L4, L5 and S1 levels. All other motor scores for her left upper and lower extremity were 0/5. This was worse than her 2010 presentation. Our plan is to document motor strength, and functional return of movement, as she progresses in therapy.

Setting: Tertiary Care Hospital

Results or Clinical Course: Our patient has spinal cord compression due to a solitary fibrous tumor, a rare soft tissue tumor (1). According to Bouyer et al., there are only 18 previously published cases. Over the next 3 months we will monitor patient’s function using the Motor Strength Scoring System and FIM Instrument while she is in physical therapy.

Discussion: According to Bouyer et al., there are only 18 cases published in the literature of spinal cord solitary fibrous tumors. They are often benign; 10-15% exhibit malignant behavior. Seppla et al. studied long term clinical outcomes of patients with spinal Schwannomas (a more frequently occurring tumor) and concluded that clinical outcome, after removal, correlated closely to the severity of preoperative symptoms.

Conclusion: Solitary fibrous tumors of the spine are rare. Once a tumor is excised the patient should be followed closely. Patient education is prudent because they may have significant loss of function, which may be a cause of significant morbidity and poor recovery.

Poster 92
Rehabilitation of Lance-Adams Syndrome: A Case Report

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Disclosures: I. Wu: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 26-year-old man with a history of IV drug abuse was found in cardiac arrest from an IV heroin overdose requiring cardiopulmonary resuscitation. He was minimally responsive by arrival to the hospital, improved minimally with naloxone, and was intubated for airway protection. CT Head and MRI Brain showed no structural abnormalities. Immediately after extubation, he had severe myoclonus affecting his speech, left arm, and trunk, which persisted despite initiating valproic acid and clonazepam.

Setting: Inpatient Rehabilitation Facility (IRF).

Results or Clinical Course: On IRF admission, myoclonus was poorly controlled, absent during sleep but exacerbated by distractions, emotions, and tasks involving increased concentration or coordination, resulting in hyperkinetic dystarthria, dysmetria, and ataxia. The patient also demonstrated impairments of memory, problem solving, and planning. Medical management incorporated a combination of valproic acid, clonazepam, and bupropion. Symptoms improved with physical, occupational, and speech/language therapy programs enhanced by the use of therapies targeting the cognitive contribution to myoclonus. These included identifying triggers of myoclonus; rehearsing, segmenting, and sequencing complex tasks; distraction desensitization; dual-task and obstacle course training. On discharge, the patient demonstrated rare vocal spasms and functional improvements in the areas of cognition, self care, mobility, and locomotion.

Discussion: Lance-Adams syndrome, or post-hypoxic myoclonus, is a rare condition occurring after hypoxic brain injury related to cardiopulmonary arrest. It is characterized by action-, intention-, emotion-, or stimulus-triggered jerking movements that lead to significant disability but commonly improve over time. The pathogenesis remains unclear; however, investigators have hypothesized cerebellar Purkinje cell susceptibility to hypoxic injury and dysfunction in GABAergic and serotoninergic pathways. Reports indicate valproic acid, clonazepam, levetiracetam, zonisamide, and baclofen have improved symptoms. Guidelines for rehabilitation have not been fully described.

Conclusion: Rehabilitation strategies, including therapies that address the neuropsychological contribution to myoclonus, employed alongside medical management can maximize recovery from Lance-Adams syndrome.

Poster 93
Postural Orthostatic Tachycardia Syndrome after Left Frontoparietal Craniotomy for Meningioma Resection: A Case Report

Britney Tsui, MD (UNC Hospitals, Chapel Hill, NC, United States), Angela Lipscomb-Hudson, MD

Disclosures: B. Tsui: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient was a 35-year-old woman who underwent left frontoparietal craniotomy for resection of a meningioma. Intraoperatively she had several seconds of left facial twitching characterized as a seizure; postoperatively no electrical seizure activity was noted on continuous video electroencephalogram (cvEEG) with Levetiracetam continued for seizure prophylaxis. She was admitted to Acute Inpatient Rehab (AIR) on postoperative day 7. During therapy she developed acute onset dizziness and nausea upon standing and lost consciousness with vomiting, incontinence, and tachycardia. No involuntary movements were noted. The episode lasted several seconds before she regained consciousness and was alert and oriented at her neurologic baseline. Labwork and electrocardiogram (EKG) were unremarkable. Head CT showed no acute changes. She underwent cvEEG which showed no epileptiform waves. Her Levetiracetam was increased yet she continued having similar episodes. It was thought her episodes may be due to syncopal rather than seizure events. Treatment for orthostatic intolerance was initiated, including wearing an abdominal binder and compression hose,
increasing oral hydration, salt tablets, and precautions for orthostasis. Therapy included focus on repositioning to a recumbent position at symptom onset.

**Setting:** Acute inpatient rehabilitation.

**Results or Clinical Course:** The patient responded well to interventions. She experienced no further episodes and was discharged after 6 weeks. It was felt her presentation was most likely due to Postural Orthostatic Tachycardia Syndrome (POTS).

**Discussion:** POTS is a type of orthostatic intolerance thought to be due to autonomic dysregulation characterized by a rise in heart rate > 30 beats/min and symptom onset upon upright positioning. To date, POTS is not well understood and there are no definitive treatments. This is the first reported case, to our knowledge, of POTS occurring after menigioma resection in a patient without a previous history of syncope.

**Conclusion:** This case suggests a potential cause for POTS being central dysautonomia due to non-traumatic brain injury. This case specifically provides an alternative diagnosis for patients with seizure-like events and demonstrates a variety of non-pharmacologic interventions and special considerations for physiatrists caring for these patients.

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**Poster 94**

**Minocycline as a Treatment Option in a Patient with Transverse Myelitis Who Developed Pulmonary Nocardiosis on Methylprednisolone: A Case Report**

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**Disclosures:** M. Berri: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 80-year-old previously healthy woman developed acute onset lower extremity paresis without areflexia. Compressive myelopathy was ruled out using imaging, and cerebral spinal analysis was obtained. Patient met diagnostic criteria of transverse myelitis and treatment with 1 gram methylprednisolone IV was initiated to which patient improved. This treatment continued on rehabilitation floor for 5 days as a prednisone taper was initiated. On day 9 on IPR stay, patient developed respiratory insufficiency and was transferred to the ICU work up. CT thorax, abdomen and diagnostic/therapeutic thoracentesis revealed loculated empyema and cultures were positive for pulmonary Nocardidia. Infectious disease consultation recommended discontinuation of steroid treatment with a fast taper given immunocompromised state with only Sulfamethoxazole-Trimethoprim for treatment. Patient had previously received IVIG therapy prior to admission without improvement. At time of medical stabilization, patient was transferred back to rehabilitation unit. Bilateral lower extremity paresis worsened significantly on American Spinal Injury Association (ASIA) motor scores with the abrupt steroid taper. Back on the rehabilitation unit, patient was started on Minocycline 100 mg twice daily PO for its anti-inflammatory and neuroprotective profile.

**Setting:** Neurotrauma rehabilitation unit.

**Results or Clinical Course:** ASIA examination was used to monitor improvement. Within about 36 hours, the ASIA motor scores improved by eight points. The total improvement plateau occurred within 6 days in this patient. There was a peak of increase in ASIA motor score of 12 points from initiation of treatment.

**Discussion:** To our knowledge, the use of Minocycline has not been documented in the literature to augment or aid in motor recovery in patients with transverse myelitis. This is a novel approach that provided improvement in the rehabilitation functional outcome in a patient with a unique complication to the standard treatment options with transverse myelitis.

**Conclusion:** The neuro-protective and anti-inflammatory profile of the tetracycline antibiotic, Minocycline, should be considered as a treatment option in patients who are immunocompromised and or cannot tolerate standard treatment options such as high dose steroids when treating transverse myelitis.

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**Poster 95**

**Relationship between Hypogonadism and Agitation on Admission to Acute Inpatient Rehabilitation after Traumatic Brain Injury**

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**Disclosures:** M. Maneyapanda: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To evaluate the potential association between hypogonadism and agitation on admission to acute inpatient rehabilitation after traumatic brain injury (TBI).

**Design:** Retrospective cohort study.

**Setting:** Brain injury unit in an academic inpatient rehabilitation hospital in the United States.

**Participants:** 46 male patients admitted for inpatient rehabilitation after TBI within a 6-month period.

**Interventions:** Not applicable

**Main Outcome Measures:** Agitated Behavior Scale (ABS) score, serum free testosterone level.

**Results or Clinical Course:** Of the 46 patients, 33 (71.7%) were hypogonadal, defined as serum free testosterone level < 2 ng/mL. 13 patients were eugonadal. The mean age of the hypogonadal group was 48.69 (standard deviation (SD) 18.2). The mean age in the eugonadal group was 42.92 (18.2, P = .34). In the hypogonadal group, the mean ABS score in the first 6 shifts was 19.20 (7.07). In the eugonadal group the mean ABS score was 18.18 (5.67, P = .26). The percent of shifts that patients demonstrated agitation (ABS > 21) was 26.3% (52 agitated shifts) in the hypogonadal group and 21.8% (17 agitated shifts) in the eugonadal group (P = .66).

**Conclusion:** In this cohort, patients with hypogonadism had slightly more shifts in a state of agitation, and a slightly higher mean ABS score than patients with eugonadism. Further research is needed to determine if there is causal relationship between hypogonadism and agitation. These findings may have implications on the relationship between hormone dysfunction and behavior after TBI.

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**Poster 96**

**Long-Term Safety Analysis of 3 mg/mL of Gablofen® (Baclofen Injection) Administered through Intrathecal Route**

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**Disclosures:** Y. Zheng: Employment - Mallinckrodt

**Objective:** To assess the rate of granuloma formation and to demonstrate the safety of 3 mg/mL Gablofen® (Mallinckrodt Pharmaceuticals, Inc., St. Louis, MO) administered through intrathecal route using a SynchroMed® II (Medtronic Inc., Minneapolis, MN) pump over a 9-month treatment period.

**Design:** A prospective, open-label, single-arm, long term safety study.

**Case Description:** Not applicable

**Program Description:** Not applicable

**Setting:** Multi-center trial conducted in the USA.

**Participants:** All subjects, ≥ 4 years old with severe spasticity, receiving a stable dose of baclofen 2 mg/mL intrathecaly. Subjects
were excluded if they had a history of malignancy (except for local skin cancer or in situ cervical carcinoma) or inflammatory granuloma, or if they had a life expectancy <12 months.

Interventions: After obtaining an informed consent, the provider withdrew residual 2 mg/mL baclofen from the subject’s implanted pump and replaced it with 3 mg/mL of Gablofen®. Dose adjustments were not allowed for the first 10 days, after which the dose was adjusted up to 2 mg/day.

Main Outcome Measures: Incidence of catheter-tip granulomas as confirmed by Magnetic Resonance Imaging (MRI) with or without contrast or a CT scan (when MRI was contraindicated), as well as other treatment-emergent adverse events (TEAEs) reported in the study population.

Results or Clinical Course: Of the 153 enrolled subjects (age range 4 - 69 years old), 108 (70.6%) completed their 9-month follow-up at the time of this safety analysis. A total of 50 serious adverse events (SAEs) were reported in 29 subjects (19%), and 4 events in 3 subjects (2.0%) were reported to be related to the study medication. None of the reported SAEs were considered unexpected based on the safety profile of intrathecal baclofen. Among the 63.4% of study subjects who experienced at least one TEAE, 8.5% of adverse events were considered treatment-related by the investigator. Overall, seven subjects presented with clinical signs and symptoms suggestive of a granuloma. Results from MRI in 6 subjects and CT scan in one subject confirmed absence of any catheter-tip granulomas in all seven subjects.

Discussion: Not applicable

Conclusion: No confirmed masses or catheter tip granulomas were seen in subjects who were administered 3 mg/mL baclofen via intrathecal pump during the 9-month duration. The 3 mg/mL concentration of baclofen appears to be safe and well-tolerated in the study population.

Poster 97
Rehabilitation of a Stroke Patient with Charles Bonnet Syndrome: A Case Report
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Disclosures: E. V. Adamov: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 67-year-old woman was admitted with the worst headache of her life, diagnosed with subarachnoid hemorrhage and a 3-cm basilar aneurysm causing mass effect and hydrocephalus.

Program Description: Patient underwent angiography and aneurysm stenting and coiling. She subsequently developed infarctions in basilar artery distribution, including bilateral posterior cerebral arteries and perforating vessels. Due to worsening hydrocephalus, the patient also underwent an extra-ventricular drain placement. She was then transferred to an acute brain injury unit.

Setting: Inpatient traumatic brain injury unit

Results or Clinical Course: During her rehabilitation stay, the patient was noted to have visual impairment and complex visual hallucinations, which significantly limited her participation in therapy. Symptoms were initially attributed to steroid delirium or depakote side effect, however termination of these medications did not alleviate hallucinations. Dementia workup resulted negative; repeat imaging was stable. Psychiatry and Neuro-opthalmology consulted to evaluate for cortical blindness, Anton-Babinski syndrome, Balint’s syndrome, or Charles Bonnet Syndrome (CBS). Cortical blindness was confirmed, and CBS was deemed the most likely explanation of her symptoms.

Discussion: Charles Bonnet, Anton-Babinski and Balint’s syndromes are each characterized by a distinct constellation of symptoms that are often unrecognized until the patient is undergoing rehabilitation. Failure to promptly diagnose and treat these conditions can frustrate progress in therapy. CBS is a rare disorder characterized by complex visual hallucinations several weeks to months after onset of visual deterioration due to ocular pathology or disruption of optic pathways, without cognitive impairment. Pathophysiology of visual hallucinations in these patients remains poorly understood. Current management includes reassurance and counseling, however treatments such as SSRIs and anticonvulsants are being investigated.

Conclusion: There is a lack of awareness about CBS among medical professionals, often leading to inappropriate diagnosis and management. In this case, acute rehabilitation of a patient with subarachnoid hemorrhage and ischemic strokes was complicated by visual hallucinations due to cortical blindness and CBS.

Poster 98
Acute Spinal Cord Injury Rehabilitation in Pregnancy: A Case Report
Latanya D. Lofton, MD (Carolinas Rehabilitation, Charlotte, NC, United States), John Cuneen, MD, Jonathan Silverman, MD

Disclosures: L. D. Lofton: I Have No Relevant Financial Relationships To Disclose.

Case Description: Patient is a 21-year-old woman who was admitted to acute inpatient rehabilitation with T12 AIS impairment scale C incomplete spinal cord injury following a motor vehicle accident. During her initial evaluation, she was noted to have a positive beta human chorionic gonadotropin test (β-hCG).

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: Obstetrical ultrasound confirmed the presence of intrauterine pregnancy in our patient with T12 AIS impairment scale C incomplete spinal cord injury following a motor vehicle accident. Due to the pregnancy and spinal cord injury, our patient had increased risk factors for venous thromboembolism as well as urinary tract infections. Her hospital course was complicated by urinary tract infection, spasticity, neuropathic pain, intractable nausea and vomiting, and mood disorder. Adjustments to medications and the therapeutic program were made to reduce risk of adverse effects to the fetus while preventing secondary complications to our patient. A comprehensive team approach with physiatry, maternal fetal medicine, psychology, and rehabilitation therapy was implemented to provide the best treatment plan for this patient.

Discussion: There are many special factors involving medical and therapeutic interventions that must be considered when providing acute spinal cord injury rehabilitation to patients who are also pregnant, especially in the first trimester of pregnancy. Although there are recommendations regarding chronic spinal cord injury and pregnancy, there is minimal information in the literature regarding acute spinal cord injury rehabilitation and coexisting pregnancy.

Conclusion: Physiatrists and rehabilitation professionals must be knowledgeable regarding the recommendations and modifications in management of patients with acute spinal cord injury who may also be pregnant.

Poster 99
The Effects of Pre-Morbid Anxiety and Depression on Functional Outcomes in Acute Stroke Patients
Admitted to Inpatient Rehabilitation
David B. Essaff, DO (University of Rochester Medical Center, Rochester, NY, United States), Sarah Ackroyd, MPH, Kevin Rhie, BS, Katarzyna B. Iwan, Jennifer Fleeman, PsyD, Kanakadurga R. Poduri, MD

Objective: To test the hypothesis that functional outcomes, as measured by the FIM efficiency ratio (FIM Gain/LOS), are adversely affected by a premorbid history of anxiety and/or depression among stroke patients admitted to acute inpatient rehabilitation.

Design: Retrospective cohort study of 484 stroke patients admitted to the acute rehabilitation unit from January 2010 through December 2014. Among these, 91 patients had a premorbid diagnosis of anxiety and/or depression.

Setting: Acute inpatient rehabilitation unit of a tertiary care hospital.

Participants: Acute stroke patients admitted to inpatient rehabilitation.

Main Outcome Measures: A Student’s t-test was used to compare the means of the two groups for: age, admission FIM, discharge FIM, FIM gain, length-of-stay (LOS), and FIM efficiency ratio (ER).

Results or Clinical Course: There are no statistically significant differences between the means of the two groups (non-anxiety/depressed vs anxiety/depressed) for: age (65 and 64; years), admission FIM (64 and 64), discharge FIM (89 and 86) and LOS (17 and 16; days), respectively. The standard normal deviate statistic for the difference of the two means for ER is significant at 8.22 ($P < 0.00001$) with a mean ER for the non-anxiety/depressed and the anxiety/depressed groups of $0.72 \pm 0.35$ and $1.66 \pm 1.08$, respectively.

Conclusion: Most conclude that post-stroke depression adversely affects rehabilitation. Little is known, however, of the effects of premorbid mental health conditions on rehabilitation outcomes. While it could be argued that premorbid anxiety/depression may adversely affect stroke rehabilitation functional outcomes, our study did not indicate that these diagnoses limited functional gains during acute inpatient rehabilitation in patients with stroke for the variables: admission FIM, discharge FIM, and LOS. Although the ER was significantly greater for the anxiety/depressed group, this is likely a consequence of limitations of the study. Specifically, no pre-rehabilitation psychiatric screenings were performed to establish the presence of anxiety/depression symptoms that might account for differences among the groups. Additional research is needed to help establish the effects of premorbid mental health on stroke rehabilitation outcomes.

Poster 100
Sternoclavicular Abscess as a Cause of Shoulder Pain in Acute SCI: A Case Report

Latanya D. Lofton, MD (Carolinas Rehabilitation, Charlotte, NC, United States)

Disclosures: L. D. Lofton: I Have No Relevant Financial Relationships To Disclose.

Case Description: Patient is a 50-year-old woman who was admitted to acute inpatient rehabilitation with T10 ASIA impairment scale B SCI following a motor vehicle accident. She was progressing as expected with her ability to propel a manual wheelchair and perform activities of daily living. However, during the course of her hospitalization, she developed a postoperative wound infection at the site of her lumbar decompression and fusion. She simultaneously began to report worsening right shoulder pain.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: MRI confirmed the presence of septic arthritis at the sternoclavicular joint. She underwent CT guided aspiration and lavage of the SC joint. She was also found to have a large pleural effusion and underlying empyema, and she subsequently underwent bronchoscopy. Lumbar laminectomy wound cultures, bronchial, and blood cultures were positive for MRSA. She was treated with a course of vancomycin, and she was treated with oral doxycycline for immunosuppressive therapy following completion of the IV antibiotics.

Discussion: Sternoclavicular abscess is rare, but it may cause serious complications. It is most commonly caused by Staphylococcus aureus, and it usually requires antibiotic therapy. In severe cases, surgery may be needed.

Conclusion: Shoulder pain is a common problem in patients with spinal cord injury. However, there is minimal information in the literature regarding sternoclavicular abscess as a source of shoulder pain in this patient population. Physiatrists and SCI specialists should be knowledgeable about the recognition and management of this condition.

Poster 101
An Interdisciplinary Approach to the Rehabilitation of a Patient with Balint’s Syndrome: A Case Report

Erika Trovato (NYU, New York, NY, United States), Stephanie Windler, PT, DPT, NCS, Kevin Franzese, DO, Nayeema Chowdhury, DO, Kristie Izzo, MS, CCC-SLP, Siobhan Burns, OTR-L, MS, Jaime M. Levine, DO

Disclosures: E. Trovato: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 72-year-old man with history of amyloid angiopathy and cerebral hemorrhages sustained an acute left temporal parietal intraparenchymal hemorrhage. He was noted to have impairments in visual perception, memory, language and balance. The patient was diagnosed with Balint’s Syndrome, characterized by simultagnosia, oculomotor apraxia and optic ataxia. The patient required acute inpatient rehabilitation to address this unique set of impairments.

Setting: Acute inpatient rehabilitation.

Results or Clinical Course: An interdisciplinary approach was utilized focusing on task-based training to improve his cognitive and physical functioning. The patient benefited from errorless learning techniques, a low stimulation environment, and proprioceptive input to improve balance and coordination. Objective testing with the O-LOG, FIM, Berg Balance Test, and a specialized protocol for spaced retrieval of orientation information were utilized in order to track the patient’s rehabilitation progress. At time of discharge, the patient demonstrated improvement in orientation (8/30 to 20/30 on O-LOG), balance (0/56 to 17/56 on Berg Balance Test), basic communication skills, and self-care activities over four weeks.

Discussion: This case report demonstrates a unique rehabilitation approach to Balint’s Syndrome, whereby established objective scales were incorporated to measure the patient’s functional improvements over time. It has been reported in limited research that rehabilitation training should be focused on the improvement of visual scanning, the development of visually guided manual movements, and integration of visual elements. This case report agrees with these findings and supports an interdisciplinary approach to address patients with complex functional impairments.

Conclusion: This case report supports published reports of treating Balint’s syndrome with an interdisciplinary approach. However, more research is needed to validate an effective clinical approach for this distinctive syndrome.

Poster 102
Ischemic Steal Syndrome Leading to Severe Distal Peripheral Neuropathy

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Disclosures: J. Singh: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 48-year-old woman with a history of diabetes mellitus and end stage renal disease on hemodialysis was admitted to...
the hospital after she began to have fever and pain at the site of her Perm-A-Cath. The Perm-A-Cath was removed, and she was deemed a candidate for AV fistula placement for hemodialysis access. Within 24 hours of fistula placement, she developed pain and the inability to flex or extend her left wrist and fingers. She was diagnosed with ischemic steal syndrome. An urgent distal revascularization interval ligation was performed.

Setting: Academic medical center.

Results or Clinical Course: Although the fistula was salvageable, she continued to have extremely limited use of the left upper extremity despite occupational therapy. Nerve conduction studies were performed on her left upper extremity four weeks later and revealed absent left median, ulnar, and radial sensory and motor responses. Needle EMG on the left arm revealed no motor units firing for the distal median, ulnar, and radial nerves.

Discussion: A serious complication of hemodialysis vascular access is ischemic steal syndrome. Steal syndrome, which is generally distal hypoperfusion, can be caused by three main etiologies. They are arterial occlusive disease, excess blood flow through the AV fistula, or failure of collateral flow development. These conditions "steal" blood flow meant for distal profusion and can potentially cause irreversible impairment if not detected early in the fistula’s development. Patients with diabetes are at greater risk for development of steal syndrome. If surgical intervention is required, the procedure of choice is distal revascularization with interval ligation.

Conclusion: Steal syndrome is an uncommon but serious complication of hemodialysis shunts. Irreversible functional impairment may occur if steal syndrome is not detected early on.

Poster 103
Intrathecal Baclofen Expediting the Recovery of an Injured Brain: A Case Report

Joseph L. Connor, MD (MedStar National Rehabilitation Hospital, Washington, DC, United States), Esperanza Guillermety, MD


Case Description: A 54-year-old man with a past medical history significant for a ruptured intracranial aneurysm resulting in left hemiplegia was discharged from an outside acute rehabilitation unit requiring some assistance with ambulation and activities of daily living. Approximately 3-4 months later, the patient’s recovery at home was complicated by bacterial ventriculitis requiring a cranioplasty and removal of his ventriculoperitoneal shunt. He was rendered minimally conscious for 3 weeks and became bedridden and dependent for self-care with moderate cognitive impairment.

Program Description: 54-year-old man with cognitive decline and spasticity after brain injury.

Setting: Outpatient rehabilitation clinic.

Results or Clinical Course: On presentation to our rehabilitation clinic after the ventriculitis, the patient was able to slowly self-feed with his left arm and spoke few words. He required supplemental gastric tube feeds, used a lift for transfers, had very limited movement with his left arm and spoke few words. He required supplemental clinic after the ventriculitis, the patient was able to slowly self-feed of daily living. Approximately 3-4 months later, the patient's recovery at home was complicated by bacterial ventriculitis requiring a cranioplasty and removal of his ventriculoperitoneal shunt. He was rendered minimally conscious for 3 weeks and became bedridden and dependent for self-care with moderate cognitive impairment.

Conclusion: Steal syndrome is an uncommon but serious complication of hemodialysis shunts. Irreversible functional impairment may occur if steal syndrome is not detected early on.

Discussion: There have been few reports of intrathecal baclofen triggering recovery from altered states of consciousness after brain injury. The mechanism of action is unclear, but hypothesized to be a result of inhibition of dysfunctional stimuli to the injured brain. This report supports this evidence and suggests that systemic baclofen may have a mild similar effect.

Conclusion: Initiation of intrathecal baclofen correlated well with significant improvements in level of consciousness and cognitive functions in our patient after a severe brain injury.

Poster 104
Neuromyelitis Optica Precipitated by Chikungunya
Viral Infection: A Case Report

Abir Naguib (Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY, United States), Steven A. Sparr, MD

Disclosures: A. Naguib: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 50-year-old woman presented with left arm weakness and numbness that spread to the left leg over a day. Two months prior while visiting Jamaica, she developed an acute febrile illness characterized by malaise, diarrhea, myalgia, arthralgia, and rash. She was diagnosed with chikungunya and recovered over two weeks without residual symptoms. On examination, vision was intact. She had left upper and lower extremity weakness and right upper and lower extremity loss of sensation. Sensation and proprioception were diminished bilaterally in the upper and lower limbs, extending to the wrists and ankles. Deep tendon reflexes were absent in both arms and brisk in both legs. Plantar reflex was mute bilaterally. She had urinary incontinence.

Setting: In-patient hospital setting.

Results or Clinical Course: MRI of the brain was normal. MRI of the spinal cord was consistent with transverse myelitis extending from C2 to C7. CSF revealed lymphocytic pleocytosis. Serology showed IgG and IgM antibodies to chikungunya viral (CHIKV) infection. Serology was also positive for NMO (neuromyelitis optica) antibodies. She was started on high dose IV steroids resulting in some improvement in physical function and bladder function. She was non-ambulatory initially but with intensive rehabilitation she was able to ambulate with assistance. However, a few days after discharge she experienced a relapse and was unable to move both legs and her left arm, with urinary retention. Repeat MRI showed further extension of cord involvement from C2 to the conus. Treatment with plasmapheresis did not result in further improvement.

Discussion: The natural history of NMO is one of a stepwise deterioration due to accumulating visual, motor, sensory, and bladder deficits. Early diagnosis is crucial as immune modification can improve long term outcome. There are reports of NMO triggered by EBV, VZV and HIV. This can occur by molecular mimicry or non-specific up-regulation of the immune system precipitating a latent autoimmune process. To date there have been no reports of NMO triggered by CHIKV.

Conclusion: CHIKV has been shown to cause neurological complications but there have been no reports of it precipitating NMO. The presence of NMO antibodies in this patient with recently diagnosed CHIKV suggests that NMO can be a potential complication of CHIKV.

Poster 105
Cranial Nerve IX, X, and XII Palsies Following Fourth Ventricle Ependymoma Resection: A Case Report

Travis O’Brien, MD (Mayo Clinic, Rochester, MN, United States), Allen W. Brown, MD

Case Description: The patient is a 59-year-old man who underwent surgical resection of a grade II fourth ventricle ependymoma via suboccipital craniectomy and C1 laminectomy after presenting with refractory headache. Postoperatively, he was unable to wean from the ventilator and required tracheostomy placement. After extubation, examination identified isolated cranial nerve IX, X, and XII palsies, flaccid bilateral lower motor neuron speech impairment, and severe dysphagia necessitating percutaneous gastrostomy tube placement for enteral feeding. His acute hospital course was further complicated by orthostatic hypotension leading to multiple syncopal episodes, likely due to baroreceptor dysfunction. He developed very high feeding residuals secondary to gastroparesis requiring jejunal extension and low intermittent suction.

Setting: Tertiary care medical center.

Results or Clinical Course: After his medical condition stabilized, he successfully completed a course of inpatient rehabilitation. His orthostatic hypotension was successfully managed with an abdominal binder and compression stockings, in addition to titration of midodrine and fluoroceftisone. Tube feeds were successfully transitioned to a nocturnal regimen and intermittent suction was discontinued after starting metoclopramide. His respiratory status improved after minimizing secretions with the use of scopolamine patches, but we were unable to decannulate by the time of discharge. He fully participated in comprehensive physical, occupational, and speech therapy. He required a walker for mobility secondary to lightheadedness, but was discharged independent in ambulation and activities of daily living. His motor speech quality markedly improved and he successfully adopted compensatory communication strategies.

Conclusion: This is a unique case of isolated cranial nerve IX, X, and XII palsies due to presumed traction injury during fourth ventricle ependymoma resection at the cervico-medullary junction. It demonstrates classic impairments related to functions of these cranial nerves, such as dysphagia, lower motor neuron speech impairment, impaired cough, gastroparesis, and baroreceptor dysfunction. This patient required a comprehensive medical and rehabilitation approach that is most effectively delivered in an inpatient rehabilitation setting.

Poster 106
Inpatient Rehabilitation Brain Tumor Population – Factors Associated with Acute Care Transfers

Prateek Grover, MD, PhD (Washington University School of Medicine, St Louis, MO, United States), Abhishek Jain, MD, Sri Krishna Patchala, MD, Sinhnu Jacob, MD, Angela Valleeck, MBA, David Carr, MD


Objective: The aim of this study was to identify patient variables associated with less-than-desirable discharge disposition, i.e., acute care transfer (ACT) or skilled nursing center (SNC) in the acute inpatient rehabilitation brain tumor population.

Design: A retrospective quality improvement study, comprised of record review of acute inpatient rehabilitation brain tumor patients from 2012-2014 was performed to evaluate risk factors for less-than-desirable discharge outcomes, defined as disposition other than home.

Setting: This QI study setting was a 96-bed acute inpatient rehabilitation facility (IRF), The Rehabilitation Institution of St. Louis (TRISL), St Louis, MO.

Participants: 74 admissions with a primary diagnosis of brain tumor in 2012 (N=54) and 2014 (N=20) were included.

Interventions: Data reviewed included admission medical information (vital signs, labs), demographics, comorbidities, medications, admission FIM scores, and nursing admission screens.

Main Outcome Measures: The main outcome measure was discharge other than home (ACT or SNC). The group discharged home was compared with the ACT / SNC group using T-test for continuous, and Chi-square for categorical variables. ROC curves / AUC were used to define predictor variables.

Results or Clinical Course: 40% of the brain tumor population was discharged to an ACT (28%) or SNC (12%), a rate much higher than the facility’s average acute care transfer rate (15%) for 2014 or the national average (11%). Only 4 factors were significantly correlated with less-than-desirable discharge outcomes: longer inpatient rehabilitation stay, lower Braden score, lowest oxygen saturation, and lower total FIM scores at admission (ROC, AUC=0.71), with eating, bowel, bladder and bed/chair transfers FIMs being the most predictive.

Discussion: Given the high less-than-desirable discharge rate, this population merits further study to determine patient characteristics that define appropriateness for admission to acute inpatient rehabilitation. Accordingly, the long-term goal is to design a screening tool to maximize utilization of inpatient rehabilitation resources, including early hospitalist involvement, based upon patient risk profile.

Conclusion: Factors significantly associated with ACTs have been identified in this study. Ongoing work includes increasing sample size with the intention to generate predictive models using logistic regression once N=100.
Conclusion: Symptoms include ipsilateral cerebellar signs, nystagmus, ipsilateral Horner’s syndrome, dysphagia, hoarseness. Acute rehabilitation should comprise a comprehensive rehabilitation care team approach with all fields of therapy. Along with motor deficits, dysphagia should be appropriately addressed with video swallow testing.

Poster 108
Auditory Verbal Agnosia in a Patient with Bilateral Temporoparietal Lobe Infarcts: A Case Report
Nina Bhupathiraju, MD (Marianjoy Rehabilitation Hospital, Wheaton, IL, United States), Richard Krieger, MD

Disclosures: N. Bhupathiraju: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 69-year-old right-handed woman has a history of hypertension, diabetes, and coronary artery disease. Following a right-sided temporoparietal ischemic stroke, she had mild cognitive deficits and was diagnosed with seizure disorder. She was started on antiepileptics and discharged home independently. Six months later, she presented to an acute care hospital with acute aphasia and word-finding difficulty. Brain imaging revealed prior infarct with an acute left-sided temporoparietal ischemic stroke. Patient had minimal motor deficits and hearing and voice were intact. She was able to comprehend common environmental sounds but unable to understand verbal statements. Once stable, was admitted to acute inpatient rehabilitation hospital.

Setting: Freestanding acute inpatient rehabilitation hospital.
Results or Clinical Course: Patient was diagnosed with auditory verbal agnosia and expressive aphasia and communication barriers complicated acute rehabilitation program. She only expressed symptoms after the second infarct to the left-sided temporal lobe as bilateral temporal lobe injury manifests with word deafness. Patient responded appropriately to written and visual commands and communicated with fluent written statements. She expressed paraphasic errors in speech and was unable to comprehend her own errors. Eraser board and marker and computer applications were used as primary modes of communication along with mimicking visual actions. Extensive speech therapy sessions included reading a simple written command followed immediately by hearing the same command to improve word recognition. For improvement in speech, paraphasic errors were written down phonetically for her to acknowledge her own mistakes.

Conclusion: Auditory verbal agnosia is rare and manifested after bilateral temporal lobe injury. Superior and lateral parts of left-sided temporal lobe include primary auditory processing and language recognition centers. While isolated injury manifests as expressive or receptive aphasia, word deafness has been found primarily in bilateral lesions. Improvement in communication and cognition includes augmentative and alternative strategies with compensatory mechanisms such as sign language.

Poster 109
Prolonged Urinary Retention from Severe Thiamine Deficiency: A Case Report
Kirsten Gage, MD (University of Pittsburgh Medical Center, Pittsburgh, PA, United States), Amanda L. Harrington, MD

Case Description: A 75-year-old woman with a history of non-small cell lung cancer status post chemotherapy and radiation and no previous history of bowel or bladder incontinence presented with acute onset paraplegia, absent rectal tone, and urinary retention. All diagnostic imaging and procedures (including but not limited to an MRI of the brain; cervical, thoracic, lumbar, and pelvic MRIs; lumbar puncture; CT of the chest; muscle biopsy) were negative in elucidating the cause of acute onset paraplegia. After several days of diagnostic work-up, patient was discovered to have an undetectably low thiamine level thought likely to be the cause of her symptoms. She was started on high dose intravenous thiamine followed by oral thiamine supplementation. She initially showed a small improvement in her lower extremity strength, and bowel incontinence resolved. The patient, however, continued to have urinary retention. She was admitted to inpatient rehabilitation with a Foley catheter in place. Thiamine level was rechecked upon admission and found to be within normal limits.

Setting: Spinal cord injury unit, tertiary care hospital.
Results or Clinical Course: The patient made significant functional gains during her rehabilitation course improving from requiring total dependence for ambulation upon admission to ambulating community level distances and transferring with modified independence upon discharge. Despite functional gains, the neurogenic bladder did not improve. Multiple voiding trials were attempted, and pharmacologic treatment with both tamsulosin and urecholine were utilized without success. A Foley catheter had to be replaced prior to discharge. A voiding trial was subsequently attempted as an outpatient; however no volitionally voiding occurred.

Discussion: There are an extremely limited number of case reports describing urinary retention secondary to severe thiamine deficiency; however, in all previous reports, urinary retention improved with thiamine repletion. This is the first reported case of isolated and sustained urinary retention despite adequate thiamine treatment and resolution of all other neurologic symptoms associated with the diagnosis.

Conclusion: Assessment for neurogenic bladder is necessary in patients with thiamine deficiency and may not improve with thiamine repletion.

Poster 110
Extremely Rare Presentation of Triplegia: A Case Report
Justin Averna, DO, Joyce Cheng (Temple University Hospital, Philadelphia, PA, United States), Adam D. Weidenhammer, MD, Ernesto Cruz, MD

Case Description: A 57-year-old man presented seeking a second-opinion regarding a questionable history of post-polio syndrome with mild right-sided weakness. Patient provided a history of declining mobility and progressive headaches within a 3-month period. He was modified independent with a right Lofstrand crutch for ambulation and independent for activities of daily living (ADLS) premorbidly. Physical examination on admission revealed right upper and lower limb grossly 4/5 throughout on manual muscle strength testing. Workup included CT/MRI of the brain and revealed a large brain mass consistent with a parafalcine meningioma compressing down on the corpus callosum and other midline structures. Patient underwent a prolonged, 12-hour vertebrectomy with resection of a large extra-axial mass. Post-operative examination revealed manual muscle strength of 0/5 in all extremities except 4/5 proximal and 3/5 distal strength in the right upper limb. Patient was slow to answer questions and follow commands. A left-upper motor neuron facial palsy was present, tongue was midline, extraocular muscles intact without field cuts and sensation to light touch and pinprick was intact throughout. He was treated with steroids and antiseizure prophylaxis post-operatively.

Setting: Tertiary care rehabilitation center.
Results or Clinical Course: Patient was subsequently admitted to a tertiary care rehabilitation center and participated in intensive
therapy for 6 weeks. He was maximum assistance for all transfers, dependent for all ADLs, and ambulation was not occurring at time of admission. Physical examination at time of discharge was 4/5 muscle strength testing in the left upper limb, 5/5 in the right upper limb, and 2/5 proximal and 1/5 distal strength in the lower limbs. Discharge functional status was close supervision with wheelchair mobility, maximum assistance with transfers, close supervision with upper extremity dressing and setup for eating. The patient was transferred to a skilled nursing facility for continued therapy.

**Conclusion:** Outside of spastic triplegia diagnoses secondary to cerebral palsy, triplegia is extremely rare and to our knowledge, this case report is one of only a few reports in the literature. This report underscores the importance of acute, intensive inpatient rehabilitation in extremely rare presentations of disease.

**Poster 111**
**The Role of Chronicity of Spinal Cord Injury on Duration of Autonomic Dysreflexia**

**Ryan Solinsky, MD (University of Washington, Seattle, WA, United States), Aaron Bunnell, MD**

**Disclosures:** R. Solinsky: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To describe factors influencing the duration of autonomic dysreflexia (AD) occurring in admitted patients with spinal cord injury (SCI) when using a standardized treatment algorithm.

**Design:** Retrospective chart review.

**Setting:** Inpatient VA spinal cord injury unit.

**Participants:** 78 male veterans with SCI (American Spinal Injury Association (ASIA) A-D, Neurologic levels C1-T7) who experienced AD while admitted to our inpatient unit over a 3 ½ year period.

**Interventions:** All patients were treated with a nursing-driven, longitudinal AD treatment protocol until systolic blood pressure decreased to below 160 mmHg or further escalation of care was needed. Steps in the protocol included 1) conservative, non-pharmacologic management. 2) 1 inch of nitroglycerin paste. 3) Additional 1 inch of nitroglycerin paste. 4) 10mg of hydralazine PO. 5) Additional 10mg of hydralazine PO.

**Main Outcome Measures:** Duration of AD episode from onset to resolution.

**Results or Clinical Course:** 410 episodes of AD were captured during the study period. 97.6% of episodes resolved using this protocol. The mean duration of AD was 63.1 minutes. A bimodal distribution with a strongly matched quadratic correlation was identified between the duration of AD episodes and chronicity of SCI (R squared=0.991). A moderate, positive linear correlation existed between duration of AD episodes and completeness of injury (as determined by ASIA classification, R squared=0.788), and no significant correlation was found between episode duration and neurologic level of injury.

**Conclusion:** Chronicity of spinal cord injury is strongly correlated to duration of autonomic dysreflexia when using this treatment algorithm. Further research is needed to determine if these results can be extended to other SCI populations using varied treatment protocols.

**Poster 112**
**Ultrasound-Guided Onabotulinum Toxin A (Botox) Injection of the Psoas Muscle Using a Posterior Approach: A Case Report**

**Joelle A. Makon, MD (Virginia Commonwealth University, Richmond, VA, United States), Michael T. Kelly, DO, Douglas P. Murphy, MD**

**Disclosures:** J. A. Makon: I Have No Relevant Financial Relationships To Disclose.

Case Description: A posterior approach to ultrasound-guided Onabotulinum Toxin A (Botox) injection was used to treat iliopsoas muscle spasticity (IMS) in a 40-year-old man with spinal cord injury and hip flexion contracture. This ultrasound-guided technique was performed with the patient lying on his side. The psoas muscle was easily visualized under ultrasound, and a 3.5-inch (22-gauge) spinal needle was advanced anteriorly in a slightly medial to lateral direction through the erector spinae muscle, and between the transverse processes to target the psoas muscle. Using the Doppler function, as well as aspiration, it was determined that the needle was not in proximity to vascular structures. 150 units of Botox were subsequently distributed to the psoas muscle at 3 levels between L2-L4.

**Setting:** Veterans Affairs Medical Center

**Results or Clinical Course:** The ultrasound-guided injection was followed by a regular stretching program with a therapist. At 3 days post injection there was noticeable improvement in hip passive range of motion which continued to improve over the next 2 weeks. Further physiatric examination at 3 weeks post-injection revealed a reduction in Modified Ashworth Score from 4 to 2. Nursing staff reported improvement in ease of turning, hygiene, and toileting.

**Discussion:** The iliopsoas is a powerful hip flexor often targeted with Botox injections for management of spasticity and is usually accessed using an anterior approach. Botox is known to be most efficacious when in closest proximity to the motor end plate (MEP), the majority of which are found in the middle section of this muscle. The mid-point of the psoas muscle is easily accessed using the posterior approach, and ultrasound-guided examination allowed for easy visualization of the muscle belly, as well as safe and reliable needle guidance. Furthermore active hip flexor tone made a posterior approach the safest way to complete the procedure. To the best of our knowledge this is the first case report to describe a posterior approach of this procedure.

**Conclusion:** In select cases where active flexor tone and high-grade spasticity are concerning, ultrasound-guided Botox injections of the iliopsoas using a posterior approach can be a safe and effective alternative for management of IMS.

**Poster 113**
**Autonomic Instability Associated with Anti-Epileptic Agents in Setting of Late Post-Traumatic Seizures after Traumatic Brain Injury, A Case Report**

**Stephen Hampton, MD (Rutgers-NJMS/Kessler, Bloomfield, NJ, United States), Neil Jasey, MD**

**Disclosures:** S. Hampton: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** Patient is a 38-year-old man who sustained a severe traumatic brain injury after an ATV rollover accident. He developed generalized tonic-clonic seizures more than 5 months after the initial injury despite seizure prophylaxis with levetiracetam 750mg twice daily. Under video-EEG monitoring, adequate seizure treatment was not achieved until levetiracetam dose was increased to 1,000mg three times daily and additional oxcarbazepine and topiramate were introduced. Over the subsequent few weeks, the patient developed gradual decline in heart rate and temperature with nadir of heart rate of 38 beats per minute and temperature of 86 degrees Fahrenheit prompting transfer to an Acute Care Hospital.

**Setting:** Acute rehabilitation hospital.

**Results or Clinical Course:** MRI brain demonstrated extensive cystic encephalomalacia consistent with a severe traumatic brain injury and post-traumatic hypertrophic olivary degeneration related to disruption of circuitry within the Guillain Mollaret (or Myoclonic) Triangle. Cardiac electrophysiology workup was unremarkable. Following reduction of levetiracetam dose after transition of
oxcarbazepine and topiramate to phenytoin and lamotrigine, bradycardia and hypothermia significantly improved. Lamotrigine dose was slowly increased prior to discontinuation of phenytoin without significant change in vital signs.

**Discussion:** Guidelines exist for treatment of post-traumatic seizures after a traumatic brain injury based upon timing (i.e., immediate, early, late). Adverse effects from these medications can be pronounced, especially when large dosages and multiple agents are necessary to treat refractory seizures. Rare reports exist associating levetiracetam with bradycardia and adjuvant use of topiramate with hypothermia. To our knowledge, there is no association between injury to the Guillain Mollaret Triangle and bradycardia or hypothermia.

**Conclusion:** This case highlights the complicated management of post-traumatic seizures after traumatic brain injury as well as the association in this case of severe bradycardia and hypothermia with levetiracetam and topiramate use.

**Poster 114**
**Correlation of Fractional Anisotropy with Motor Recovery in Stroke Patients after Acute Rehabilitation**

Hongmei Wen, PhD, MD, Mohamad Alshikho, MD (Massachusetts General Hospital, Boston, MA, United States), Yao Wang, MD, Yaping Hua, MD, PhD, Ross D. Zafonte, DO, Martha Herbert, MD, PhD, Qing M. Wang, MD, PhD

**Disclosures:** M. Alshikho: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To test the hypothesis that fractional anisotropy (FA) correlates with motor function after acute stroke rehabilitation.

**Design:** Retrospective

**Setting:** Acute inpatient rehabilitation.

**Participants:** From 2012-2015, 1510 consecutive stroke patients admitted to the acute rehabilitation hospital were screened. Inclusion criteria include that MRI was performed within 2 weeks of onset of stroke and DTI scan was performed using the same MRI scanner and acquisition parameter (TE=96, TR=5000, TI=-1, Flip angle=90), a single-shot echo planar imaging (EPI) sequence was used in DTI data including 28 nonlinear diffusion directions with b=1000 s/mm². Forty-three subjects with ischemic or hemorrhagic stroke were selected for the study.

**Interventions:** Standard acute inpatient rehabilitation.

**Main Outcome Measures:** The motor subscale of the Functional Independence Measure (FIM) was obtained from the medical record and the relative gain after rehabilitation was calculated using Montebello Rehabilitation Factor Score (MRFS). K-mean cluster analysis of FIM-motor and MRFS generated good and poor recovery groups, respectively. Imaging data were collected using the Research Patient Data Registry (RPDR) and mi2b2 Workbench which is a centralized warehouse of clinical data. The study was approved by Institutional Review Board.

**Results or Clinical Course:** FA was significantly higher in higher FIM-motor group compared with lower FIM-motor group in the right corticospinal tract (r = 0.013), left corticospinal tract (r = 0.031), right posterior limb of the internal capsule (PLIC) (P = 0.0081) and left PLIC (P = 0.018). We found significant positive correlation between FIM-motor score at discharge and FA in the left corticospinal tract (r = 0.485, P = 0.0088) and right corticospinal tract (r = 0.456, P = 0.014) and the left peduncle (r = 0.39, P = 0.035) in the higher FIM-motor group. FA was also significantly higher in MRFS good recovery group than the poor recovery group in the left corticospinal tract (P = 0.005), right corticospinal tract (P = 0.004), and in the left PLIC (P = 0.018). Significant positive correlation was found between FA and MRFS motor score in the left corticospinal tract (r = 0.538, P = 0.046) in the good recovery group.

**Conclusion:** Higher fractional anisotropy correlates with better motor outcome in stroke patients undergoing acute inpatient rehabilitation.
likely to be discharged to skilled nursing facility (r = P 0.355, P = 0.047), lower FIM motor subscore on admission (r = -0.338, P = 0.023) and discharge (r = -0.355, P = 0.025) and lower total FIM score on discharge (r = 0.363, P = 0.021). Stroke patients with lower serum BDNF level were more likely to be discharged to skilled nursing facility (r = -0.407, P = 0.009).

Conclusion: Serum BDNF level was associated with functional outcomes as measured by FIM and discharge destination within 2 month of the onset of stroke. BDNF may serve as a prognostic biomarker for functional recovery and may be used as a surrogate marker to evaluate the responsiveness to targeted neurorestorative therapies. Larger scale studies are warranted to confirm these results.

Poster 117
Eight-and-a-Half Syndrome as a Sequela of Pontine Hemorrhage: A Case Report
Rebecca R. Shoemaker (Rehabilitation Institute of Michigan- DMC, Detroit, MI, United States), Maria Humayan, MD
Case Description: A 52-year-old man presented with eight-and-a-half syndrome and was found to have a left dorsal pontine hemorrhage as demonstrated on magnetic resonance imaging. He had a past medical history significant for human immunodeficiency virus (HIV) and deep vein thromboses secondary to antiphospholipid syndrome. On initial examination he was found to have left conjugate gaze palsy and partial deviation of gaze in the right eye. Additional findings included a left facial droop and right upper extremity weakness. On later evaluation by ophthalmology he was discovered to have intranuclear ophthalmoplegia of the left eye, torsional nystagmus and 20/50 visual acuity bilaterally. He also had multiple episodes of hallucinations thought to be secondary to antipsychotic medication administration as well as a bedside sitter. When medically stable he was admitted to the neurosciences unit to address the deficits resulting from his pontine hemorrhage.
Setting: Inpatient rehabilitation facility
Results or Clinical Course: The rehabilitation course was complicated by continued hallucinations, insomnia and visual complaints including diplopia and blurred vision that further complicated his progression in therapy sessions. His right upper extremity strength improved but his ophthalmic symptoms did not. Further developments will be discussed.
Discussion: Eight-and-a-half syndrome is a relatively rare disorder that results from a lower pontine tegmentum lesion and presents with unilateral intranuclear ophthalmoplegia, horizontal gaze palsy and lower motor neuron cranial nerve seven palsy. The only remaining horizontal eye movement is abduction of the eye contralateral to the lesion. Nystagmus is often present. Vertical eye movements are preserved. Possible ophthalmological symptoms include diplopia, oscillopsia and blurred vision which may spontaneously resolve but are occasionally persistent and difficult to manage.
Conclusion: The ophthalmologic symptoms of the relatively rare eight-and-a-half syndrome following a pontine lesion may be persistent and crippling in nature and impact the progression of therapy in the rehabilitation stage.

Poster 118
Prolonged Treatment of Paroxysmal Sympathetic Hyperactivity Limits Functional Gains: A Case Report
Tomasz Chec, BS (Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA, United States), Ziva Petrin, MD, Matthew B. Sonagere, DO, Kristofer J. Feeko, DO
Disclosures: T. Chec: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 35-year-old man with a past medical history of hypertension initially presented with non-traumatic type A aortic dissection, complicated by ischemic stroke of the left anterior, left middle, and right posterior cerebral artery, and subsequent cerebral edema treated with a left decompressive hemicraniectomy. He had a complicated hospital course with ventilator-dependent respiratory failure requiring tracheostomy and PEG tube placement. He remained minimally conscious, with recurrent episodes of agitation, fevers, hypertension, tachycardia, diaphoresis and posturing, eventually recognized as paroxysmal sympathetic hyperactivity (PSH). Episodes persisted despite a regimen of quetiapine, clonidine, propranolol, fentanyl, diazepam and bromocriptine. He was discharged to a long-term care facility at a dependent level unable to follow commands.
Setting: Tertiary care acute hospital followed by acute inpatient rehabilitation.
Results or Clinical Course: He required multiple acute hospital care admissions for numerous infections with fever, tachycardia, and hypertension treated as persistent PSH. Following transmetatarsal amputation 21 months after initial injury, he was admitted to acute inpatient rehabilitation and weaned off bromocriptine, diazepam, and fentanyl without further evidence of sympathetic hyperactivity. He progressed from dependent functional status to improved levels of consciousness with consistent orientation and reliable verbalization. After 3 weeks of rehabilitation he was decannulated, tolerated a soft mechanical diet, followed 3 step commands, directed care for dressing and bathing, supervision for feeding and discharged home with family.
Discussion: PSH is a syndrome of transient increases in heart rate, blood pressure, respiratory rate, temperature, and diaphoresis in the setting of severe acquired brain injury. Resolution can be obscured by coexisting infections. Anatomical localization, duration and triggers are still being elucidated. Further insight into resolution of PSH and weaning off medication is needed.
Conclusion: Prolonged and inappropriate treatment for PSH, if unrecognized, can limit rehabilitation. Withdrawal of sedating medications can result in significant functional gains.

Poster 119
An Analysis of Early and Late Response to Foot Drop Stimulation in Persons with Stroke
Kristina M. Quirolgico, MD (New York Presbyterian Hospital - Columbia and Cornell, New York, NY, United States), Ashley Giambroone, PhD, Ziyad Ayyoub, MD, Steven R. Edgley, MD, Kari Dunning, PT, PhD, Keith McBride, MPT, DPT, Michael W. O’Dell, MD
Disclosures: K. M. Quirolgico: Research Grants - Bioness
Objective: To identify variables predicting an early (ER) versus late responder (LR) to foot drop stimulation (FDS) in persons with stroke.
Design: Secondary analysis of data from FASTEST clinical trial.
Setting: Multicenter clinical trial.
Participants: Ninety-nine subjects (48.5% female, age=60.7±12.4y, time post-stroke=4.8±5.3y), with foot drop and a comfortable gait...
speed (GS-C) < 0.8 m/s in the FDS (Bioness L300™) arm of the 42w clinical trial.

**Interventions**: During the first 6w, subjects received 8 sessions of physical therapy for FDS training, and gradually increased FDS to full day use as their primary device. Repeat assessments were conducted while using the FDS device at 6, 12, 30, 36, and 42w.

**Main Outcome Measures**: The time point for a subject to achieve his/her maximum GS-C. About 50% achieved a maximum GS-C by 12w, which was used to define ER (<12w, N=49) v. LR (>12w, N=50). Chi-square or Student’s t-test were used to examine differences in baseline demographic, stroke, and clinical variables by responder status. Variables with P<.05 were analyzed with logistic regression to predict ER v. LR.

**Results or Clinical Course**: There was no significant difference in baseline GS-C between ER (0.39m/s) and LR (0.45m/s; P=.1822). ER and LR achieved a mean gain in GS-C of 0.13(0.14) and 0.24(0.14) m/s, respectively. Baseline variables entered into a logistic regression included: age, ethnicity, stroke type, lower extremity Fugl-Meyer, Berg Balance Scale, Timed Up and Go, and 6 minute walk test. In the adjusted regression, only age (64.6+11.4y for ER vs. 56.9+11.9y for LR) remained a significant predictor (odds ratio=0.95; 95% CI, 0.91-0.99; P=.012.) The C-statistic for this model was 0.73.

**Conclusion**: Both younger and older subjects with chronic stroke make clinically important gains in gait speed using FDS. Age is the primary factor determining an ER versus LR to FDS. LR (younger) subjects make greater overall gains and require a longer time frame to achieve a maximal benefit. Baseline clinical measures indicated ER (older) subjects had greater impairment suggesting decreased functional reserve.

**Poster 120**

**Recovery of Function after Locked-In Syndrome: A Case Report**

Adam D. Weidenhammer, MD (Temple University Hospital, Philadelphia, PA, United States), Michael Marino, MD

**Disclosures**: A. D. Weidenhammer: I Have No Relevant Financial Relationships To Disclose.

**Case Description**: A 38-year-old previously functionally independent woman presented to acute care with 1 week of progressive weakness, polydypsia, vomiting, and balance difficulties. Work up revealed electrolyte abnormalities secondary to suspected renal tubular acidosis. The patient underwent aggressive fluid and electrolyte repletion and subsequently developed rapid overcorrection of her serum sodium level. Concomitantly she was found to have lower limb deep vein thromboses and was started on intravenous heparin. Within 24 hours of starting heparin she became comatose with hypoxic respiratory failure requiring intubation. Computerized axial tomography of the brain showed an acute pontine hemorrhage. She regained consciousness several days later but was found to have complete paralysis of her limbs, trunk, and near complete paralysis of her bulbar and facial muscles.

**Program Description**: Moss Rehabilitation, Elkins Park, PA.

**Setting**: Tertiary care rehabilitation center.

**Results or Clinical Course**: Patient was subsequently transferred to a tertiary rehabilitation center and participated in 3 months of intensive therapy. At the time of admission she required total assistance level for activities of daily living and mobility. She was unable to vocalize but was able to use eye scanning and subtle head movements to communicate. Physical examination at the time of admission revealed plegic facial muscles but intact extracocular movements and intact light and pin-prick sensation. Muscle strength testing revealed 0/5 upper limb strength, trace movement with hip adduction and abduction, and trace ankle plantar flexion bilaterally. Discharge functional status was minimum assistance with upper body dressing and bathing, close supervision with lower body dressing and transfers, and moderate assistance with ambulation. Physical examination at time of discharge revealed 5/5 muscle strength testing throughout all limbs, with the exception of mild weakness with left ankle dorsiflexion. She was discharged home for continued outpatient therapy.

**Conclusion**: Locked-in syndrome is a rare entity and significant motor return and functional improvement are extremely unusual. This report illustrates the importance of intensive rehabilitation in this population.

**Poster 121**

**Physician Scarcity is Related to Medical Complications for Persons with Chronic Spinal Cord Injury**

Michelle M. Didesch, MD (Rutgers University - New Jersey Medical School, Newark, NJ, United States), Amanda Botticello, PhD, MPH, Steven Kirshblum, MD

**Disclosures**: M. M. Didesch: I Have No Relevant Financial Relationships To Disclose.

**Objective**: The purpose of this study was to explore whether the occurrence of severe medical complications among adults with chronic spinal cord injury (SCI) was associated with availability of local medical services.

**Design**: Secondary analysis of cross-sectional survey data from the National Spinal Cord Injury Model Systems (SCIMS) database linked with county-level healthcare information from the Area Health Resources Files (ARHF).

**Setting**: Community

**Participants**: Persons with SCI age 17 or older with a follow-up interview completed between 2011 and 2014 and a valid address that could be used to identify county of residence (N=1,834).

**Interventions**: Not applicable

**Main Outcome Measures**: Outcomes included binary measures of reported occurrences of rehospitalization, pressure ulcers, and urinary tract infections (UTI) in the past 12 months. Key independent measures included total number of Physical Medicine and Rehabilitation (PM&R) MD physicians and general MD practitioners per county of residence as well as total number of short-term general and rehabilitation hospitals.

**Results or Clinical Course**: Preliminary results from multivariate logistic regression analyses indicated that the likelihood of reporting a recent rehospitalization or UTI was not associated with differences in county healthcare resources. Persons with SCI were significantly less likely to report a pressure ulcer in the past 12 months if they resided in a county with a large number of active PM&R physicians (> 5) (OR = 0.70, 95% CI= 0.52, 0.96) net of differences in injury severity, functional independence, and demographic characteristics.

**Conclusion**: Scarcity of local PM&R physicians may be related to occurrence of long-term physical complications from SCI. More research is needed to assess if the availability of healthcare resources in the local area affects the ability of persons with SCI to attain needed preventive care.

**Poster 122**

**Compartment Syndrome after Fall Presenting as Knee Pain in Paretic and Neglected Limb: A Case Report**

Melissa Roscher, MD (University of Pittsburgh Medical Center, Pittsburgh, PA, United States)

**Disclosures**: M. Roscher: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 90-year-old woman was found down by her family. She was found to have a right middle cerebral artery occlusion with dense left hemiparesis and significant left-side neglect. She was managed conservatively without t-PA. Six days later, on admission to inpatient rehabilitation (IPR), she complained of left knee pain and repeatedly asked for her knee to be straightened to relieve the pain. At that time, her left knee and leg were without edema or deformity. She had mild tenderness to palpation of the lateral knee. She had spontaneous but not voluntary movement of the left leg. Her leg was extended and repositioned with pillows with some relief in the pain. The following day, she had increased redness, firmness, and swelling over the anterior-lateral left lower leg. She could not tolerate passive dorsiflexion and insisted her pain would be relieved if her leg were straight, despite the knee already being extended. X rays of the knee and lower leg were negative for fracture or soft tissue abnormalities. In the next few hours, the compartment became firm and more painful to movement or touch. Trauma surgery was consulted, and the patient was taken to the OR for urgent fasciotomy of the left lower leg lateral and anterior compartments. Resumed perfusion of underlying muscles was noted intraoperatively, and the patient experienced subjective relief of symptoms.

Setting: Tertiary care hospital.

Results or Clinical Course: The patient returned to IPR three days after fasciotomy. On readmission, her left leg was tender at the surgical site, and her knee pain had resolved. She exhibited dense neglect of the entire left side and no spontaneous movement of the left leg. She was later discharged to skilled nursing facility.

Discussion: This patient experienced a delayed presentation and slow onset of compartment syndrome nearly one week after injury. Interestingly, localized pain in a paretic limb on her neglected side was the initial symptom. This was followed by development of more classic and objective signs of compartment syndrome in the subsequent 24 hours. Urgent fasciotomy confirmed clinical suspicions and improved patient’s symptoms.

Conclusion: Compartment syndrome may cause localized pain in a paretic limb despite near total neglect of that side.

Poster 123
Cervical Dystonia: Treatment with Phenol Injections to Spinal Accessory Nerves

Abraham Alfaro, PhD, DO (Bacharach Institute for Rehabilitation, Pomona, NJ, United States)

Disclosures: A. Alfaro: Speakers Bureau - Allergan; Other - Allergan

Objective: To assess the effects of phenol injections to spinal accessory nerves (SAN) on head rotation for patients who have cervical dystonia (CD) with torticollis. Since SAN innervate sternocleidomastoid and upper trapezius muscles, a block of the ipsilateral SAN should increase head rotation ipsilaterally.

Results or Clinical Course: For patients who have CD with torticollis, head rotation was: pre-injection left 21.7 degrees, and right 59 degrees; and post-injection left 44.6 degrees and right 55.1 degrees. Post-injection, head rotation left increased 23.2 degrees (107%) and right was -3.9 degrees (-6.6%). Phenol injected averaged 1.2 mL/patient at a stimulus of 0.5mA. One patient had a right SAN phenol block with 0.8 mL at 1 site; head rotation increased right 49% and left 24%.

Conclusion: For patients who have CD with torticollis, head rotation increased in the direction of the SAN that was blocked with phenol without a significant decrease in contralateral head rotation. This is the first report of phenol SAN blocks; more data will determine the role of phenol SAN blocks for the treatment of CD.

Poster 124
Oxycodeone Overdose and Global Hypoxia Leads to Anterior Cord Ischemia Resulting in Tetraplegia: A Case Report

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Disclosures: M. Mekki: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 35-year-old woman with chronic low back pain managed with oxycodeone was found unresponsive by her family after intentional overdose. The patient received naloxone in the ambulance, and on arrival to the ED, the patient reported inability to move her bilateral lower extremities. CT head and CT thoracic and lumbar spine were negative for acute pathology. Blood gas analysis revealed severe respiratory acidosis, and she was placed on BIPAP for hypercapnia and admitted to the MICU. Subsequent spinal MRI showed spinal cord swelling and increased T2 signal in the cervical and upper thoracic spine from C5 to T5, most prominent in the anterior portion of the spinal cord. Comprehensive serological and cerebrospinal fluid analysis studies were negative for infectious or other etiologies. Based upon the history, clinical findings, and imaging, patient was determined to have ischemic injury to the anterior spinal cord secondary to global hypoxia in the context of respiratory depression after opioid overdose.

Setting: Inpatient rehabilitation facility.

Discussion: This is the first reported case, to our knowledge of ischemic non-traumatic spinal cord injury (NTSCI) in the setting of respiratory depression and global hypoxia after oral opioid overdose. In addition, the manifestation of spasticity was unique in the setting of spinal cord ischemia.

Conclusion: We present a rare case of incomplete non-traumatic spinal cord injury (NTSCI) resulting from a unique pathophysiology. This case broadens our knowledge of the possible causes and outcomes of NTSCI, allowing for a more targeted management and rehabilitation approach.

Poster 125
Severe Beauty Parlor Stroke Syndrome in a Young Otherwise Healthy Patient: Could a Motor Vehicle Accident Have Played a Role?: A Case Report

Matthew J. Santiago, MD (Temple University Hospital/ MossRehab, Philadelphia, PA, United States), Eric Altschuler, MD, PhD, Christina Abavana, MD, Andrea E. Brown, MD

Disclosures: M. J. Santiago: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 27-year-old woman presented with falling to her left and worsening headaches for the past week. She was awoken from sleep with the worst headache of her life, and noticed that her left eye was drooping and she had difficulty swallowing. She was unable to vocalize her thoughts when she tried calling for help. She had associated neck pain and intermittent vertigo. She had had a professional hair wash the day before onset of symptoms. Physical examination revealed left ptosis and miosis. Light touch and pin prick were diminished on the right side of her face. She had dysphonia and asymmetric palate; tongue midline. Pin prick and temperature were diminished right arm and leg; past pointing on the left and unsteady left-leaning gait.

Setting: Academic medical center.

Results or Clinical Course: CT negative. CT angiography: dissection of the distal left vertebral artery, markedly reduced caliber of the left V3 segment and occlusion of the left V4 segment with reconstitution of the most distal portion of the left V4 segment just proximal to the basilar artery secondary to retrograde flow.

MRI: acute infarction of the left posterior inferior cerebellar artery territory involving the left dorsal lateral medulla and left posterior cerebellum. Admitted to the neurology ICU, her headache, dysphonia and gait instability significantly improved. Studies for vasculitis and connective tissue disease were normal. The patient was anticoagulated.

Discussion: There have been multiple reports of vertebralbasilar ischemia secondary cervical spine extension and rotation within a salon sink while getting a shampoo (“salon sink stroke syndrome (SSSS)”). Did something predispose this young healthy patient to a severe SSSS? The patient had been involved in a motor vehicle accident six months prior to presentation.

Conclusion: Study of motor vehicle accidents and other traumas as predisposing events for SSSS are warranted.

Poster 126

JCV CGN Neurontis Treated with Recombinant IL-7

During Intensive Rehabilitation — A Case Report

Jeremy Hartman, MD (Washington University St. Louis, St. Louis, MO, United States)

Disclosures: J. Hartman: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient was found to have JCV Cerebellar Granule Nerve neurontis several years after being treated with Rituximab for leukemia. He had significant nystagmus and nausea. The patient was treated with recombinant IL-7 for immune system reconstitution to stop progression and possibly improve his cerebellitis. He was treated with 2 injections of recombinant IL-7 in the second and third weeks of his admission in conjunction with standard physical therapy focusing on strength training with exercise bike, standing frame, and walking in the parallel bars and with a bariatric walker as well as a brief trial of the autoambulator. He was also treated with adjunctive medications consisting of mirtazapine, meclizine, and ondansetron. Following initiation of the IL-7 the patient showed gradual improvement in his ambulation and ataxia as was demonstrated by his improvement in ambulation from 50% to 25% assist and his improvement in his ambulatory distance which increased from 12’ in the parallel bars to 48’. He also showed resolution of his nystagmus and nausea. Unfortunately, due to insurance constraints, the patient was unable to complete a full trial with the autoambulator prior to discharge.

Setting: Inpatient rehabilitation hospital.

Results or Clinical Course: The patient was discharged to a SNF and was later able to return home temporarily prior to readmission to the primary hospital for IRIS. Prior to readmission, the patient was reported to have improved ambulation with a standard walker per follow up with neurology 6 weeks after discharge from inpatient rehabilitation.

Discussion: JCV CGN neurontis with cerebellitis is a rare cause of cerebellar ataxia without a clear treatment for disease. In patients who appear to be responding to their treatments, it may be appropriate to try more aggressive and intensive therapy like robot assisted ambulation.

Conclusion: JCV CGN is a rare cause of cerebellitis. In cases where it is responding to treatment in inpatient rehabilitation, more aggressive and intensive exercise regimens should be considered.

Poster 127

A Novel Presentation of Lumbarplexopathy after Epidural Anesthesia: A Case Report

Jessica Justmann (Washington University in St. Louis, St. Louis, MO, United States)

Disclosures: J. Justmann: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient presented at term for induction of labor and required transition to cesarean section for fetal distress and suspected chorioamnionitis. She received an initial epidural upon presentation and a second prior to surgery due to complaints of persistent pain. Following delivery she complained of bilateral lower extremity weakness and altered sensation affecting the right greater than the left. Magnetic resonance imaging of the lumbar spine showed no evidence of epidural hematoma. At presentation to acute inpatient rehabilitation her examination was significant for decreased light touch over left lower extremity with preserved pinprick below the knee. Pinprick was diminished in the right lower extremity from the hip, light touch over right anterior thigh was absent but was preserved below the knee. Strength examination revealed normal strength other than bilateral hip flexors 4/5; absent dorsiflexion, 1/5 extensor hallucis longus and 4/5 plantarflexion. Following removal of her catheter she was noted to have urinary retention after completing treatment for a urinary tract infection and defecation was noted to be difficult with persistent sensation of rectal fullness.

Setting: Acute inpatient rehabilitation facility

Results or Clinical Course: After 4 weeks of intensive inpatient rehabilitation the patient was ambulating with bilateral ankle foot orthotics. Her sensation improved to sharp/dull discrimination throughout bilateral lower extremities. She reported normal sensation in left lower extremity and a persistent zone of anesthesia on right thigh. She was voiding with scheduled toileting, intermittent catheterization and bowel regimen. She will be following up in Physical Medicine and Rehabilitation clinic in April, final outpatient rehabilitation notes and EMG/NCS are pending at this time.

Discussion: Epidural for anesthesia is a common procedure offered to women in labor. In a literature review there is scant mention of bilateral polyradiculopathy and there is limited description of recovery.

Conclusion: While a body of evidence exists for unilateral foot drop following epidural anesthesia, this is a novel presentation of MRI-negative lumbarplexopathy with bilateral weakness, foot drop with decreased sensation and its recovery.
### PAIN AND SPINE MEDICINE

**Poster 128**

**Dosage-Dependent Effectiveness of Treatment of Breakthrough Cancer Pain with Fentanyl Pectin Nasal Spray**

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**Disclosures:** I. Bucior: Employment - Depomed, Inc.; Stock Options or Bond Holdings - Depomed, Inc.

**Objective:** To evaluate the effectiveness, acceptability, and safety of different dosages of Fentanyl Pectin Nasal Spray (FPNS; Lazanda®) in treatment of breakthrough cancer pain (BTPc).

**Design:** Analysis of data from two randomized Phase 3 studies.

**Setting:** At home with routine clinical visits.

**Participants:** Patients with cancer who were experiencing on average 1-4 episodes of BTPc per day.

**Interventions:** >60 mg/day oral morphine (or equivalent) for background pain; and 100-, 200-, 400-, or 800-µg FPNS or matching placebo for BTPc.

**Main Outcome Measures:** The primary efficacy endpoint was patient-averaged summed pain intensity difference at 30 min post-dose (SPID30). Secondary endpoints included: SPID at 5, 10, 15, 45, and 60 min post-dose; patient acceptability scores (overall satisfaction, speed of relief, reliability, ease of use, and overall convenience of the nasal spray).

**Results or Clinical Course:** Mean baseline pain intensity was similar between FPNS and placebo. At 5- to 60-min post-dose, patients receiving 800-µg FPNS reported higher pain intensity than patients receiving lower dosages. SPID at 5- to 60-min post-dose was larger for FPNS than placebo (SPID30, 8.5 vs. 4.5; P<.0001). SPID30 for patients receiving 800-µg FPNS was smaller than for patients receiving 100- or 200-µg FPNS (6.6 vs. 10.2; all P<.05), with similar results for SPID45 and SPID60. On average, 74% of patients reported being "satisfied" or "very satisfied" across all acceptability scores, with similar scores between patients receiving 100- to 800-µg FPNS. Overall, 50.7% of patients receiving FPNS reported adverse events (AEs). AEs were typical of fentanyl, mostly mild-to-moderate in severity, and did not increase in frequency or severity with increasing FPNS dosage.

**Conclusion:** FPNS was efficacious and accepted across all dosages, and higher dosages did not affect its safety and tolerability. This study suggests that FPNS provides rapid and effective analgesia, with a potential for range of dosages for treatment of BTPc.

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**Poster 129**

**Pain Relief and Its Impact on Sleep in Treatment of Neuropathic Pain Associated with Postherpetic Neuralgia**

Mark S. Wallace, MD, Brett B. Snodgrass, MSN, APRN, FNP-C, Jamie Massengill, MS, MHS, PA-C, Iwona Bucior, PhD (Depomed, Inc., Newark, CA, United States), Charles Argoff, MD

**Disclosures:** I. Bucior: Employment - Depomed, Inc.; Stock Options or Bond Holdings - Depomed, Inc.

**Objective:** To characterize factors defining responses in pain intensity and its interference with sleep, and their impact on overall outcomes in patients with postherpetic neuralgia (PHN) treated with gastroretentive gabapentin (G-GR; Gralise®).

**Design:** Analysis of integrated data from randomized Phase 3 and open-label Phase 4 studies.

**Setting:** At home with routine clinical visits.

**Participants:** Patients with PHN (n=556).

**Interventions:** After a 2-week titration, patients received G-GR 1800-mg once-daily for 8 (Phase 3) or 6 (Phase 4) weeks, followed by a 1-week dose tapering period.

**Main Outcome Measures:** Visual Analog Scale (VAS), Brief Pain Inventory (BPI), and Patients’ Global Impression of Change (PGIC) completed at baseline and/or end-of-study. Responders were patients with >30% reduction in VAS pain or BPI sleep; Non-Responders patients with <30%.

**Results or Clinical Course:** Responders in VAS or BPI sleep were mostly females (64.3-65.6%). Both Responder groups shared similar improvements across outcomes assessed on VAS, BPI, and PGIC. For all Responders, there was a linear correlation between percent reductions in VAS and BPI sleep interference (all P<.001). Being a Responder in VAS was not predictive of reporting significant changes in BPI sleep interference and vice versa. There were no differences between Responders and Non-Responders in frequency or severity of adverse events (AEs). More Non-Responders discontinued early due to AEs (17.9-18.4% vs. 9.0-9.3%, P<.01), mostly due to mild or moderate AEs.

**Conclusion:** Reductions in pain or sleep interference were not predictive of each other, but were accompanied by parallel improvements in other treatment responses. Female sex seemed the only baseline characteristic contributing to better treatment responses in pain or sleep. Another important factor was early discontinuation due to AEs, but not AE severity, suggesting that patients’ ability to tolerate AEs and that better education about the safety profile may facilitate more successful treatment of PHN.

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**Poster 130**

**Ilioinguinal Nerve Block to Treat Complications of Hernia Repair: A Case Report**

Laura Davids (Stony Brook University, Little Neck, NY, United States), Susan M. Stickevers, MD, Yudell Edelstein, MD

**Disclosures:** L. Davids: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 45-year-old man who underwent open herniorrhaphy with mesh placement one year prior presented with chronic right groin pain. Pain was described as "burning," and was exacerbated by Valsalva maneuver and lumbar extension. On examination, pain was elicited on palpation over the inguinal ligament. No motor or sensory deficits were appreciated. Tinel’s sign was positive at the inguinal ligament. Patient was diagnosed with ilioinguinal neuralgia and scheduled for an ilioinguinal nerve block.

**Setting:** Tertiary care hospital.

**Results or Clinical Course:** Ilioinguinal nerve block was performed by identifying a point 2 inches medial and 2 inches inferior to the anterior superior iliac spine, and triamcinolone and lidocaine were injected at an oblique angle toward the pubic symphysis. The patient tolerated the procedure well and reported immediate relief of pain that lasted four months. Due to recurrence of groin pain, an ultrasound was performed which demonstrated no evidence of ilioinguinal nerve damage; however, a recurrent indirect inguinal hernia due to a mesh defect caused traction on the nerve when the patient stood upright. The patient was advised to return to his surgeon for revision surgery.

**Discussion:** Inguinal hernia repair can result in injuries to the ilioinguinal, iliohypogastric, and genitofemoral nerves. Chronic groin pain following inguinal hernia repair has been reported in 5-22% of patients following surgery. Ultrasound is a useful technique as it provides dynamic imaging of the nerves and surgical site in multiple positions.
Conclusion: Ilioinguinal neuralgia following herniorrhaphy may require nerve block or nerve ablation for pain control in recalcitrant cases. In the case of a mesh defect causing traction on the nerve, an ilioinguinal nerve block can provide immediate relief pending surgical revision.

Poster 131
Rare Cause of Sacroccygeal Pain in Ice Hockey
Player: A Case Report
Eliana Cardozo, DO (New York Presbyterian, New York, NY, United States), Richard G. Chang, MD, MPH, Jaclyn Bonder, MD, James F. Wyss, MD, PT
Disclosures: E. Cardozo: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 27-year-old former hockey player with questionable history of concussion and intracranial bleed presented with coccyx and low back pain which radiated to bilateral lower extremities and triggered headaches for six years. The pain began since college and mostly occurred after strenuous activity. It was excruciating and mildly improved with rest and analgesics. Brain and Lumbar MRI from two years ago were unremarkable. Physical examination was notable for feeling of tightness in coccyx area with lumbar flexion and straight leg raise and tenderness over the left sciatic notch. Neurovascular examination was unremarkable. The patient’s pain continued despite physical therapy and analgesics. He was referred to a pelvic floor specialist, where a focused pelvic and lumbosacral MRI was obtained, which showed a hypointensity layering in the distal thecal sac at the level of S2-S3, likely representing chronic subarachnoid blood products contacting the adjacent nerve roots. He was also evaluated by neurosurgery and deemed not to be a surgical candidate. He then underwent a caudal epidural steroid injection.
Setting: Outpatient physiatry practice.
Results or Clinical Course: At three-week follow up from the caudal injection, the patient reported a significant improvement in his pain and activity tolerance; adjuvant treatment included NSAIDs, muscle relaxants, and physical therapy. Since this was one of the most effective treatments he had experienced thus far, a second caudal injection was done two months later with greater relief. He now reported most days to be pain free and a greater increase in his exercise tolerance.
Discussion: Chronic blood products in the thecal sac as a cause of back pain has not been described in the literature. The patient’s pain correlated to the location where the meniscus was visualized and contacting adjacent nerve roots. Effective results were achieved with caudal injections.
Conclusion: Sequela of prior intracranial hemorrhage may occur on rare occasion include back pain and lumbosacral radicular symptoms secondary to chronic blood products in the thecal sac.

Poster 132
Management of Primary Raynaud’s Phenomenon Using Topical Capsaicin Cream: A Case Report
Pegah Safaeian, DO (The Rehabilitation Institute of Chicago, Chicago, IL, United States), Randy L. Calisoff, MD
Disclosures: P. Safaeian: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 28-year-old man with primary Raynaud’s phenomenon suffering from severe daily symptoms secondary to vasoconstriction of the hands, prompted exploration of safe, alternative therapies to systemic medications such as calcium channel blockers. Cold immersion testing was done at baseline in which the subject’s dominant hand was immersed in ice water for one minute and thirty seconds then allowed to recover at room temperature. The time to recovery was measured as the time necessary to regain color and sensation in the hand. Capsaicin 0.075% (OTC) cream was used topically on the bilateral hands three times daily for a duration of twenty minutes prior to being washed off. Following four weeks of treatment, capsaicin use was discontinued. Cold immersion testing was repeated weekly throughout a four week course of capsaicin use and again repeated one month following discontinuation of capsaicin to assess stability of results.
Setting: Tertiary care outpatient center
Results or Clinical Course: Following four weeks of treatment with capsaicin, recovery time in the dominant hand decreased from a baseline value of 63 minutes to 3.5 minutes. One month following discontinuation of treatment, recovery time in the dominant hand had increased to 22 minutes. While showing an increase, this continued to be well below the baseline measurement. Additionally, 1 month following discontinuation of capsaicin, the patient reported an average of three episodes per week of symptoms of vasoconstriction of the hands, still well below the daily symptoms previously experienced.
Discussion: This is the first reported case, to our knowledge, of the use of capsaicin topical cream for the symptomatic treatment of Raynaud’s phenomenon.
Conclusion: In this case report, we demonstrate the unique potential for topical capsaicin cream to decrease both the frequency of occurrence and duration of each episode of color change and associated sensory change in a patient with primary Raynaud’s phenomenon.
Conclusion: This case demonstrates that PNFs may be an effective treatment for patients suffering from rare cases of abdominal CPRS.

Poster 134
Likelihood and Degree of Pain Relief from a Glenohumeral Joint Injection in Various Shoulder Pathologies

Ryan Mattie, MD (Stanford University, Redwood City, CA, United States), David J. Kennedy, MD

Disclosures: R. Mattie: I Have No Relevant Financial Relationships To Disclose.

Objective: We assess the likelihood of pain relief after glenohumeral joint (GHJ) injection in patients with shoulder pain resulting from osteoarthritis (OA), adhesive capsulitis (AC), rotator cuff (RTC) injury, or labral tear.

Design: Retrospective analysis of prospectively collected data.

Setting: Outpatient academic interventional suite.

Participants: 149 patients comprising 154 affected shoulders.

Interventions: Patients underwent a basic pre-procedure examination to identify maneuvers that aggravated their pain, and examination results were used to classify the cause of the shoulder pain as due to OA, AC, RTC tendinopathy, or labral tear. Patients rated their shoulder pain on a 0-10 Numeric Rating Scale (NRS), while undergoing maneuvers that aggravated their pain. Patients then received a GHJ injection under fluoroscopic guidance with 3mL of 0.5% Marcaine, 2mL of 1% lidocaine, and 1 mL of triamcinolone 40mg/mL.

Main Outcome Measures: Following the procedure, patients underwent a repeat physical examination, using the same patient specific examination maneuvers that created their pain pre-procedure and rated their pain again utilizing the same 0-10 NRS. Significant pain relief levels were scaled at 100%, 80%, or 50% of the pre-injection pain score. Less than 50% pain relief was considered a non-response to injection.

Results or Clinical Course: Of the 154 shoulders injected, 47 were diagnosed with OA, 79 with AC, 14 with RTC tendinopathy, and 14 with a labral tear. OA and labral tear showed the best injection responses with over 78% of patients experiencing a significant amount of pain relief. AC had the worst response with only 67% of patients experiencing significant relief. 68% of patients with OA experienced 100% pain relief after injection.

Conclusion: GHJ injections are likely to provide significant pain relief for a variety of shoulder pathologies. Injections were found to be most effective in OA and labral tears. The highest degree of injection efficacy was for treatment of OA.

Poster 135
Cervical Myelopathy (CM) in Patients with Cerebral Palsy (CP): Case Series

Joon-Sung Kim, MD (St. Vincent’s Hospital, Suwon, Korea (the Republic of))

Disclosures: J. Kim: I Have No Relevant Financial Relationships To Disclose.

Objective: To evaluate clinical characteristics and radiologic findings of CP patients with CM who underwent cervical operation.

Design: We sorted out patients with CP from patients who had cervical operation for CM in the neurosurgery department from 2007 to 2014. We evaluated type of CP, age at development of symptoms from myelopathy, and the first neurosurgery visit and surgery, symptoms of myelopathy, electrodiagnostic findings and alignment of cervical spine before surgery, preoperative injection of botulinum toxin, surgical procedure, surgical complications, and postoperative application of halo vest. In addition, the radiological findings were classified by the level of cervical vertebrae, which were based on interpretation of preoperative magnetic resonance imaging or computed tomography of cervical spine by radiologist.

Setting: Chart and x-ray review.

Results or Clinical Course: Total 8 CP patients with CM were included. The number of abnormal findings of preoperative cervical imaging were classified by cervical level. Hemiations of cervical disc and osteoarthritis of facet joints were found in C3-7, C2-5, respectively. Spinal stenosis was the most commonly developed in C3-4, and radiological findings related to myelopathy were mainly in C3-4 and C5-6.

Conclusion: Anatomical findings of cervical spine in CP with CM showed common abnormalities in upper cervical segments compared to cervical spondylotic myelopathy upon aging. Repetitive axial rotation or lateral bending caused by neck writhing movement of CP patients could develop these anatomical abnormalities. Diagnosis of CM in CP patients is delayed because underlying neurological problems conceal newly developed symptoms from myelopathy. Therefore, national screening system of CM in CP patients is necessary, and regular neurological examination and electrophysiologic tests such as somatosensory evoked potential could be available.

Poster 136
Patient-Controlled Fentanyl Iontophoretic Transdermal System (Fentanyl ITS) Improved Post-Operative Mobility Compared to Intravenous Patient-controlled Analgesia (IV PCA) Morphine: A Pooled Analysis of Randomized, Controlled Trials

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Disclosures: H. Danesi: Employment - The Medicines Company

Objective: The aim of this pooled analyses was to compare mobility in postoperative patients treated with either fentanyl ITS or morphine IV PCA as assessed by the patient, nurse, and physical therapist (PT).

Design: Pooled-analysis of randomized, active-comparator studies.

Setting: Hospitalized postoperative patients.

Participants: Patient ease-of-care (EOC) questionnaires from 937 patients treated with fentanyl ITS and 945 patients treated with morphine IV PCA; Nurse EOC questionnaires from 848(fentanyl ITS) and 761 (morphine IV PCA) nurses; PT EOC questionnaires from 261 (fentanyl ITS) and 253 (morphine IV PCA) PTs.

Interventions: Fentanyl ITS compared with morphine IV PCA for postoperative pain management.

Main Outcome Measures: Outcomes of patient mobility were assessed by a validated EOC Questionnaire which was given to patients, patient’s nurses, and physical therapists involved in patient care.

Results or Clinical Course: Fentanyl ITS significantly improved patient mobility (P<0.0001) compared to morphine IV PCA as assessed by the Patient EOC Questionnaire mobility question. Fentanyl ITS also showed a statistically significant benefit on the nurses EOC mobility question (moving patient with device, P<0.001) and on the physical therapist’s mobility questions (impact on mobility when transferring patients to a chair, P<0.001; ambulating patients in their room, P<0.001; or ambulating patients outside their room, P<0.001) compared to IV PCA morphine.

Conclusion: Due to improved mobility with fentanyl ITS, complications are expected to be less frequent than with IV PCA and epidural PCA. Incorporation of this strategy into post-operative pain management protocols may reduce length of stay and total hospital costs.

Poster 137
Superficial Radial Neuropathy Following Acupuncture Treatment: A Case Report

Benjamin J. May (University of Virginia, Charlottesville, VA, United States), Jeffrey G. Jenkins, MD, Rebecca Louie, DO

Disclosures: B. J. May: I Have No Relevant Financial Relationships To Disclose.
Case Description: The patient, a 74-year-old right hand dominant woman, presented for evaluation of left wrist pain and dorsal hand numbness. 3 months prior, she had been treated for left shoulder pain by an acupuncturist. During the treatment, a needle was placed subcutaneously in the anatomic snuff box of her left wrist (corresponding to the acupuncture point Yang Xi/Large Intestine 5). She immediately experienced intense pain, and the needle was removed. Since that time, the patient noted intermittent paresthesias and shooting pain along the dorsal left wrist and hand. She presented to an orthopedic hand surgery clinic, where x-rays of the wrist revealed no acute abnormalities and no retained foreign bodies. The patient was prescribed hand therapy, a wrist brace, and gabapentin; all provided minimal relief. She was then referred for electrodiagnostic testing. On the day of electrodiagnostic evaluation, physical examination of the patient was remarkable for allodynia along the radial aspect of the dorsum of the left wrist. Nerve conduction studies revealed absent left radial superficial sensory nerve action potential at the thumb and reduced left superficial sensory nerve action potential at the wrist. Corresponding evoked potentials on the right side were normal. Needle EMG examination of the left upper limb and cervical paraspinals was normal.

Setting: Academic Medical Center Electrodiagnostic Laboratory.

Results or Clinical Course: Electrophysiologic testing demonstrated evidence of a left superficial radial sensory neuropathy. The acute onset of neuropathic symptoms in a corresponding distribution during acupuncture treatment suggests iatrogenic superficial radial nerve injury.

Discussion: There have been rare case reports of iatrogenic peripheral nerve injury from acupuncture. To our knowledge, this is the first reported case of injury to the superficial radial nerve. Physiatrists performing or prescribing acupuncture for pain management should be aware of this possible complication. Particular care should be taken when employing acupuncture points in close proximity to peripheral nerves.

Conclusion: Iatrogenic nerve injury is a potential complication of acupuncture treatment.

Poster 139
Paraspinal Muscles and Sagittal Spinopelvic Alignment in Patients with Degenerative Spondylolisthesis

Sibel Demir-Deviren, MD (University of California San Francisco, San Francisco, CA, United States), Emel E. Ozcan Eksi, MD, Julio Carballido-Gamio, PhD, Roland Krug, PhD, Murat Pekmezci, MD, Murat S. Eksi, MD, Sigurd Berven, MD, Vedat Deviren, MD

Disclosures: S. Demir-Deviren: I Have No Relevant Financial Relationships To Disclose.

Objective: To compare paraspinal muscles, sagittal spinopelvic misalignment (SSM) and their relationships in patients with degenerative spondylolisthesis (DS) who chose to have surgery with those who did not.

Design: Retrospective study on prospectively collected data.

Setting: University-based spine center

Participants: One hundred four patients with DS (surgical n: 72; nonsurgical n: 32) were included based on the exclusion criteria: BMI > 40 kg/m², DM, spondylolytic spondylolisthesis, Modic 1 DDD, scoliosis, osteoporosis, metastatic cancers, neuromuscular disorders, and previous spine surgery.

Interventions: None

Main Outcome Measures: Age, height, weight, and BMI were recorded. Facet joint widening was measured on T2-weighted lumbar spine MRI. Paraspinal muscles’ (multifidus, erector spinae (ES), psoas) volumes were measured based on manually defined contours using IPP™, and fatty infiltration of paraspinal muscles was graded using Goutallier and Quartile classifications on T1-weighted images. Lumbar lordosis, sacral slope (SS), pelvic tilt (PT), pelvic incidence (PI) were measured using Surgimap™ on lateral spine x-rays. Then SSM was calculated.

Results or Clinical Course: The groups were similar in age and facet joint widening (mean age: 63.06±14.33). BMI and SSM were higher in the surgical group (P<.031). The surgical group had larger volumes of multifidus and more fatty infiltration in paraspinal muscles than the nonsurgical group (P<.030). Surgical patients had lower SS, as they had more fatty infiltration in multifidus and ES (r=-0.413; r=-0.376). They had significantly higher PT as they had more fatty infiltration in psoas (r=-0.382).

Conclusion: Patients with higher SSM and BMI were more likely to have surgery. Even though surgical patients had bigger paraspinal muscles, increased fatty infiltration impaired the contractility of paraspinal muscles. We recommend tailoring exercise programs for patients with DS. Further studies need to be done to determine whether SSM could be avoided by improving the quality and strength of paraspinal muscles in DS.

Poster 140
The Effect of Comprehensive Non-surgical Treatments in Patients with Spondylolytic Spondylolisthesis

Emel E. Ozcan Eksi, MD (University of California San Francisco, San Francisco, CA, United States), Savas Sencan, MD, Lisa U. Pascual, MD, Sigurd Berven, MD, Vedat Deviren, MD, Shane Burch, MD, Bobby Tay, MD, Sibel Demir-Deviren, MD


Objective: To assess the effectiveness of comprehensive nonsurgical treatments (CNT) in patients with spondylolytic spondylolisthesis (SS).

Design: Retrospective study on prospectively collected data.

Setting: University-based spine center

Participants: Patients who underwent CNT for SS at the UCSF Spine Center between 2009-2014 were evaluated. Patients who met the following criteria were excluded: scoliosis, previous spine surgery, and grade 3-4 spondylolisthesis.

Interventions: CNT including oral medications, patient education, bilateral transforaminal epidural steroid injections (TFE) at the level of SS, and a 6-8 week exercise program initiated 2-3 days following TFE.

Main Outcome Measures: Age, gender, comorbidity score, smoking status, duration of structured nonsurgical treatments, medication use, facet joint widening on T2-weighted axial lumbar spine MRI, and translation on flexion-extension lateral lumbar spine x-rays.

Results or Clinical Course: Only 31% of patients with SS underwent surgery after they received CNT. The surgical (female: 5; male: 5) and nonsurgical groups (female: 13; male: 9) were similar in age (55.81±117.39 years P>.050) and comorbidity scores. The nonsurgical group had longer follow-up duration compared to the surgical group (1029.55±831.61 vs 366±491.89 days; P=.009). The nonsurgical group had 60±32.48% pain relief for 96.05±159.85 days, while the surgical group had 42±36.68% pain relief for 51.6±52.08 days after TFE (P>.050). In the surgical group, 30% of the patients used opioids and 30% of the patients used neuropathic pain medications, while in the nonsurgical group, 22.70% used opioids and 13.60% used neuropathic pain medications (P>.050).

Conclusion: CNT should be considered as the first line treatment for patients with SS as it may prevent the need for future surgery. Patients with SS achieved pain relief of longer duration and utilized less opioids when compared to patients who underwent surgery. We
recommend a program of CNT prior to considering surgery for patients with SS.

**Poster 141**
Assessing Self-Efficacy of Muscle Spasms Control and Its Impact on Intensity of Pain-Tension-Spasms-Pain Cycle within an Interdisciplinary Pain Management Program

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Disclosures: J. W. Atchison: Research Grants - Paraxel/Pfizer, INC/Grunenthal.

Objective: Patients with chronic pain participating in our interdisciplinary treatment program frequently report experiencing muscle spasms. Most of these patients are unaware that muscle spasms are a part of the vicious cycle of pain and muscle tension and lack the skills for controlling spasms. We seek to assess how relaxation and biofeedback training may help patients to reduce muscle spasm, improve their confidence to control them, and to determine whether this reduction in muscle spasm leads to a reduction in intensity of vicious cycle components.

Design: Retrospective

Setting: Urban academic pain management clinic.

Participants: 102 chronic pain patients.

Interventions: Biofeedback and relaxation training.

Main Outcome Measures: Measures included; 1) a modified version of the Chronic Pain Self-Efficacy Scale (CPSS) with an additional question about the patient’s certainty to control spasms; 2) the patients reports on changes in muscle spasms; and 3) numeric rating scales (0 "no pain or tension" to 10 "worst imaginable") to assess pain and tension pre- and post-treatment.

Results or Clinical Course: The majority of patients (68%) reported that their spasms improved at the end of treatment (19% same and 4% worse; 10% not assessed). Patients indicated improved control over their spasms and pain, a reduction in severe pain, and reduced levels of average pain and muscle tension, (all P’s < .01). Moreover, the improvements were similar regardless of antispasmodic medication usage (all P’s > .79). Improved confidence to manage muscle spasms was significantly associated with reductions in average pain and tension and increased efficacy to control pain (all P’s < .05, r’s 0.21 — 0.34).

Conclusion: Examination of patient reports and data shows that patients receiving training in relaxation and biofeedback as part of an interdisciplinary pain program demonstrated improved muscle spasms symptoms and increased confidence in their ability to control them. Overall it appears that improved control of muscle spasms helped to narrow pain-tension-spasm-pain cycle.

**Poster 142**
Regenerative Medicine to Treat an Unresponsive Painful Shoulder of Multiple Etiologies: A Case Report

Ali Mirdamadi, MD (Medstar Georgetown University Hospital/National Rehabilitation Hospital, Washington, DC, United States), Christopher S. Karam

Disclosures: A. Mirdamadi: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 52-year-old woman presented with complaints of right arm pain with paresthesias radiating down to her right elbow following increased training at the gym. Her imaging showed OA at the AC joint as well as partial thickness tear of the supraspinatus tendon. Patient had failed conservative treatments with therapy and medication. Now presenting with increased intensity of paresthesias in her right arm radiating into her hand. Patient had previous cervical fusion; follow-up imaging was unremarkable. She also had no relief from cervical epidural steroid injections. Patient failed conservative measures with therapy and anti-inflammatories. Given her continued neuropathic pain complaints, she was started on a tricyclic antidepressant pain medication. EMG/NCS revealed an upper trunk plexopathy. Given the chronicity of injury (> 1year) patient was advised to stop NSAIDs and undergo treatment with regenerative medicine.

Setting: Outpatient physiatry clinic.

Results or Clinical Course: Patient responded well to initial prolotherapy of the right supraspinatus tendon under ultrasound guidance with continued relief, eventually electing to undergo injection of platelet-rich plasma (PRP) into the tendon for more definitive relief. Patient was noted afterwards to have relief of pain and improvement in function.

Discussion: The use of regenerative medicine, more specifically, prolotherapy and platelet-rich plasma (PRP) under ultrasound guidance, can be used to treat shoulder pain as a result of a supraspinatus partial tear due to osteophytes at acromioclavicular joint as well as upper trunk brachial plexopathy of unknown origin unresponsive to a more conservative approach.

Conclusion: Regenerative medicine in conjunction with a well-rounded approach involving physical therapy, appropriate neuropathic/anti-inflammatory pain medications, and structured return to activity can be effective when used together in treating difficult shoulder pain of multiple etiologies.

**Poster 143**
Genicular Neurotomy as an Alternative Option for Chronic Knee Pain after Total Knee Arthroplasty: A Case Report

Ali Mirdamadi, MD (Medstar Georgetown University Hospital/National Rehabilitation Hospital, Washington, DC, United States), Christopher S. Karam

Disclosures: A. Mirdamadi: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 56-year-old man presented with complaints of chronic right knee pain 2 years post right knee replacement. The procedure was followed by two subsequent staph infections along with persistent knee pain. Patient failed conservative treatment with focused therapy, oral pain medications, and steroid injection. He was then referred to an interventional pain management physician to explore an alternative treatment plan.

Setting: Outpatient Interventional Spine and Pain management clinic.

Results or Clinical Course: After failing conservative management, other pain generators were explored, and a genicular nerve block was discussed in detail with the patient. After agreeing with the plan, an initial diagnostic genicular nerve block was performed under direct fluoroscopic guidance. Patient was followed up 10 days after the initial diagnostic block and his pain improved by more than 50% as per his pain diary. After the successful diagnostic block, a genicular nerve radiofrequency ablation was performed under fluoroscopic guidance. Patient was followed up 10 days after the ablation and he reported 80-100% pain relief and improvement in function.

Discussion: Despite the general efficacy of knee replacements, there are those with pain that persists after surgery. Traditionally in these unfortunate cases, patients have few options if any that does not involve additional surgery, which is rarely successful. Radiofrequency ablation of the genicular nerves with a well-rounded approach involving physical therapy, appropriate pain medications, and structured return to activity are effective when used together, thus alleviating pain to the knee and restoring function.

Conclusion: It is important to note that while surgery is considered to be the accepted treatment option for patients with advanced joint disease, many individuals have comorbidities that may prevent them from being an appropriate surgical candidate. Others may simply want to avoid surgery due to personal reasons such as being unable to take off the necessary time from work for the procedure...
and post-operative recovery period. In these cases, radiofrequency neurotomy of the genicular nerves could be a safe and successful alternative.

Poster 144
The Graded Effects of Lumbar Stabilization Exercises and Its Verification Using Electromyography
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Disclosures: D. Park: I Have No Relevant Financial Relationships To Disclose.

Objective: To determine the effects of graded lumbar stabilization exercises on lumbar stabilizing muscles.

Design: Cross-sectional study.
Setting: Tertiary teaching hospital.
Participants: Ten healthy males.
Interventions: Five common exercises for strengthening the lumbar stabilizing muscles were selected: curl up, dead bug, side bridge, superman and bird dog exercises. And each exercise was divided into five levels by varied level of intensity.
Main Outcome Measures: Using superficial electromyography, the electrical activity of rectus abdominis (RA), external oblique abdominis (EO), multifidus (MF) and erector spine (ES) muscles was recorded during the exercise. The areas under the curve which were adjusted to different duration and peak amplitude were calculated. The Kruskal Wallis test and the post-hoc test with Mann-Whitney test were used.
Results or Clinical Course: As the level of intensity of each exercise increased, the activity of related lumbar stabilizing muscles was generally increased. In detail, the activity of RA and EO was distinctly increased when trunk curl was added to neck flexed or supine position in the curl up exercise. However the posture of upper extremities didn’t influence the activity change of recorded lumbar stabilizing muscles. In the dead bug posture, the activities of RA, EO and MF were more increased while performing both arm and leg movements rather than arm or leg movement alone. In the side bridge posture, when leg abduction was added, mean area of MF was significantly increased. In the prone posture, lengthening the duration of the superman exercise increased the mean area of MF, ES and RA. In the bird dog posture, the activities of ES and MF were more increased while performing both arm and leg lifts rather than arm or leg lift alone.
Conclusion: The graded lumbar stabilization exercises could be effective ways to strengthen muscles and increase the patient compliance. According to the physical ability of patients, they will be prescribed the proper level of the exercise intensity, and also only small numbers of exercise were needed to educate, instead of various kinds of different lumbar stabilization exercises.

Poster 145
Delayed Diagnosis of Bilateral Cervical Facet Dislocation: A Case Report
Anupam Sinha, DO (Rothman Institute, Philadelphia, PA, United States), Madhuri Dholakia, MD
Disclosures: A. Sinha: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 42-year-old woman presented with a 2-week history of neck pain and arm pain after she fell down 6 steps on Christmas Eve while holding her 2-year-old son. Her back and neck landed against a metal child safety gate. She reported neck pain, along with paresthesias and weakness in her bilateral upper extremities. She also reported pain in the proximal upper extremities. Overall symptoms ranged from 5 to 10 out of 10 on the visual analog scale, and increased with sitting, bending, and twisting. She denied bowel, bladder, or balance disturbance. Physical examination revealed tenderness to palpation over the lower cervical spine, upper trapezius and medial scalp. Deep tendon reflexes were 2/4. Bilateral upper and lower extremity strength was 5/5 with 4/5 strength noted in the bilateral biceps and wrist extensors. There were no long track signs.

Setting: Orthopedic practice.
Results or Clinical Course: MRI of the cervical spine revealed a 5-mm anterior dislocation of C5 on C6, with evidence of a perched facet on the right, and a dislocated facet on the left at the C5-C6 level. Disc herniation was present at C5-6 as well without evidence of cord compression. Patient was admitted the next day and underwent a posterior C5-6 decompression and fusion. At 6-week follow up, patient demonstrated 5/5 strength in the upper extremities with mild residual paresthesias. She had no other neurological symptoms.

Discussion: Bilateral cervical facet dislocations are a neurological emergency. The injury usually occurs via hyperflexion of the cervical spine as a result of trauma. Patients may present with radiculopathy but often are myelopathic on examination. Treatment options are dependent on type of dislocation, neurological status, and associated disc herniation. Closed reductions may be performed under anesthesia in low risk patients, however surgical decompression and instrumentation is necessary for patients with neurological compromise.

Conclusion: We present an unusual case of bilateral cervical facet dislocation following a fall. The patient presented with minimal neurological deficit, with complaints of neck pain and mild arm weakness. Physicians should keep in mind the possibility of cervical facet dislocation after trauma and the need for urgent surgical attention.

Poster 146
CR845, a Novel Peripherally-Acting Kappa Opioid Receptor Agonist, Has Low Abuse Potential Compared With Pentazocine
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Disclosures: J. W. Stauffer: Employment - Cara Therapeutics, Inc.

Objective: To examine the relative abuse potential of CR845, a potent, peripherally-acting, selective kappa opioid receptor agonist (KORA), compared with placebo and pentazocine, a schedule IV opioid analgesic.

Design: Randomized, double-blind, active- and placebo-controlled study.

Setting: Single-center clinical research organization.

Participants: Recreational polydrug users with experience using opioids and hallucinogenic agents.

Interventions: Subjects received a single bolus IV dose of the following 4 treatments in random order: CR845 5 mcg/kg (therapeutic dose), CR845 15 mcg/kg (supra-therapeutic dose), placebo, and pentazocine 0.5 mg/kg. Treatments were separated by a 48-hour washout period.

Main Outcome Measures: Drug liking bipolar Visual Analog Scale (VAS) was the primary measurement and was assessed periodically between 5 minutes and 8 hours after dosing.

Results or Clinical Course: Drug liking scores for pentazocine were significantly greater than that of placebo and either dose of CR845 (P < 0.0001 for each comparison to pentazocine). The least squares mean response compared with pentazocine was 57.6 ± 1.9 for pentazocine, 65.3 ± 1.9 for CR845 5 mcg/kg, 66.9 ± 1.9 for CR845 15 mcg/kg, and 52.4 ± 1.9 for placebo, demonstrating that both doses of CR845 had significantly lower drug liking response compared with pentazocine. Additional bipolar VAS measurements were lower for CR845 compared with pentazocine for “overall drug liking” (P < 0.0001 for both doses of CR845) and “take drug again” (P < 0.0003 for CR845 5 mcg/kg and P < 0.0001 for CR845 15 mcg/kg). These VAS scores for CR845 were equivalent for both doses and were similar to those of placebo.
Conclusion: These results suggest that the novel and selective peripherally acting KORA, CR845, may present a low risk for abuse liability in humans.

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Poster 147
CR845, a Peripheral Kappa Opioid Receptor Agonist, Provides Better Pain Relief With Less Nausea and Vomiting Than Placebo in Patients After Bunionectomy

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Disclosures: J. W. Stauffer: Employment - Cara Therapeutics, Inc.

Objective: To assess the analgesic efficacy of CR845, a peripherally-acting, selective kappa opioid receptor agonist.

Design: Double-blind, placebo-controlled clinical study.

Setting: Single-center clinical research organization.

Participants: Adult patients (N = 51) undergoing elective primary unilateral first metatarsal bunionectomy surgery.

Interventions: One day after bunionectomy, patients were randomized 2:1 to CR845 (5 mg/mg/kg, IV) or placebo after reporting a Visual Analogue Scale (VAS) pain score ≥ 40 (out of 100) at rest. Within 30-60 minutes after the initial study drug dose, patients could receive an additional dose, as needed, and then every 8 hours as needed over the next 48 hours. Rescue medication (fentanyl 50 mcg IV) was available as needed.

Main Outcome Measures: Pain intensity (VAS) was assessed periodically during the 48-hour study period. The mean summed pain intensity differences from baseline over 24 hours (SPID0-24) was the primary efficacy measurement.

Results or Clinical Course: In the prespecified analysis of the complete population, a statistically significant reduction in SPID0-24 with CR845 compared to placebo (P = .033) was observed, with only CR845 having a 95% CI significantly less than 0 (P = .0007). This observation was supported using the modified intent-to-treat population in which a greater decrease in SPID0-24 was observed with CR845 than placebo, although this difference was not significant (P = .116). Again, only CR845 had a 95% CI significantly less than 0 (P = .022). The SPID0-48 difference between treatment groups was statistically significant for the complete population (P = .024). Compared to placebo, patients treated with CR845 experienced fewer treatment-emergent adverse events (AEs) of nausea (23.6% vs. 58.8% for placebo; P = .028) and vomiting (5.9% vs. 23.9% for placebo; P = .034). Mild transient facial tingling (paresthesia) and somnolence were observed with CR845 (11.8% for both), but there were no reports of psychiatric AEs characteristic of centrally-acting kappa opioids.

Conclusion: In this study, CR845 resulted in reduced pain intensity with lower incidence of nausea and vomiting versus placebo in patients after bunionectomy surgery.

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Poster 148
The Effect of an Active Worker’s Compensation Claim on Completion Rates of an Interdisciplinary Pain Management Program

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Disclosures: A. N. Babu: I Have No Relevant Financial Relationships To Disclose.

Objective: Interdisciplinary Pain Management Programs (IPMPs) have been shown to be an effective way to improve the return to work rate in patients with chronic pain. Completion of the full 4-week program is considered vital in order to see these beneficial effects; however a certain percentage of patients are unable to do so due to a variety of reasons. We aim to determine if patients with AWCC have a lower completion rate of a 4-week IPMP compared with those without an active claim.

Design: Retrospective chart review of prospectively collected data.

Setting: Outpatient pain management clinic with a 4-week IPMP.

Interventions: Not applicable

Main Outcome Measures: Program Completion Rate, Release to Work Rate, RIC Multidimensional Impression of Change.

Results or Clinical Course: 193 patients were enrolled in the IPMP in the year 2013. The overall Program Completion Rate for the program was 77.72%. 73.8% of subjects with an AWCC completed the program, compared with 79.7% of the individuals without an active claim. The Released to Work Rate for Worker’s Compensation patients was 97.6% for completers, compared with 29.4% compared to non-completers. Patients reported the greatest amount of perceived improvement in their ability to cope with their pain and the least amount of perceived improved in their overall level of pain.

Conclusion: Patients completing a 4-week IPMP with an AWCC reported overall improvement in their symptoms and a much higher Released to Work Rate than non-completers. The Program Completion Rate for individuals with an AWCC was not significantly different than those without an active claim, despite the lack of clear improvement in pain scores. This is an important and encouraging finding given the challenges associated with this population. It appears that many Workmen’s Compensation patients completing an IPMP improve in several areas, particularly their reported ability to cope with their pain, which allows for higher return to employment rates. This aligns strongly with the philosophical basis of many IPMPs: functional improvements can be seen by teaching patients to manage their pain, rather than focusing on lowering pain scores. Future research should be directed toward investigating and encouraging improvement in completion rates for this population.

Poster 149
Acute Spinal Cord Compression Following Multiple Epidural Blood Patches for Post-Dural Puncture Headache: A Case Report

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Disclosures: S. M. Ferker: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient is a 41-year-old woman with a past surgical history of L3-L5 laminectomy, fusion and with post-laminectomy syndrome. After failing all conservative therapy, she was referred for a spinal cord stimulator trial. The trial provided significant relief but the patient developed a post-dural puncture headache (PDPH) after the procedure. Despite rest and caffeine, the headache worsened. That night, she went to the Emergency Room for further management. She felt no relief after the first epidural blood patch (EBP), and so within thirty minutes a second blood patch was administered according to standard procedure. The headache resolved, and so within thirty minutes a second blood patch was administered according to standard procedure. She remained free of headache symptoms. She was referred for a spinal cord stimulator trial.
entails autologous blood being injected into the patient’s epidual space, tamponading the dorsal dural defect, preventing further CSF leakage. The first epidural blood patch gives relief in the majority of cases reported, and the second one is successful in nearly all cases. The procedure carries a low risk of transient complications including paresthesias in the legs, low back pain and dizziness. Serious complications are extremely rare, and include epidual abscess formation, arachnoiditis, and as in this case epidural hematoma.

**Conclusion:** Numerous interventional pain procedures carry a risk of causing a PDPH for which EBP is a standard treatment. Although complications from EBP are rare, they can be serious. Symptoms suggestive of spinal cord compression after EBP should trigger prompt neurological evaluation.

**Poster 150**
**Pelvic Lipoma Presenting as Lumbar Radiculopathy: A Case Report**

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**Disclosures:** K. F. Cruz: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient presented with a 1-year history of low back pain with radiation to the right lower extremity in a posterolateral distribution with associated paresthesia. Conventional treatment, including oral pain medications and physical therapy, did not relieve her symptoms. Physical examination revealed absent bilateral deep tendon reflexes at the knee, extensor hallucis longus weakness on the right, and intact sensation in the L2-S2 distribution. MRI of the lumbosacral spine identified a right pelvic mass. An MRI of the pelvis confirmed a large fatty tissue mass in the pelvis that measured 15.1 cm × 14.2 cm × 11.4 cm abutting the right psoas muscle and invading the sciatic foramen with displacement of the sciatic nerve. There was resultant local mass effect with asymmetric atrophy of the right piriformis and obturator internus musculature. She underwent resection of the right pelvic and retroperitoneal mass. Histologic evaluation confirmed a benign lipoma.

**Setting:** Outpatient pain clinic.

**Results or Clinical Course:** The patient made steady progress in outpatient therapy after resection of the mass. One month postoperatively she ambulated at the modified independent level.

**Discussion:** Pelvic lipomas are rare causes of lumbar radiculopathy. The majority of cases are caused by disc herniation. The differential diagnosis also includes synovial cysts, retroperitoneal hematoma/mass, pelvic tumor, or piriiformis syndrome. On review of existing literature, two published cases of radiculopathy caused by pelvic or retroperitoneal lipomas impinging lumbar or lumbosacral nerve roots were identified.

**Conclusion:** This is an unusual case of pelvic lipoma impinging on lumbar nerve roots leading to lumbar radiculopathy. This case illustrates the importance of considering rare causes of lumbar radiculopathy and emphasizes the utility of advanced imaging in making the correct diagnosis. Unusual causes should be considered when there is lack of response to conventional treatment.

**Poster 151**
**Evaluation of the Effectiveness of Once-Daily Hydrocodone in Patient Subgroups**

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**Disclosures:** W. Wen: Employment-Purdue Pharma.

**Objective:** To examine effectiveness outcomes within patient subgroups of single-entity, once-daily hydrocodone (HYD) formulated with abuse-deterrent properties; and to assess between-subgroup differences in effectiveness and safety outcomes.

**Design:** This post hoc analysis used data from an open-label 52-week trial of treatment with HYD tablets. Binary subgroups were defined for six factors: age, gender, opioid experience, baseline pain severity, history of depression, and stable HYD dose at the end of a 45-day dose-titration period.

**Setting:** 88 investigational sites in the United States.

**Participants:** Patients with moderate-to-severe chronic noncancer pain.

**Interventions:** HYD 20, 40, 60, 80, 120 mg/day. Adjustment of HYD dosage, short-acting opioid and nonopioid analgesics were allowed during study.

**Main Outcome Measures:** Univariable and multivariable models examined changes in average pain intensity (API; 11-point numeric rating scale), pain interference (Brief Pain Inventory-Interference subscale [BPI-I]), physical and mental HRQL (SF-36v2 Physical and Mental Component Summaries [PCS and MCS]), and sleep quality (MOS Sleep Scale Sleep Problems Index [SPI]) from baseline to maintenance, and subgroup differences in treatment-emergent opioid-related adverse events (TEAEs).

**Results or Clinical Course:** All subgroups showed clinically meaningful improvements in API, BPI-I, and PCS scores. Between-subgroup comparisons found greater improvements for opioid-naïve patients and for patients with severe baseline pain. Incidence of TEAEs differed minimally between subgroups.

**Conclusion:** Regardless of age, gender, opioid experience, baseline pain severity, history of depression, or stable titrated dose, patients treated with HYD showed clinically meaningful improvements in pain intensity, pain interference, and physical HRQL. Improvements were generally larger for opioid-naïve patients and patients with severe baseline pain.

**Poster 152**
**Participation Restrictions of Individuals with Chronic Cervical Spine Pain**

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**Disclosures:** A. Miciano: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To quantify the participation restrictions (PR) in individuals with chronic cervical spine pain (CSP) and to investigate the correlation between PR status and scores from clinician-derived performance-based assessments (PBA).

**Design:** Retrospective cross-sectional study.

**Setting:** Comprehensive outpatient rehabilitation facility.

**Participants:** 100 subjects completed the Self-Administered Co-Morbidity Questionnaire and 61 subjects were determined to have CSP.

**Interventions:** Not applicable

**Main Outcome Measures:** The PROMIS-57 v1.0 subscales, from the National of Health (NIH) toolbox, described the PR status: physical function (PF), satisfaction with social role (SSR), and pain impact (PI) subscales. The Functional Performance Tests, used as clinician-derived PBA, included: Sit-to-Stand (STS), Loaded-Reach (LR), Trunk-Flexion ×10 repetitions (TF), and 50-feet-Walk-Fastest (FWF).

**Results or Clinical Course:** Data were first tested for gender differences. Only the PI variable differed between genders (Mann-Whitney test, Z = -1.198, P = .002); however, there was no difference in the correlation among measures for the PI variable, and hence, data were combined for the correlation analyses. Pearson’s correlation coefficient was used for all correlations, which did not differ in terms of significance from Spearman’s correlation. The mean PROMIS T-scores [SD] were: PF 35.15 [6.06]; SSR 36.52 [8.18]; and PI 67.47 [6.89]. The PROMIS subscales had a statistical significance: PF with STS (r = −.469; P = 0), LR (r = .271; P = .049), and FWF (r = .410; P = .002); SSR with STS (r = .333; P = .14), TF (r = .244; P = .084), and FWF (r = .237; P = .084).
and PI with STS ($r=\cdot312; P=\cdot022$), LR ($r=\cdot323; P=\cdot18$), and FWF ($r=\cdot267; P=\cdot51$).

Conclusion: Individuals with CSP tend to have a severe increase in participation restrictions, specifically severely poor PF, severe decrease in SSR, and high PI. The PROMIS tool adequately describes the PR of individuals with chronic cervical spine pain and correlates with functional performance scores. It would be valuable as an alternative to PBA in a busy clinical practice. Future research is needed to determine if there is an inter-relationship between body function, activity limitation, and participation restrictions in these individuals.

Poster 153
Physician Perspective of the Diagnostic Criteria of Myofascial Pain Syndrome
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Disclosures: D. Kumbhare: I Have No Relevant Financial Relationships To Disclose.
Objective: To characterize practicing clinicians’ perspectives of the current diagnostic criteria for myofascial pain syndrome.
Design: Cross-sectional study.
Setting: Pain clinic, Emergency Department, PMR office, Family Practice.
Participants: The sample population (n=119) consisted of 40% family physicians, 31% physical medicine and rehabilitation (PMR) specialists, 11% rheumatologists, 10% emergency room (ER) physicians, and 8% anesthesiologists specializing in chronic pain.
Interventions: Questionnaire was administered to assess physician perspective of diagnostic criteria of myofascial pain syndrome.
Results or Clinical Course: Anesthesiologists had a higher median score (6; IQR, 5-6) in response to “restricted range of motion” compared with the other clinician groups: family physicians (4; IQR 4-5), PMR specialists (4; IQR 2.5-5), rheumatologists (4; IQR, 2-4), ER physicians (3.5; IQR 3-4), (c2=20.15, P<.000). Compared with other clinician groups, anesthesiologists had a higher trend of median scores for “referred pain” (6; IQR, 5-7 vs. 5; IQR, 4-6) and “pain reproduction” (6; IQR, 5-6 vs. 5; IQR, 4-6) criteria, but it did not reach significant levels. The median scores of the groups of practicing clinicians were 3 (IQR, 3-4) for “poor sleep”, 4 (IQR, 3-5) for “daytime fatigue” and 3 (IQR, 2-4) for “cognitive symptoms”. There were no significant differences between the median responses of the groups of practicing clinicians to “poor sleep” “daytime fatigue” and “cognitive symptoms”.
Conclusion: In general, there was poor agreement amongst the physicians with regards to the diagnostic criteria. Further studies should examine clinician’s knowledge and understanding of the diagnostic criteria for MPS. These studies should also focus on their ability to accurately diagnose the syndrome.

Poster 154
Clinical Characteristics Associated with Cognitive Dysfunction in Fibromyalgia
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Disclosures: L. Burtz: I Have No Relevant Financial Relationships To Disclose.
Objective: To examine the association between cognitive dysfunction and socio-demographic and clinical characteristics in patients with fibromyalgia (FM).
Design: Cross-sectional study.

Setting: Interdisciplinary fibromyalgia treatment program (FTP) at a tertiary care hospital.
Participants: 668 subjects with FM who completed the FTP between May 2012 and November 2013.
Interventions: Not applicable.
Main Outcome Measures: Multiple Ability Self-report Questionnaire (MASQ) assessing cognitive function in 5 domains, tender point count (TPC), Widespread Pain Index (WPI), Bodily Pain Score (BPS), Physical Function Scale (PFS), Medical Outcomes Sleep Scale-II (MOS-II), Generalized Anxiety Disorder-7 (GAD-7), Patient Health Questionnaire-9 (PHQ-9), and Multidimensional Fatigue Inventory (MFI-20).

Results or Clinical Course: Age negatively correlated with MASQ scores in all cognitive domains except visual-perceptual ability. Education, sex, and TPC had no correlation with MASQ scores. All other outcome measures had statistically significant correlations with all 5 domains of MASQ. Worse cognitive functions were associated with higher WPI scores (more areas of pain), lower BPS scores (more severe/limiting pain), lower PFS scores (decreased physical functioning), higher MOS-II scores (more sleep problems), higher GAD-7 scores (greater anxiety), higher PHQ-9 scores (greater severity of depression), and higher MFI-20 scores (greater fatigue). Multiple regression modeling showed that mental fatigue (M-F) subset scores of the MFI-20 had the strongest correlation with MASQ scores in the 5 cognitive domains (language, visual-perceptual ability, verbal memory, visual-spatial memory, and attention-concentration) ($R^2 = 0.38, 0.18, 0.33, 0.22, and 0.50$ respectively; $P<.0001$) followed by PHQ-9 scores ($R^2 = 0.19, 0.11, 0.15, 0.13,$ and 0.24 respectively; $P<.0001$).

Conclusion: Cognitive dysfunction in individuals with FM is correlated with a variety of clinical characteristics, and cognitive dysfunction in specific domains shows different strengths of correlation with different clinical characteristics.

Poster 155
Back Pain in the Gut: A Case Report
Leigh F. Hanke, MD (New York Presbyterian Hospital, University Hospital of Columbia and Cornell, New York, NY, United States), David J. Carmier, DO, George Christollas, MD

Case Description: A 59-year-old man presented with chronic, severe and stabbing right flank and right lower quadrant (RLQ) abdominal. Pain was exacerbated with maneuvers that increased intra-abdominal pressure and alleviated with extension and walking. Physical examination was notable for mild pain with lumbar ROM, mild right costovertebral, and RLQ tenderness without rebound or guarding. Neurologic examinations was intact. Thoracic, lumbar, and pelvic musculoskeletal examination with provocative testing of these regions were unremarkable. MRI of the lumbar spine was notable for facet arthrosis and L5-S1 degenerative disc disease. Prior conservative treatment with medications and physical therapy had limited relief. Patient had seen multiple gastroenterologists, and had extensive workup including ultrasound, computed tomography of the abdomen and pelvis, and significant laboratory evaluation. Abdominal and pelvic etiologies could not be identified to explain his abdominal pain.
Setting: Academic medical center.

Results or Clinical Course: Thoracic spine MRI demonstrated evidence of a large right side foraminal T11-12 disc extrusion encroaching upon exiting T11 nerve root. Consideration was given to a right T11 neuritis with an atypical presentation as the source of his abdominal pain. A right T11 thoracic transforminal epidural steroid injection (TTFEIS) was pursued and resulted in a 90% pain reduction, complete functional restoration, and was diagnostic of the disc extrusion at this level as the source of pain.
Discussion: The thoracic spine is not typically responsible for isolated, nondermatomal abdominal pain. More common etiologies must be ruled out. It is reasonable to consider atypical etiologies of pain in resistant cases that had extensive workup and treatment without adequate explanation of the presenting symptom. Thoracic neuritis may be responsible for resistant cases of abdominal pain for which no obvious etiology may be identified.

Conclusion: Thoracic neuritis should be considered in the differential diagnosis of isolated abdominal pain without apparent explanation. In such cases TTEFsIs may serve both a diagnostic and therapeutic role.

Poster 156

Botulinum Toxin Therapy for Severe Raynaud’s Syndrome and Digital Ulcerations in a Patient with Limited Scleroderma: A Case Report

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Case Description: A 55-year-old woman with history of scleroderma presenting with chronic digital ulcerations of the hands secondary to severe Raynaud’s syndrome. She demonstrated poor hand dexterity and severe pain limiting function. The patient’s symptoms were refractory to conservative treatments including occupational therapy and oral medications including Tadalafil and Amlodipine. She was consequently referred for trial of IncobotulinumtoxinA (Xeomin) injections to the bilateral hands.

Setting: Outpatient clinic.

Results or Clinical Course: Three weeks post-injections, the patient reported improved pain, range of motion of the fingers, dexterity, skin color, and healing of the digital ulcerations. No complications were reported.

Discussion: Rheumatologic conditions, such as scleroderma, pose a particular challenge for patient and provider alike. DMARDs can help slow disease progression but may not provide symptomatic relief for the vasospastic changes that lead to ischemic ulcers, pain, and loss of function. We present a patient with significant symptomatic relief in both hands three weeks after botulinum toxin injection. We speculate that botulinum toxin improves circulation through modulation of sympathetic tone, though further studies are needed to confirm this effect.

Conclusion: We present a case of scleroderma induced Raynaud’s syndrome, digital ulceration, and poor hand function successfully treated with botulinum toxin.

Poster 157

Non-Inferiority of Cooled Versus Traditional Radiofrequency Ablation of the Lumbar Medial Branch Nerves in the Treatment of Axial Low Back Pain

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Objective: To determine non-inferiority of cooled radiofrequency ablation (RFA) to traditional RFA in providing pain relief, time to repeat procedure, and radiation exposure.

Design: Retrospective chart review.

Setting: Single provider PM&R pain clinic at an academic medical center.

Participants: Thirty-nine patients undergoing a total of sixty lumbar medial nerve branch radiofrequency ablations (36 traditional and 24 cooled).

Main Outcome Measures: Follow-up post-procedure pain score, percent improvement, days to repeat RFA, and fluoroscopy time of procedure.

Results or Clinical Course: When comparing 60 radiofrequency ablations, there was no significant difference in BMI (29.33 vs. 31.60 kg/m², P=0.19) or sex (29% vs. 42% male, P=0.42) between cooled or traditional groups. Patients who underwent cooled RFA had an older average age (68.48 vs. 51.80 years, P<0.001). The pre-procedure pain scores were not significantly different between groups (6.08 vs. 6.28, P=0.78). Post-procedure pain scores for patients who followed up between 30 and 90 days post RFA were lower in the cooled group (4.28 vs. 6.26, P=0.008), while patient perceived percent improvement in their axial low back pain was greater in traditional group (81.67% vs. 40.0%, P=0.006). The time to repeat ablation was longer in the traditional group than in the cooled group, however the difference was not statistically significant (359.3 vs. 288.7 days, P=0.45). Finally, traditional RFA procedure of six or more levels exposed patients to longer fluoroscopy time than cooled RFA at the same levels (196.2 vs 141.4 seconds, P=0.02).

Conclusion: The process of cooled radiofrequency ablation has been adopted by the interventional pain management community, with a more direct approach to the lumbar medial branch nerve, as a means to create a larger burn. This retrospective study demonstrates non-inferiority of cooled radiofrequency ablation compared to traditional RF in improvement of pain and time to repeat ablation. Cooled RF exhibits additional clinical benefits noted in our study. The older average age of the cooled RF group demonstrates an opportunity to treat more degenerative spines that previously were not candidates for traditional RF due to the complex anatomy. Additionally, with a more direct approach patients and providers are exposed to less fluoroscopy time and possibly increased efficiency.

Poster 158

Excruciating Bilateral Toe Pain in a Patient with a Substantial Smoking History: A Case Report

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Case Description: A 64-year-old woman presented to a hospital complaining of long-standing, excruciating bilateral toe pain. While multiple diagnoses were considered in the past, including peripheral neuropathy and gout, standard treatments for both were unsuccessful. Accidental foot trauma also caused permanent purple discoloration to multiple toes leading to her presentation to the hospital. At the time, all of the toes were extremely painful. Sensation description varied from severe burning to “electrical shock.” During initial interview she also revealed a 140-pack-year smoking history. Patient was admitted and seen by vascular surgery, rheumatology and infectious disease services. Given her presentation and tobacco history, the collaborating services established a working diagnosis of Buerger’s Disease (BD).

Setting: Acute care hospital.

Results or Clinical Course: Patient was treated conservatively with pain medication, instructed to quit tobacco immediately and discharged home. Unfortunately, she was unable to quit smoking and returned two weeks later with worsening pain. Multiple treatments were considered but given progression of her disease, she underwent a right transmetatarsal amputation and a month later a left transmetatarsal amputation.

Discussion: BD is a non-atherosclerotic, thrombotic, occlusive disease which affects small to medium-sized vessels. Most common presentation is digit ischemia affecting toes, fingers or both. BD is predominantly a clinical diagnosis but tests specific for other conditions can be used to diagnose BD via exclusion of respective diseases. Main role of management in BD is to prevent tissue loss and
amputation. Specific etiology of BD has not been established but studies depict a strong correlation with tobacco exposure, making tobacco and nicotine cessation the core of all treatments. Bypass surgery may be considered in select patients with suitable distal target vessels. Other treatments used to manage pain include sympatheticotomy and spinal cord stimulation. Calcium channel blockers and intermittent pneumatic compression also decrease pain by increasing blood flow.

Conclusion: BD is a rare but potentially devastating cause of toe pain especially in smokers. While no exact cause of BD has been identified, smoking cessation is vital for pain relief and amputation prevention.

Poster 159

Study to Comprehensively Calculate Risk of Aberrant Behavior to Opioids by Incorporating Genetic and Phenotypic Risk Factors in Pain Patients

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Disclosures: N. Anand: Employment - Proove Biosciences

Objective: The objective of this study is to determine the predictability of aberrant behavior to opioids (misuse, abuse, dependence and addiction) by using a comprehensive scoring algorithm incorporating single nucleotide polymorphisms affecting neurochemistry of the mesolimbic reward system and phenotypic risk factors.

Design: Cross-sectional study.

Setting: 5 clinics in the United States.

Participants: 162 pain patients, 80 of which were diagnosed with opioid drug dependence (ODD, ICD code 304.01), and 82 controls.

Interventions: Not applicable.

Main Outcome Measures: Risk of opioid aberrant behavior using Opioid Risk Index (ORI), a scoring algorithm that yields a score of 0 to 52 by incorporating genetic and phenotypic risk factors (11 SNPs and 6 phenotypic factors).

Results or Clinical Course:

A cross tab analysis using IBM SPSS found a significant association between ODD and an ORI score equal to or greater than 13 [Pearson Chi-Square = <0.05; Fishers Exact = <0.05; Sensitivity = 80.00% (95% CI: 69.56% to 88.11%); Specificity = 93.90% (95% CI: 86.33% to 97.97%); Positive Predictive Value = 92.75% (95% CI: 83.88% to 97.58%); Negative Predictive Value = 82.80% (95% CI: 73.57% to 89.83%); Positive Likelihood Ratio = 13.12 (95% CI: 5.57 to 30.89); Negative Likelihood Ratio = 0.21 (95% CI: 0.14 to 0.33)]. Low (0-11), moderate (12-23) and high-risk (24 and greater) groups were calculated for the ORI by comparing it to the Opioid Risk Tool (ORT).

Conclusion: This study suggests that an ORI score equal to or greater than 13 is a good cutoff to predict the risk of aberrant behavior to opioid pain relievers and is a useful tool to effectively stratify patients with risk of abusing opioids into low, moderate and high-risk groups. In comparison to the ORT test (current gold standard), the ORI test might be a more robust test to help clinicians predict a patient’s likelihood of aberrant behavior to opioids.

Poster 160

Ultrasound-Guided Ilioinguinal and Iliohypogastric Nerve Blocks May Treat Chronic Pelvic Pain

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Disclosures: P. Dehghan: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 32-year-old woman with surgical history of C-section (2010) who presented with chronic pelvic pain times 4 years duration. Lysis of adhesions (2012) offered minimal improvement. Pain was located in the suprapubic and bilateral groin regions, with radiation to anterior mid-thighs. Her pain was refractory to physical therapy and lidocaine injections. The severity of her pain necessitated use of Percocet. Examination revealed hypersensitivity along the lower abdomen and groin with decreased sensation in her lower extremities. No weakness was appreciated. Patient was scheduled for elective ultrasound-guided ilioinguinal and iliohypogastric nerve blocks.

Setting: Tertiary care outpatient Interventional Spine service

Results or Clinical Course: A 22-gauge 3.5-inch needle was inserted near the ilioinguinal and iliohypogastric nerves under ultrasound guidance. A cocktail of 1ml 1% Lidocaine and 8 ml 25% Bupivacaine were injected on the following dates: 10/3/14, 11/5/14, and 12/24/14. The first 2 injections resulted in mild pain relief for 1 week. After the third injection, her pain improved substantially for 1 month. Upon follow-up on 2/6/15, the patient endorsed pain in her lower abdomen. An ultrasound-guided superior hypogastric plexus block was performed resulting in 50% pain reduction. The patient was subsequently able to wean off Percocet and was started on Nortriptyline.

Discussion: The incidence of post-operative neuropathy following major pelvic surgery is 1.9%. This complication generally resolves with minimal intervention, although long term disability is occasionally reported. Ilioinguinal and iliohypogastric nerve blocks may be a valuable strategy in the diagnosis and treatment of chronic suprapubic and groin pain after lower abdominal surgery.

Conclusion: It is important for physiatrists to consider post-operative entrapment neuralgia in their differential diagnosis of chronic pelvic pain. Diagnosis and treatment can be performed with the use of ultrasound-guided injections of a local anesthetic.
weakness in elderly people. Of 78 subjects with myelopathy of unknown cause that were investigated, 22 subjects had an AVM on angiography.

**Conclusion:** This case report illustrates a case of an undiagnosed spinal arteriovenous malformation without prior symptoms in an elderly patient. Recognition of symptoms and prompt diagnosis of AVM is important to allow further advanced imaging and possible surgical intervention.

**Poster 162**
**Complete Resolution of Long-term Piriformis Syndrome after Surgical Release: A Case Report**

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**Disclosures:** J. Stanek: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 53-year-old woman presented to clinic with a 7-year history of right piriformis syndrome that began with “burning” right hip/buttock pain. The patient was initially treated by an outside pain management specialist using psychotherapy. The patient’s pain continued, and the patient was seen by multiple providers and received a variety of treatments without successful resolution of her pain. Some of the treatments used by the patient included physical therapy, sacroiliac joint injections, facet injections, pool therapy, piriformis stretches, L4-5 fusion, and spinal cord stimulator placement. Medications used in the past included acetaminophen, cyclobenzaprine, pregabalin, gabapentin, multiple narcotics, topiramate, carbamazepine, tramadol, duloxetine, ibuprofen, naproxen, meloxicam, and piriformis injection with botulinum toxin. The discharge summary from recent hospitalization at an outside hospital read that providers postulated somatization disorder. When she presented to our facility, examination revealed reciprocal gait with antalgia on the right leg, atrophy of the right gluteus maximus, tenderness to palpation of the right piriformis, and positive straight leg test and FABER bilaterally. Normal lumbar range of motion, and normal strength in bilateral lower extremities were found.

**Setting:** Academic tertiary care center

**Results or Clinical Course:** Conservative management was initiated with topical lidocaine and capsaicin as well as pelvic floor physical therapy, however pain was unchanged. Treatment was escalated to trial of methylprednisolone/triamcinolone injected into the piriformis, again without benefit. Open piriformis release was then offered and performed 52 days after initial presentation to our clinic. In the postoperative clinic visit after surgical release of the piriformis (12 days later), the patient had 100% resolution of pain. The patient was able to completely turn off her spinal cord stimulator and could ambulate without the use of an assistive device.

**Discussion:** This case of intractable piriformis pain failed all common conservative therapies.

**Conclusion:** Consider piriformis release when other treatments have failed.

**Poster 163**
**A Rare Neurologic Complication of Intrathecal Drug Delivery for Cancer-Related Pain: A Case Report**

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**Disclosures:** K. N. Nanos: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 68-year-old woman with a history of pilocytic astrocytoma, developed progressive left hip pain several years post treatment. Investigations revealed a pelvic sarcoma, requiring chemotherapy and a hemipelvectomy. Post-operatively, her pain remained significant. She trailed multiple opioid and adjuvant medications for pain control to no avail. Consequently, she underwent placement of an intrathecal drug delivery system (IDDS) after a successful trial. Post-operatively, she developed left lower limb allodynia. Her intrathecal morphine dose was increased several times over the ensuing weeks, providing only brief, mild relief followed by intense worsening of her pain. The following month, she was admitted for persistent pain exacerbation in the setting of altered mental status, paraplegia, and neurogenic bladder/bowel symptoms. She was treated with multiple antibiotics under the suspicion that she had developed meningitis post-implantation. MRI of her spine revealed T2 hyperintense lesions most prominent at the site of implantation. The diagnosis of acute disseminated encephalomyelitis (ADEM) was made. The intrathecal pain pump was suspected to be responsible for these clinical changes and was explanted.

**Setting:** Outpatient clinic

**Results or Clinical Course:** Following administration of IVIG and methylprednisolone, the patient noted improvement of her allodynia. She regained bladder and bowel control and some strength in her right leg. However, her T9 sensory level and left leg plegia persisted.

**Discussion:** Adequate treatment of cancer-related pain can be a significant challenge, complicated by medication side effects from high dosages and polypharmacy. IDDS can be effective in managing cancer-related pain while allowing for significant reductions in medication dosages, thereby minimizing side effects. Complications commonly seen are well described and parallel those associated with implantation of central venous access.

**Conclusion:** The above case represents a particularly complex scenario involving IDDS implantation for control of cancer-related pain; a challenging task that does not come without risk. However, the goal to maximize function and improve quality of life is paramount when dealing with intractable cancer-related pain.

**Poster 164**
**Evaluation of Blinding in Randomized Controlled Trials of Back Pain Treatment Modalities**

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**Disclosures:** B. Freed: I Have No Relevant Financial Relationships To Disclose.

**Objective:** Back pain treatment modalities lack strength of recommendation. Randomized controlled trials (RCT) despite being one of the supreme gold standards in evaluating the evidence of effectiveness of a treatment modality, do not generally assess for success of blinding. Blinding aims to minimize performance bias. This is a potential confounding factor limiting the accuracy of RCTs investigating different treatment modalities. This study aims to assess blinding in randomized controlled trials of back pain treatment modalities to strengthen current recommendations.

**Design:** This systematic review uses a blinding index (BI), a chance corrected measurement of blinding, to assess for patterns of blinding and correlations with effect size in back pain studies from 2000-2013. The BI is calculated using correct and incorrect guesses of treatment group allocation by study participants.

**Setting:** Outpatient clinical settings.

**Results or Clinical Course:** Searching Ovid, Medline and Pubmed databases 1,028 studies were found to potentially meet search criteria. Of these studies Only 23 or 2% included data on patient guesses of treatment group allocation, with a total of 2,584 patients. The experimental treatment groups had an average BI value of 0.44 and the control treatment groups had an average BI value of -0.09. Both the overall average and most common blinding scenario showed more correct guesses beyond chance in the experimental group and random guessing in the control group. Only 35% of studies could be included in
scenarios with potentially successful blinding. While studies with potentially successful blinding were 29% less likely to have positive outcomes, there was only a minimal negative correlation between BI values and effect size.

**Conclusion:** Overall, only a minority of studies on the treatment of back pain potentially remained blinded at the end of the trial, showing a need to rethink how to approach the matter of blinding, and how to interpret the outcomes of RCTs within the context of blinding.

**Poster 165**
**A Cautionary Tale of Acute Low Back Pain: A Case Report**

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**Disclosures:** D. E. Gutierrez: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** 75-year-old man with a PMH of HTN, Afib, DM, presents with CVA, with his immediate hospital course being complicated by a UTI which was treated with antibiotics. The patient was eventually transferred to acute rehabilitation to gain maximum function. The patient was noted to meet sepsis criteria requiring transfer to ICU where he was found to have UTI caused by ESBL. He completed a course of antibiotics and was transferred back to rehab. Soon after being treated for his UTI, the patient began to complain of mild lower back pain. He showed neither classical signs of infection nor any focal neurological deficits on exam; a review of systems was negative. His back pain was treated conservatively. However, the patient’s hospital course was complicated by seizure prompting immediate attention. A Lumbar MRI revealed evidence of osteomyelitis at L4-S1 with epidural involvement and abscess formation. The patient was treated with appropriate intravenous broad spectrum antibiotics.

**Setting:** Inpatient Rehabilitation Unit.

**Results or Clinical Course:** Patient’s low back pain improved and the patient was able to gain some significant function for the remainder of his hospital stay.

**Discussion:** Batson’s Venous Plexus is a valveless plexiform network that bridges the superior and inferior venae cavae with the entire length of the vertebral canal. It is thought that this venousplexus can provide a gateway for certain metastatic cancers as well as the spread of infection, particularly those of the urinary tract, to the spine. Infections such as epidural abscesses, osteomyelitis, and/or diskitis are some of the more common infectious causes of acute low back pain, particularly in medically complex patients. When dealing with low back pain in the inpatient setting, one must consider an aberrant infection even with minimal clinical signs of infection, as was the case in this presentation. In particular, as clinicians we should keep in mind Batson’s Plexus and its relationship with the spine.

**Conclusion:** Repeat urinary tract infections with sudden onset of low back pain should keep open the possibility of transmission of bacteria to the spine. It should be noted that Batson’s Plexus might also be linked to low back pain in these cases given the probable congestion of epidural veins, especially with the presence of bacteremias.

**Poster 166**
**Pulsed Radiofrequency for the Treatment of Blackberry Neuralgia: A Case Report**

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**Disclosures:** S. T. Dona: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient is 66-year-old Caucasian man with a history of sharp, shooting, and burning pain localized over the right hip with radiation toward the anterior lateral thigh. An extensive medical investigation was completed and he was ultimately diagnosed with meralgia paresthetica secondary to the impingement of his lateral femoral cutaneous nerve (LFCN) by his Blackberry phone clip. Patient underwent a diagnostic LFCN nerve block and hydrodissection resulting in complete relief of his symptoms for one day. Following this successful diagnostic block, the patient returned to clinic for pulsed radiofrequency ablation of the right LFCN under ultrasound guidance.

**Setting:** Private practice.

**Results or Clinical Course:** Musculoskeletal ultrasound was used to identify the right lateral femoral cutaneous nerve incorporating a systematic anatomical survey medial and inferior to the ASIS. The LFCN was found to lie in the subcutaneous plane deep to the fascia lata medial to the ASIS. Once the LFCN was identified and surrounding area was thoroughly scanned, a 22-gauge 100mm, 10 mm active tip radiofrequency needle was advanced adjacent to the lateral femoral cutaneous nerve just medial to the ASIS as visualized on US. With sensory stimulation at 50 Hz, parasthesias were elicited in right lateral thigh at 0.6 V. Next 3 cc of 0.5% lidocaine was injected around the nerve. Then pulsed radio frequency ablation of the right lateral femoral cutaneous nerve was carried out at temperature of 42°C, a rate of 2 pulses/second, and a width of 20ms for 120 seconds. This step was then repeated one more time. The patient had immediate relief and returned to the clinic in 2 weeks reporting 90% relief. At 10 weeks follow-up, the patient’s pain returned to baseline and pulsed radiofrequency under ultrasound guidance was repeated.

**Discussion:** Meralgia paresthetica is an uncommon sensory mononeuropathy characterized by paresthesia, pain or sensory impairment along the distribution of the lateral femoral cutaneous nerve. The mononeuropathy is often caused by entrapment or compression of the nerve as it crosses the anterior superior iliac spine and runs beneath the inguinal ligament.

**Conclusion:** Pulsed radiofrequency of the LFCN in combination with ultrasound may offer an effective, safe and accurate treatment option for patients with meralgia paresthetica.

**Poster 167**
**The Beneficial Effects of Dry Needling of Active Trigger Points in Subjects with Chronic Myofascial Pain Persist 6 Weeks After Treatment**

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**Disclosures:** J. V. Aredo: I Have No Relevant Financial Relationships To Disclose.

**Objective:** Determine the effects of dry needling of an active myofascial trigger point (MTrP) 6 weeks after treatment.

**Design:** A prospective, non-randomized, interventional clinical study.

**Setting:** University campus.

**Participants:** 30 adult subjects with neck/shoulder girdle pain for at least 3 months and an active MTrP.

**Interventions:** 3 weekly dry needling treatments of the most symptomatic active MTrP.

**Main Outcome Measures:** Pain measured by verbal analog scale (VAS) and Brief Pain Inventory (BPI), and MTrP status determined by digital palpation. MTrP status was classified as active (spontaneously painful), latent (painful only upon palpation), and resolved (no palpable nodule). Secondary outcome measures include cervical range of motion, pain pressure threshold, SF-36 quality of life measures, Profile of Mood States, and Oswestry Disability Index (ODI). Comparisons of means were done on assessments at baseline (T0) and 6 weeks after completion of treatment (T2). We also evaluated differences between end of treatment (T1) and T2.
Results or Clinical Course: 27 subjects (90% of 30) had a change in MTrP status from active at baseline (T0) to latent or resolved at T1. 22 subjects (73% of 30) sustained this change at T2 (P = .0953). VAS, BPI, and ODI scores remained significantly reduced between T0 and T2 (P = .0001, P < .0001, P = .0035, respectively). The significant improvements from T0 in one-sided cervical side bending (P = .0345) and rotation (P = .0021), and SF-36 pain (P = .0032) and physical function (P = .0163) were sustained at T2. These improvements were sustained between T1 and T2 in all measures except VAS (P = .0474).

Conclusion: The effects of dry needling on pain reduction and other variables of interest are sustained between T0 and T2. Pain did increase significantly between T1 and T2.

Poster 168
Diagnosis of Ulnar Neuropathy Secondary to Snapping Triceps Syndrome Using Dynamic Sonography. A Case Report
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Disclosures: R. Mathur: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 24-year-old right handed man presented with 13 months of pain in the right elbow with paresthesias in the 4th and 5th digits.
Program Description: The patient complained of numbness and tingling in the 4th and 5th digits. On physical examination, he had tenderness on palpation over the cubital tunnel. Conservative management with nighttime elbow splints did not alleviate his symptoms. Nerve conduction studies revealed slowing of motor conduction velocity across the elbow. A dynamic ultrasound test was performed which revealed the triceps tendon over the medial epicondylo and a hypoechoic ulnar nerve. During the functional ultrasound assessment, a painful snap was felt through the transducer at 90 degree elbow flexion. The patient was referred to surgery, and surgical exploration confirmed the presence of snapping triceps syndrome.
Setting: Outpatient pain clinic.
Results or Clinical Course: The patient underwent open elbow surgery. At 3-month follow up examination, the patient remained asymptomatic, and regained full neurologic function and elbow range of motion.
Discussion: The most common abnormality leading to compressive symptoms of ulnar neuropathy is an accessory anconeus epicondylaris muscle. The epicondylaris muscle extends from the medial olecranon to the inferior surface of the medial epicondylo. It extends superficially to the ulnar nerve in the cubital tunnel where it can be associated with cubital tunnel syndrome. Dynamic sonography of the elbow is the imaging modality of choice since it can evaluate the function of the triceps insertion and medial epicondyle during flexion and extension.
Conclusion: This type of functional imaging of the elbow is used to aid in the accurate diagnosis of and differentiation between ulnar nerve dislocation, an accessory anconeus muscle, or snapping of the medial triceps muscle.

Poster 169
Liposomal Bupivacaine Intercostal Nerve Blocks for Acute Thoracostomy Pain: A Case-Report
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Disclosures: A. Saby: I Have No Relevant Financial Relationships To Disclose.
Objective: Determine the utility of liposomal bupivacaine intercostal nerve blocks to alleviate acute thoracostomy pain.
Design: Case report
Case Description: A 66-year-old man with pleural mesothelioma underwent a radical pleurectomy, decortication, and chest tube thoracostomy. His intra-operative course was complicated by a STEMI necessitating anticoagulation with heparin and clopidogrel.
Setting: Surgical ICU in a quaternary medical center.
Interventions: The inpatient PM&R Pain Service was consulted to manage the patient’s significant chest wall pain secondary to the patient’s chest tube thoracostomy. Via ultrasound-guidance, 3ml [39.9mg] of liposomal bupivacaine was injected into each thoracic rib margin of ribs 7, 8, 9, 10, and 11. Between injections, the needle was withdrawn and the injection sites bandaged.
Results or Clinical Course: The patient’s chest wall pain was assessed as a “7/10” on the Verbal Numeric Rating Scale (VNRS) prior to procedure. Five minutes after the liposomal bupivacaine intercostal nerve blocks, the patient’s pain was assessed as “0/10” at rest and “5/10” with coughing on the VNRS. Follow-up consultation the next day revealed that the patient had no significant adverse reactions (incl. no nausea, vomiting, pruritis, excessive sedation, or somnolence), and his chest wall pain was a “4/10” on the VNRS. The patient endorsed that he was able to cough as well as “twist and rotate” along the thoraco-lumbar spine with significantly less chest wall pain.
Conclusion: In addition to alleviating the patient’s acute thoracostomy chest wall pain, our goal was to enhance the patient’s ability to expectorate excess pulmonary secretions, use incentive spirometry, and participate in chest physical therapy for effective pulmonary hygiene. Management considerations included the need for a minimally invasive approach given the patient’s ongoing post-STEMI anticoagulation regimen. As compared with other interventional forms of analgesic delivery (e.g. patient controlled epidural analgesia, continuous intercostal analgesia), intercostal nerve blocks do not require catheter placement, thus decreasing the risk of hemorrhage and infection. Furthermore, liposomal bupivacaine has demonstrated up to 72 hours of analgesia in investigational studies as compared with bupivacaine HCl, which provides no more than 9 hours of analgesia.

Poster 170
Lumbar Radiculopathy Secondary to Schwannomatosis. A Case Report
Rajat Mathur, MD (National Rehabilitation Hospital, Bowie, MD, United States)
Disclosures: R. Mathur: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 60-year-old woman presented with three year history of low back pain radiating to her left leg.
Program Description: Patient complains of left lower extremity pain which started three years prior to presentation. The pain started to get worse recently. She described the pain as intermittent, cramping, shooting quality that worsened with lying supine. The pain was worst in the morning. She denies bowel or bladder dysfunction. Her physical examination positive for 4/5 strength in her left knee and ankle extension/flexion. She noted decreased sensation in the left L4 and L5 distribution. Magnetic resonance images (MRI) of the lumbar spine one year prior to presentation were unremarkable. She underwent two interlaminar epidural steroid injections and received no relief. Repeat MRI revealed a L5/S1 extramedullary lesion.
Setting: Outpatient interventional pain clinic.
Results or Clinical Course: Based on the MRI findings, she was referred to neurosurgery and underwent L5/S1 laminectomy. Intraoperatively, these lesions were associated with several nerve roots. The extramedullary lesion was sent to pathology and was found to be positive for S100 protein immunostain, strongly indicative of a tumor derived from Schwann cells. At 2 month follow up, the patient noted significant improvement of her function and radicular pain.

Discussion: Schwannomas are slow growing benign nerve sheath tumors. Schwannomatosis has been described as a distinct tumor syndrome separate from Neurofibromatosis. It is characterized by presence of Schwann cell hyperplasia. The dominant symptom is pain which worsens as the schwannoma enlarges, and compresses nerves and adjacent tissues.

Conclusion: As in this case, the goal of surgery is to obtain a diagnosis as well as to provide symptomatic relief. However, complete surgical resection is generally not undertaken if there are multiple lesions throughout the spinal cord and/or cauda equina. Treatments for multiple progressive lesions primarily include radiation. The patient was also referred to medical genetics for further work-up.

Poster 171
Associations between Low Back Pain and Movement Patterns (B-PAM): A Prospective Registry Protocol
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Disclosures: M. J. Desai: I Have No Relevant Financial Relationships To Disclose.

Objective: A recent systematic review of lumbo-pelvic movement identified reduced lumbar range of motion, proprioception and decreased speed of movement among subjects with low back pain (LBP). Unfortunately, it is not known whether these deficits existed prior to the onset of LBP (Laird 2014). In clinical practice, measurement of movement traditionally involves subjective observation and measurement often limited in terms of validity and accuracy. Recent advances in inertial sensor technology have profoundly improved our ability to measure both simple and complex movement. These include measurements of static postures, simple dynamic movements within a clinical setting, work or home setting. We propose to utilize the DorsaVi VMove system (Melbourne, Victoria, Australia) to establish a registry of movement data for LBP patients with age and gender matched healthy controls. The registry data would allow us to describe movement in these patients and evaluate the relationship between movement and various other factors, and evaluate the effectiveness of interventions for LBP.

Design: Prospective, registry.

Setting: Private pain medicine and physical therapy practice.

Participants: 200 age, gender matched subjects with and without LBP between the ages of 18-65.

Interventions: Measurement of movement utilizing DorsaVi VMove.

Main Outcome Measures: Inertial sensors measurements (standing, flexion, extension, lateral flexion right/left, pelvic tilt in standing, usual sitting posture, poor sitting posture, good sitting posture, pelvic tilt in sitting)Roland-Morris Disability QuestionnaireNumerical Pain Scales for pain for average leg and back pain over last 7 daysBrief Pain InventoryPatient Health Questionnaire (PHQ-4) Depression and AnxietyScreenEuroQol-5D.

Results or Clinical Course: We expect to report the results of our investigation as stratified by those with LBP as compared to those without LBP.

Conclusion: This registry will elucidate the movement patterns of subjects with LBP while also assessing and comparing these patterns to age and gender matched controls without LBP. We may provide the basis for evaluating the efficacy of treatments and interventions while improving the understanding of movement patterns for those with LBP. Further the economic impact and value proposition of this system will be further investigated as a means to more efficient evaluation of patients with LBP.

Poster 172
A Novel Percutaneous Approach for Symptomatic Lumbar Facet Cystotomy Under Fluoroscopic Guidance
Marissa Dombovy-Johnson, BS (Rochester Regional Health System, Rochester, NY, United States), Hemant Kalia, MD, MPH

Disclosures: M. Dombovy-Johnson, No Answer

Case Description: A 56-year-old woman presents to our outpatient spine center with chief complaint of progressively worsening right lower extremity neuropathic and radicular symptoms along the L5 distribution which started insidiously without any antecedent trauma. She denies any specific aggravating or relieving factors associated with her pain. MRI Lumbar Spine without contrast revealed bilateral L4-5 and L5-S1 facet arthropathy with right L4-5 Facet cyst impinging on right L5 nerve root in the lateral recess. She reported no significant improvement on gabapentin 600mg TID.

Program Description: Informed consent was obtained for a trial of percutaneous facet cystotomy. She was placed in prone position and Right L4-5 facet joint was localized under oblique fluoroscopic view. 25G 1.5inch needle was used to inject 1% lidocaine along the needle entry site. A 22G 3.5inch needle was used to access the superior 1/3rd portion of the L4-5 facet joint in the oblique view. 3ml of Omnipaque contrast was used to fill in the cyst. Once the cyst was clearly visible and filled with contrast, an 18G Touhy needle was used to access the cyst using classic interlaminar approach under AP fluoroscopic guidance and LOR technique.

Setting: Outpatient community based clinic.

Results or Clinical Course: Successful percutaneous cystotomy was achieved with our double needle approach. Patient reported almost complete resolution in her symptoms in our post-procedure area. She was followed at regular intervals of 2 weeks, 1 and 3 months respectively post-procedure. She continues to report complete resolution of her radicular symptoms.

Discussion: Traditionally, single needle approach has been widely used for percutaneous cyst rupture with a failure rate of 25% and recurrence rate of 50%. Our patient continues to report complete resolution of her radicular symptoms 3 months post procedure. We hypothesize that the two needle approach may be more effective in juxtaarticular facet cysts as compared to single needle.

Conclusion: We hereby present a unique approach to target the symptomatic facet cysts percutaneously under fluoroscopic guidance in an outpatient setting. More data are needed to comment and analyze the success rate of double needle approach compared to conventional single needle one.

Poster 173
A Prospective, Randomized, Multi-Center, Open-Label Clinical Trial Comparing Intradiscal Biacuplasty to Conservative Therapy for Discogenic Lumbar Back Pain
Mehul J. Desai, MD MPH (Minnesota Medical Advanced Pain Specialists, Maple Grove, MN, United States), Leonardo Kapural, MD PhD, Jeffrey Petersohn, MD, Ricardo Vallejo, MD, Nagy Mekhail, MD PhD, Robert Menzies, DO, Michael Creamer, MD, Michael Gofeld, MD

Disclosures: M. J. Desai: I Have No Relevant Financial Relationships To Disclose.

Methods: The Biacuplasty Trial is a prospective, randomized, multi-center, open-label clinical trial comparing the safety and efficacy of percutaneous biacuplasty (single and double needle) compared to conservative care for painful discogenic lumbar disorders. Subjects are randomized to one of the following interventions: (1) Biacuplasty using an interlaminar (single needle) technique, (2) Biacuplasty using a double needle technique, or (3) Conservative therapy. We will randomize subjects to one of these three arms in a 1:1:1 ratio. Randomization will be conducted by a computer-generated random number list. Subjects will be stratified by quadrant (Southwest, Northeast, Southeast, Northwest). Main outcome measures include change in Oswestry Disability Index (ODI) and change in Visual Analog Scale (VAS) for pain.
**Objective:** Current therapeutic options for chronic low back pain (LBP) of discogenic origin are limited. The potential for complications associated with both surgery and more conservative therapy, such as opioid use, make it an important clinical goal to avoid such treatments. Emerging data are necessary to support alternative treatments for discogenic LBP. This prospective, randomized crossover study was conducted to compare the safety and effectiveness of physician-prescribed conventional medical management (CMM, n = 34), including pharmacological management, physical therapy, interventional options, and/or lifestyle changes, to CMA + intradiscal biacuplasty (CMM+IDB, n = 29), a minimally invasive technique that utilizes cooled radiofrequency to ablate nociceptive ingrowth, the hallmark of internal disc disruption leading to discogenic LBP.

**Design:** Prospective randomized crossover.

**Setting:** Academic and private practice.

**Participants:** 63 subjects

**Interventions:** Intradiscal Biacuplasty + Conventional Medical Management versus Conventional Medical Management Alone.

**Main Outcome Measures:** The visual analog scale (VAS), SF36-physical functioning (SF36-PF), Oswestry Disability Index (ODI), Beck’s Depression Inventory (BDI), patients’ global impression of change (PGIC), and health-related quality of life (EQ-5D VAS).

**Results or Clinical Course:** Study cohort demographics were well-matched, and body mass indices were equivalent (26). Baseline scores for each study outcome were similar between study groups. In the CMA+IDB group, no major complications occurred, the mean VAS score reduction exceeded that in the CMA group (-2.4 vs. -0.56; p = .02), and the proportion of treatment responders (2-point or 30% scores for each study outcome) were similar between study groups. In the CMA+IDB group, no major complications occurred, the mean VAS score reduction exceeded that in the CMA group (-2.4 vs. -0.56; p = .02), and the proportion of treatment responders (2-point or 30% decrease in the VAS) was substantially bigger (50% vs. 18%). Large differences in mean SF36-PF, ODI, and PGIC score changes (p < .05/ outcome) favored CMA+IDB, and changes in the BDI and EQ-5D VAS scores showed greater trends of improved health in the CMA+IDB group. Differences in opioid use between groups were not statistically significant.

**Conclusion:** The comparatively superior outcomes in the CMA+IDB group suggest that IDB is a more effective treatment for discogenic LBP than CMA.

**Poster 174**

**Enhancing Diagnosis for Sacro-iliac Joint Dysfunction with Placement of Beekley Marker**

**Kush Goyal, MD** (Cleveland Clinic, Cleveland, OH, United States)

**Disclosures:** K. Goyal: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To determine if placement of Beekley marker at area of most localized pain can be accurate. To determine if marker placement correlates with positive sacroiliac joint provocative maneuvers testing (Fortin finger test, FABER, Gaensln’s, Thigh thrust, Yeoman’s).

**Design:** Methods: 161 consecutive patients (male = 54, female = 107, mean age 51.4 years) in a single practitioner’s Medical Spine practice that had symptomatic sacroiliac joint dysfunction were retrospectively reviewed. Beekley marker was placed on each patient based on ability to localize pain near posterior superior iliac spine (PSIS) with one finger at the focal area of pain (Fortin finger test) and to radiographically identify SIJ dysfunction on AP Lumbar spine x-ray.

**Setting:** Academic center.

**Results or Clinical Course:** Results: 90% (145/161) had Beekley marker placed within 2 cm of sacroiliac joint. Of those 145, 130 (89.7%) had at least 3 or more positive provocative positive testing on SI joint maneuvers. There were 16 patients who had the marker placed outside of the SI joint (> 2cm), of which, only 7/16 had 4 or more provocative positive SI joint maneuvers.

**Conclusion:** Placement of Beekley marker can aid in the diagnosis of sacroiliac joint dysfunction. Combination of accurate Beekley marker placement in combination with several positive sacroiliac joint maneuvers may increase sensitivity and positive predictive value of the diagnosis of SI joint dysfunction. Accurate diagnosis may lead to improved success of intra-articular SI joint injections.

**Poster 175**

**Pneumocephalus after Lumbar Midline Epidural Steroid Injection with Fluid and Air Loss of Resistance**

**Technique:** A Case Report

**Nicholas C. Madaffer, DO** (University of Wisconsin Hospital & Clinics, Madison, WI, United States), Michelle Poliak-Tunis, MD

**Disclosures:** N. C. Madaffer: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient received a lumbar midline epidural steroid injection (ESI) secondary to bilateral lumbar radiculopathy refractory to conservative measures. Usual patient preparation and initial needle advancement was performed with a combined loss of resistance technique using normal saline (NS) and air with a #18 gauge, 3.5 inch Tuohy needle. Once the needle was within the L4-L5 interlaminar space, needle aspiration showed CSF, and subsequently 0.5 mL of Omnipaque 240 contrast was instilled demonstrating an intrathecal spread. The needle was immediately withdrawn 2 mm and 3 cc of NS was instilled. That procedure was aborted and a successful L5-S1 interlaminar injection was then performed. Approximately 24 hours post-procedure the patient experienced acute onset of an extreme headache positionally exacerbated with upright sitting/standing, and alleviated with lying supine. She was evaluated and found to have intraventricular air of unknown etiology in the anterior horn of the left lateral ventricle and in the third ventricle. She was treated with opioids and advised to liberalize fluid intake and caffeine intake. Of note, the patient had been drinking approximately 12 caffeinated beverages daily prior to the procedure, and was unable to take NSAIDS post-procedurally due to a closely scheduled fine-needle aspiration of a thyroid nodule.

**Program Description:** Pain Medicine

**Setting:** Tertiary care university hospital.

**Results or Clinical Course:** Her pneumocephalus and headache resolved spontaneously without the need of a blood patch for CSF leak secondary to dural puncture. She obtained 4 months of pain relief from her ESI.

**Discussion:** This is the first reported case, to our knowledge, of pneumocephalus following lumbar ESI utilizing combined fluid & air loss of resistance technique.

**Conclusion:** Pneumocephalus is a potential complication following ESI despite utilizing LOR with fluid and air.

**Poster 176**

**Relationships between Chronic Low Back Pain and Sarcopenia in the Elderly**

**Sangjun Park, Hyun Bang (Seoul National University Hospital, Seoul, Korea (the Republic of)), Chaiyoung Lim, master, Se Woong Chun, MD, Keewon Kim, MD, MS, Sun Gun Chung, MD, PhD**

**Disclosures:** H. Bang: I Have No Relevant Financial Relationships To Disclose.

**Objective:** Sarcopenia is known to increase multiple morbidities. However, there is a dearth of reports on the association with musculoskeletal pain. The aim of this study was to delineate the cross-sectional relationship between sarcopenia and chronic low back pain (CLBP), with a special focus on generalized muscle mass and lumbar spine sagittal alignment.

**Design:** Retrospective cross-sectional study.

**Setting:** The records were reviewed only in Seoul National University Hospital Healthcare System Gangnam Center.
Participants: A total of 721 medical records were reviewed in Seoul National University Hospital Healthcare System Gangnam Center and data of 165 older subjects (> 65 years, 81 men and 84 women) were retrospectively analyzed.

Main Outcome Measures: Subjects were categorized into either CLBP (back pain for ≥6 months; 35 men and 36 women) or control groups (46 men and 48 women). The Modified Skeletal Muscle Mass Index (MSMI), lumbar lordotic angles (LLA), and prevalence of sarcopenia were evaluated.

Results or Clinical Course: The LLA of men and women in the CLBP group (29.8 ± 10.6 degrees, 32.1 ± 11.2 degrees, respectively) were significantly lower (P < .001 and .006, respectively) than those in the control group (37.1 ± 8.5 degrees and 38.3 ± 9.2 degrees, respectively). Additionally, MSMI was decreased in the CLBP group compared to the control group; it was 31.2 ± 1.7% vs. 32.3 ± 1.9% (P = .008) in men, 26.1 ± 1.9% vs. 27.1 ± 2.1% (P = .02) in women. For both sexes, positive correlations were also observed between MSMI and LLA (r = 0.225, P = .048 in men, r = 0.225, P = .040 in women).

Conclusion: A close cross-sectional relationship was observed between sarcopenia and CLBP suggesting potential interactions between decreased muscle mass, altered lumbar spine sagittal alignment, and CLBP.

Poster 177
Paraplegia in a Patient with Spinal Dural Arteriovenous Malformation After Epidural Steroid Injection
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Disclosures: P. Le: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 52-year-old man with history of L4-L5, L5-S1 radiculopathies presented with worsening bilateral lower extremity weakness resulting in the inability to ambulate. Two weeks before presentation, he received left sided L4-S5 epidural steroid injections under fluoroscopy for his low back pain. Two hours after the injection, he experienced paraplegia resulting in immobility of his lower extremities and subsequently developed bowel and bladder incontinence. He reported a similar event 5 months ago after receiving an epidural steroid injection in the Dominican Republic with weakness of his legs and bowel and bladder incontinence which had improved significantly. On examination, the patient had flaccid paraplegia, diminished temperature and pinprick up to T8 and diminished vibration up to his knees.

Setting: Inpatient acute rehabilitation of a tertiary hospital

Results or Clinical Course: MRI with contrast showed T2 hyperintense signal abnormality spanning from T7/T8 to the conus with expansion of the spinal cord and multiple serpiginous flow-voids dorsal to the spinal cord. Spinal angiogram revealed spinal dural arteriovenous fistula with arterial feeders from the right L3 lumbar artery and early draining veins with a serpiginous configuration. The patient underwent embolization of the arteriovenous malformation with subsequent improvement in function after a course of acute inpatient rehabilitation and outpatient therapy.

Discussion: Progressive myelopathy after epidural steroid injection in patients with spinal dural arteriovenous malformations is a rare diagnosis and is often overlooked. The pathophysiology is hypothesized to be from the sudden increase in venous hypertension and engorgement leading to cord ischemia and is not felt to be due to direct trauma.

Conclusion: Spinal dural arteriovenous malformations are greatly underdiagnosed but treatable causes of paraplegia. Review of the literature suggests that improvement is possible even after a long period of untreated symptoms. Interventionists should scrutinize previous imaging studies and perform detailed history before providing epidural steroid injections as the index patient suffered similar symptoms in the past.
Interventions: Not applicable
Main Outcome Measures: Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS); patient satisfaction assessed by 5-point Likert scale.

Results or Clinical Course: Subjects were mainly from Europe (87%), 72% were female; mean ±SD age was 54.5 ±12.0 years & median time since diagnosis was 6.0 (range: 0-49) years. At baseline, 166 (70%) subjects were injected with AbobotulinumtoxinA (median dose 500U), 48 (20%) with OnabotulinumtoxinA (163U) & 25 (10%) with IncobotulinumtoxinA (160U). The majority (86%) had previously received BoNT-A treatment (median time from 1st BoNT treatment: 64-2 months; time since last injection: 3.4 months). For all patients, the median interval between visits was 3.2 months. Mean TWSTRS Total score improved from 31.4 ±12.7 at V1 to 29.5 ±13.1 at V2 (mean [95%CI] decrease of 1.9 [-2.9;-1.0]); severity score from 15.7 ±5.6 to 14.9 ±5.6 (decrease of 0.8 [-1.2;-0.3]); disability from 9.6 ±6.1 to 8.9 ±6.3 (decrease of 0.8 [-1.2;-0.3]) & pain from 6.1 ±4.8 to 5.7 ±4.6 (decrease of 0.4 [-0.8;-0.0]). Highest satisfaction with treatment remained stable over the visits; 85% of previously treated subjects reported satisfaction (completely or rather satisfied) with treatment at V1 & 86% at V2. Overall 88% (30/34) of previously untreated patients reported satisfaction at V2.

Conclusion: TWSTRS scores slightly improved from V1 to V2, suggesting that patients may not fully return to baseline before the next injection. Overall 'highest' satisfaction with BoNT-A therapy was generally good. Future analyses will provide important information about natural history of CD treated with BoNT.

Poster 180
Examination of Home Call in an ACGME Accredited PM&R Residency Program

Kelsey S. Neufeld (Loyola University Medical Center, Maywood, IL, United States)

Disclosures: K. S. Neufeld: I Have No Relevant Financial Relationships To Disclose.

Objective: To obtain descriptive data that quantitatively assess the frequency of home call, requirement of physician to return to unit, and identify prevalent categories of calls received; to assess the utility of home call and further the education of residents and staff alike.

Design: Observational study.

Setting: Residents in home call over a 3 month period, call hours defined as 4pm-7am weekdays and weekend coverage.

Participants: Total of 6 out of possible 10 residents participated: 3 PGY-2, 2 PGY-3, and 1 PGY-4.

Interventions: Participants documented call time, reason for call, and if required physician in unit at the hospital.

Main Outcome Measures: Requirement of physician attendance in unit, frequency, and category of each type of call.

Results or Clinical Course: 206 total calls were recorded over a 3 month period by all participating residents. Residents were required to return to the hospital/rehab unit 11 of those 206 calls (5.3%). Calls were placed into one of 8 distinct categories based on frequency of call type. New onset of symptoms/results category had the most overall calls with 47 total calls, followed by lab values at 42 total calls. For those calls that required the resident physician to return to the hospital, the primary reason was new onset of symptoms, with 6 times requiring a physician out of a total of 47 calls. Falling in the unit was second, requiring a physician 5 times out of 5 calls.

Conclusion: This study illustrates the frequency and requirements of home call by resident physicians. This QI study examines the demand and requirements of resident physicians participating in home call, which demonstrates a low percentage of calls that required physician assessment and revealed 8 distinct categories of calls that are present and primarily managed over the phone while residents are taking home call. This data is useful for contributing to the understanding of home call vs in house call and for continued educational benefit for residents, nursing, and staff who interact during on call hours.

Poster 181
The Teaching Habits and Perspectives of Physical Medicine and Rehabilitation Residents

Ashwin N. Babu, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), SamueIl K. Chu, MD, Christopher Reger, MD

Disclosures: A. N. Babu: I Have No Relevant Financial Relationships To Disclose.

Objective: To investigate the teaching habits and perspectives of Physical Medicine and Rehabilitation (PM&R) residents.

Design: This is a prospective survey-based study. The survey consisted of custom questions administered through a web-based survey program. The link to the survey was distributed to residents via an email to their residency program coordinators. The study protocol was described to the residents in this email.

Setting: Physical Medicine and Rehabilitation Departments across the United States.

Participants: 1200 Physical Medicine and Rehabilitation Residents

Results or Clinical Course: 138 surveys were collected, comprising of 42 PGY-4s (30.4%), 42 PGY-3s (30.4%) 41 PGY-2s (29.7%) and 13 PGY-1s (9.4%). The majority (59.4%) of respondents were between 26-30 years old and 53% were male. 98.5% of survey subjects reported having an opportunity to teach medical students. Only 2.8% of respondents reported being "Not Interested" in teaching medical students in the future, while 45.6% reported being "Highly Interested." This teaching occurred most often at the bedside (94.9%) and via interactive discussions (78.9%). Just under half of the subjects (42.0%) reported having a mandatory PM&R rotation for medical students at their institution. Only 35.5% of subjects report having formal education on teaching. 58.6% of those surveyed felt they would benefit from formal didactics on how to be an effective teacher. Finally, 97% of subjects reported that they promote the field of PM&R to medical students "Always" or "Often."

Conclusion: Education of medical students is a crucial part of our field. We report a survey-based, prospective study that suggests PM&R residents are generally interested in teaching medical students, and would benefit from more formal education on how to be an effective teacher. Our study was limited by the survey design, and possible selection bias given the unexpectedly high percentage of subjects reporting a mandatory medical student rotation at their institution. We advocate strongly for the continued promotion and development of physiatry by delivering effective, high quality education to our medical students.

Poster 182
Establishing a Consultation Service through Multidisciplinary Rounds

Anna Maria Dunn, MD (Johnson Rehabilitation Institute, Edison, NJ, United States), Marianne Boylston, APN

Disclosures: A. Dunn: I Have No Relevant Financial Relationships To Disclose.

Objective: To determine if establishing multidisciplinary rounds in various specialties would increase the number of consults on a rehabilitation medicine service.

Design: Retrospective study.

Setting: 700 bed level one trauma center

Participants: Trauma surgical team (attending, APN, social worker, trauma fellow), Neurology team (attending, APN, RN, Social worker, stroke team coordinator), Rehabilitation team (attending, APN, chief resident, Traumatic Brain Injury Fellow).

Interventions: The chairman of two disciplines was approached to initiate multidisciplinary rounds: neurology and trauma. The idea to round weekly or daily with concurrent teams was presented to provide better communication, patient care and length of stay. Each
disciplines team patients would be discussed: ongoing problems, social situation, rehabilitation goals, and disposition.

**Main Outcome Measures:** The number of consults in a two year period prior to initiation of multidisciplinary rounds and a two year period after the development of multidisciplinary rounds.

**Results or Clinical Course:** Initiation of both daily multidisciplinary rounds in the area of neurology and trauma increased the number of rehabilitation consultations by 50 percent over a two year period as compared to the two year period prior to initiation of the rounds.

**Conclusion:** The initiation of daily multidisciplinary rounds can increase the number of rehabilitation consults in a large level one trauma center.

**Poster 183**

**Developing a Comprehensive Assessment System:**

**A Case Report**

James A. Sliwa, DO (Rehabilitation Institute of Chicago, Chicago, IL, United States), Jennifer Moore, PT, DHS, NCS

**Disclosures:** J. A. Sliwa: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 23-year-old man admitted for rehabilitation following high speed motor vehicle accident resulting in C3–C4 fracture and C4 ASIA B spinal cord injury. The patient required a posterior spinal reduction and fixation with HALO placement, prolonged ventilation with tracheostomy and feeding tube placement. During rehabilitation the patient participated fully and tolerated therapy well. At the time of discharge the patient had been decannulated, his spasticity was controlled with medication, feeding tube was removed, bowels were regulated and an indwelling catheter was used for bladder management. The patient demonstrated improved breath support, cough strength and vocal intensity. He was independent in power wheelchair mobility with sip and puff controls and the use of a mouthstick for iPad use and TV controls. The caregiver (patient’s father) was independent in providing and patient independent in directing all self care, transfers, skin care, pressure reliefs, positioning and stretching. The patient was discharged home with his father. Despite attainment of rehabilitation goals and safe discharge home the total FIM gain was only 4 points.

**Setting:** Inpatient rehabilitation facility.

**Results or Clinical Course:** FIM does not capture progress made by this patient and for many other patients during rehabilitation. Discussion: To address this issue we are developing an assessment tool that can reliably capture and reflect progress in a comprehensive manner. Multi disciplinary expert clinician panels first identified 60 new clinically relevant domains and 40 assessment tools suitable for patients with stroke, TBI, SCI, neurologic and general rehabilitation needs. We are now pilot testing these tools on inpatient units for clinical relevance and operational feasibility. Based on pilot data a final battery of assessment tools will be fully implemented. We will then use item response theory (IRT) models to reduce assessment burden without decreasing measurement precision.

**Conclusion:** This project will identify and evaluate a set of standardized assessment tools that minimizes clinician and patient assessment burden while assessing areas of function in which patient progress is not adequately documented.

**Poster 184**

**Occupational Therapy Workforce in the United States:**

**Forecasting Nationwide Shortages**

Vernon W. Lin, MD (Cleveland VA, Cleveland, OH, United States), Xiaoming Zhang, Pamela Dixon

**Disclosures:** V. W. Lin: I Have No Relevant Financial Relationships To Disclose.

**Objective:** As the baby boom generation retires in growing numbers, demand for Occupational Therapists (OTs) specializing in geriatrics will be particularly strong. Currently, there is evidence that a workforce shortage exists in the field of Occupational Therapy (OT) and few studies were published in this area to systematically examine the status of the OT workforce. This study is to examine current and future OT job surplus/shortage trends within the United States.

**Design:** Forecast models and grading methodology were developed to evaluate individual state OT job shortages from 2008 to 2030.

**Main Outcome Measures:** OT shortages and shortage ratio, and a report card were generated and compared among the 50 states in the US.

**Results or Clinical Course:** Based on current trends, demand for OT services will outpace the supply of OTs within the U.S. Shortages are expected to increase for all 50 states through 2030. The number of states with a grade D or below will increase from 3 in 2010, to 18 in 2020, to 37 in 2030, respectively. By 2030, the three states with the greatest shortage ratios will be Arizona, Hawaii, and Utah. The three states with the largest OT shortage (the number of OT jobs) will be California, Florida, and Texas. States in the northeast are projected to have the smallest shortages while states in the south and west are projected to have the largest shortages.

**Conclusion:** This study serves to provide health care professionals, policy makers, and stakeholders with a means of assessing current and future OT needs. Discussion of the issues surrounding OT shortages and ongoing assessment of supply and demand must ensue in order to mitigate the projected shortages.

**Poster 185**

**Recruitment of Inpatient Physiatrists: Factors Influencing Career Choices in Physical Medicine and Rehabilitation Residents**

Kamara M. Savage, MD (University of Arkansas for Medical Sciences, Little Rock, AR, United States), Kevin M. Means, MD, Rani Haley, MD

**Disclosures:** K. M. Savage: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To identify factors that influence career choices in Physical Medicine and Rehabilitation (PM&R) residents and determine if there are modifiable factors that make a career involving inpatient physiatry more desirable.

**Design:** Internet based survey.

**Setting:** Anonymous access to online survey.

**Participants:** PM&R residents currently enrolled in ACGME-accredited residency programs.

**Interventions:** Not applicable.

**Main Outcome Measures:** Frequency item selection and/or perceived level of importance of online survey items.

**Results or Clinical Course:** 215 of the 1273 residents responded to the survey. Only 15% of the responders were planning inpatient PM&R careers whereas 38 % were pursuing outpatient practices only. 45% of the responders were still undecided. The most influential factors on career choice were: work hours (99%), leisure time (98%), family considerations (97%), intellectual stimulation (94%), control of own schedule (94%), frequency of call (90 %), performing procedures (84%), and patient variety (83%). The factors most likely to influence someone to pursue an inpatient PM&R career specifically were: earlier cutoff times for admissions (83%), fewer calls (83 %), having availability of internist (82%), control over admissions (80%), shorter work hours (80 %), educational loan repayment (79%), salary (73%), and smaller patient load (70%).

**Conclusion:** Several factors influenced career choices in PM&R. Lifestyle factors, particularly those regarding hours spent at work were major factors influencing PM&R residents’ career choices. Modifying
several of these factors can make inpatient physiatry more attractive to current and future PM&R residents.

**Poster 186**
Implementing Practice Guidelines for Delirium in Inpatient Rehabilitation Strategies, Process, Outcomes

Mooyeon Oh-Park, MD MS (Kessler Foundation, West Orange, NJ, United States), Kimberly Hreha, OTR, Vickie Romel-Nichols, RN, CRRN, Eun Kwang Byun, MD, Anthony Lee, MD, Barrett M. Anna, MD

Disclosures: M. Oh-Park: I Have No Relevant Financial Relationships To Disclose.

**Objective:** Delirium, an acute decline in attention and cognition, is the leading complication associated with poor outcomes and increased cost among hospitalized older adults. Implementing practice guidelines for delirium in rehabilitation may improve patient outcomes and quality of care. However, this requires a well-orchestrated effort of multiple disciplines. The objective of this study is to describe the development of strategies, process, and outcomes during implementation of practice guidelines for delirium based on the stages-of-change model.

**Design:** Descriptive study.

**Setting:** A large rehabilitation hospital.

**Participants:** Patients admitted in inpatient rehabilitation.

**Interventions:** Delirium Initiative Task Force of multiple disciplines (physicians, therapists, nurses, administrators) outlined the strategy: 1) prioritizing delirium as a quality indicator at institutional level based on its impact on quality measure (acute care transfers), 2) increasing awareness of delirium by education, 3) identification of screening (Confusion Assessment Methods: CAM) & development of intervention tool (Institution_Name_Delirium Intervention Protocol: K-DIP) based on literature and potential barriers to implementation, 4) small scale trial of tools and feedback analysis, 5) outcome monitoring.

**Main Outcome Measures:** Documentation of delirium status at admission pre- and post- implementation of guidelines. Usability of intervention protocol.

**Results or Clinical Course:** 30% of patients with acute care transfer due to mental status change had delirium pre-implementation of guidelines. 23 didactic sessions (14 for nursing, 3 for therapists, 6 for MDs) about delirium were provided over 12 months. Barriers for implementation included time, knowledge of staff, administrative support, and patient population (brain injury). Documentation of delirium status at admission improved from 11% to 98% from pre- to post- implementation. Prevalence of delirium at admission was 15.2%. K-DIP was used by physicians successfully identifying delirium and preventing potential acute care transfers.

**Conclusion:** Implementing practice guidelines for delirium based on the stages-of-change model may improve practice patterns and quality of care in inpatient rehabilitation.

**Poster 187**
An Evidence-Based Assessment of Fall Risk and Prevention in an Acute Rehabilitation Facility

Lei Lin, MD, PhD (JFK Johnson Rehab Institute, Edison, NJ, United States), Chris Wade, BS, Laurent Delavaux, MD, Craig Van Dien, MD


**Objective:** To determine the relationship between fall risk assessment tools and the likelihood that a patient will fall. To measure the effectiveness of a multifactorial program designed to reduce falls.

**Design:** The Patient Safety and Quality Improvement Team put in place a multifactorial program intended to reduce the incidence of falls. This prospective study included all patients admitted from 2010 through 2014. The Conley Scale was used to assess the fall risk from 2010-2012; and was replaced with the Johns Hopkins Fall Risk Assessment Tool starting in 2013. In addition various preventive measures were employed over the 5 year period. Fall events were reported by clinical staff and reviewed by interdisciplinary team.

**Setting:** A 90-bed rehabilitation institute affiliated with medical school.

**Participants:** All inpatient rehabilitation admissions from 2010 through 2014.

**Interventions:** Various multidisciplinary fall preventive programs.

**Main Outcome Measures:** Falls per 1000 patient days each years from 2010 through 2014.

**Results or Clinical Course:** Fall incidence was reduced by 24% in our general rehabilitation unit following the initiation of the multidisciplinary fall preventive program in 2011. During the same time period there was 43% reduction in falls in our Brain Trauma Unit following the concurrent installation of close observation video monitors. In the subsequent year, 2012 - we found no statistically significant decrease in the fall index after implementation of mechanical lifts, alarms, varieties of wheelchair cushions and bed bolsters. In 2013 we began employing the Johns Hopkins Fall Risk Assessment Tool to stratify patients into risk categories, with corresponding fall intervention for each category; after which we observed an impressive 42% and 31% fall reduction in our general rehabilitation and Brain Trauma Units, respectively. There was a further 7% reduction in fall index in 2014 after further emphasis on the post fall huddle.

**Conclusion:** Inpatient rehabilitation faculties experience unique challenges that affect risk of patient falls. A better understanding of the risk factors, how they translate through different fall risk assessment tools, and the successful implementation of interdisciplinary fall prevention programs are crucial to effectively reducing fall incidence, improving patient safety and ensuring reasonable length of stay in acute rehabilitation centers.

**Poster 188**
Development of a Hybrid Tracheostomy Management Skills Workshop for Physical Medicine and Rehabilitation Residents: A Case Study

Cynthia Pineda, MD (MedStar National Rehabilitation Hospital, Washington, DC, United States)

Disclosures: C. Pineda: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** To describe the development of a hybrid formative instruction and evaluation of tracheostomy management skills focused on responding to accidental decannulation in a supervised simulated setting.

**Program Description:** 18 PM&R Residents participated in a hybrid formative workshop composed of a didactic session and hands-on simulation. The didactic session led by an ENT specialist focused on: 1) anatomy and physiology of the upper respiratory tract; 2) tracheostomy tube types; 3) management of accidental decannulation; 4) complications of tracheostomy re-insertion; 5) post-tracheostomy re-insertion assessment; 6) documentation of hand-off care and 7) tracheostomy practice guidelines per hospital standards. The simulation session focused on: 1) rapid assessment and rescue of a patient with a dislodged tracheostomy using a mannequin simulator and 2) basic airway skills training. A checklist was used to assess competencies.

**Setting:** Free-standing academic rehabilitation hospital.

**Results or Clinical Course:** Instructional techniques were experiential and learner-centered. Instructors assessed resident performance through return demonstrations structured to apply competencies. Participants received additional instruction and practice as needed. Resident post-activity evaluations using a 5-point Likert scale: overall
To determine admission timing trends at Emory Rehabilitation Hospital:

**Objective:** To assess and manage this medical emergency to ensure patient safety.

**Disclosures:** R. Bowers: I Have No Relevant Financial Relationships To Disclose.

**A Retrospective Analysis**

Timing of Admissions at Emory Rehabilitation Hospital: A Retrospective Analysis

Robert Bowers, DO, PhD (Emory University School of Medicine, Atlanta, GA, United States), Emily S. Boyd, MBBS, Dale C. Strasser, MD

**Design:** Retrospective analysis.

**Setting:** General inpatient rehabilitation hospital.

**Participants:** 378 patients admitted to Emory Rehabilitation Hospital from July 2014 to January 2015.

**Interventions:** Not applicable

**Main Outcome Measures:** Percentage of patients admitted after 3 pm, 5 pm, and on Fridays.

**Results or Clinical Course:** 378 patients were admitted to ERH between July 2014 and January 2015. 210 or 55% of all patients were admitted after 3 pm and 91 patients (24%) were admitted after 5 pm. 24% (92 patients) of all admissions occurred on Fridays.

**Conclusion:** Almost 1/4 of all admissions occurred on a Friday, which ensures that the patient will encounter multiple covering residents, physicians, and therapy staff before meeting their primary team on Monday morning. Furthermore, a majority of admissions happen late in the day when fewer staff members are available to provide optimal care for newly admitted patients. These factors can adversely affect patient care, yet they are administrative issues that cannot be directly addressed by medical personnel.

**Poster 190**

Timing of Admissions at Emory Rehabilitation Hospital: A Retrospective Analysis

Robert Bowers, DO, PhD (Emory University School of Medicine, Atlanta, GA, United States), Emily S. Boyd, MBBS, Dale C. Strasser, MD

**Disclosures:** R. Bowers: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To determine admission timing trends at Emory Rehabilitation Hospital (ERH) that may negatively impact patient care and the patient experience.

**Design:** Retrospective analysis.

**Setting:** General inpatient rehabilitation hospital.

**Participants:** 378 patients admitted to Emory Rehabilitation Hospital from July 2014 to January 2015.

**Interventions:** Not applicable

**Main Outcome Measures:** Percentage of patients admitted after 3 pm, 5 pm, and on Fridays.

**Results or Clinical Course:** 378 patients were admitted to ERH between July 2014 and January 2015. 210 or 55% of all patients were admitted after 3 pm and 91 patients (24%) were admitted after 5 pm. 24% (92 patients) of all admissions occurred on Fridays.

**Conclusion:** Almost 1/4 of all admissions occurred on a Friday, which ensures that the patient will encounter multiple covering residents, physicians, and therapy staff before meeting their primary team on Monday morning. Furthermore, a majority of admissions happen late in the day when fewer staff members are available to provide optimal care for newly admitted patients. These factors can adversely affect patient care, yet they are administrative issues that cannot be directly addressed by medical personnel.

**Poster 190**

The Warm Hand-Off: Changing the Culture of a Patient Being "Discharged" to Rehab

Richard Kim, MD (Kingsbrook Jewish Medical Center, Brooklyn, NY, United States), Ashish Khanna, MD, Adrian Cristian, MD, MHCM

**Disclosures:** R. Kim: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To evaluate the "warm hand-off" of patients being discharged to an Inpatient Rehabilitation Facility (IRF) from Medical, Surgical, and Orthopedics.

**Design:** Based on earlier work, areas in need of improvement and in understanding of the transition of care process were identified. Based on a Failure Mode Analysis (FMEA) committee’s work to improve transition of care, many initiatives were created including an Interdisciplinary Team between resident physicians, education regarding documentation at transition in care, and expanded role of the physiatry consult resident that included participation in discharge planning meetings on medical service. However, a policy of communication between the discharging resident and accepting physiatry resident at the time of admission was instituted. After these initiatives, physiatry residents were given a 16-item survey to measure the frequency and quality of the hand-off for each new admission. Surveys were collected for a period of 5 months.

**Setting:** Brooklyn, NY with IRF.

**Results or Clinical Course:** There were 270 admissions to the IRF, with 95 from outside facilities and 175 from IRF’s institution. These included: 145-Medicine, 8-Orthopedics, 22-Surgery. Telephone or in-person conversation with transferring physician/resident occurred 57%. Of these, a hand-off was initiated by the physiatry resident 67%. Of those residents involved in a hand-off, the quality of hand-off was also evaluated. Reason for hospitalization (diagnosis. Yes 99%; Hospital Course, Y-87%; Procedures, Y-70%; Medication list, Y-71%; Names of consultants, Y-70%; Labs/Imaging, Y-63%; Pending Tests, Y-50%; Anti-coagulation, Y-24%; Antibiotic instructions, Y-69%; Weight-bearing status. Y-55%; Seizure instructions Y-11%; Wound care. Y-16%; Diet. Y-81%; Further treatment/follow-up care. Y-65%.

**Conclusion:** This QI project illustrates that with proper education and collaboration between residents of different services, the frequency of its occurrence needs to be improved. Ultimately, the goal of these interventions is to change the culture and attitudes regarding discharges to an IRF. By identifying and removing barriers to quality discharges, continuing the implemented interventions, and maintaining vigilance to ensure patient safety, transition of care issues can be minimized and patient care can be improved.

**Poster 191**

Evaluation of a Formal Mentorship Program in Physical Medicine & Rehabilitation

Mithra Maneyapanda, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Leslie Rydberg, MD

**Disclosures:** M. Maneyapanda: I Have No Relevant Financial Relationships To Disclose.

**Objective:** We aim to assess attitudes and goals regarding a formal mentorship program in a Physical Medicine and Rehabilitation residency program.

**Design:** Prospective survey-based study. An anonymous survey with Likert items was distributed to all attending and resident physicians participating in the program. Responses were scored with rating 1 through 10, with 10 being the most valuable.

**Setting:** Physical Medicine & Rehabilitation Residency Program.

**Participants:** 25 attendings and 36 residents.

**Interventions:** Not applicable

**Main Outcome Measures:** Mean responses to questions.

**Results or Clinical Course:** The response rate for attendings was 25 of 25 (100%) and 28 of 36 (77.8%) for residents. Residents felt the mentorship program would be valuable for their personal/professional development (mean 7.07, standard deviation 2.14). Attendings felt the program would be valuable for junior residents (8.32, 1.22) and senior residents (8.36, 1.35). The goal of the mentorship program deemed most important by residents was career planning (9.37, 0.84). Residents also found research (7.29, 1.72), networking (7.77, 2.32), and support/resident well-being (8.00, 1.74) to be important goals of the program. When individually compared to career planning residents found all other items to be statistically significantly less important (P < .0032). Attending responses were similar and they also rated career planning as the most important goal of the program (8.48, 1.08). When individually compared to career planning, attendings found all other items to be statistically significantly less important (P < .001) except support/resident well-being (8.08, 1.38, P = .278). The only statistical difference between resident and attending mean score for goals was career planning (P = .0017).

**Conclusion:** Resident and attending physicians in a Physical Medicine and Rehabilitation residency program feel that a formal mentorship program is valuable. The most important goal of the program is career planning. Other important goals were research, networking, and resident support. These results will help tailor the mentorship program to optimize its benefits.
**Objective:** To explore barriers to physical activity in Adult Spina Bifida

**Design:** This is a descriptive study in which the outcome variable is the barriers to physical activity. The Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) was administered to quantify physical activity levels. The scale includes a total of 13 items which range from leisurely activities such as household cleaning to vigorous exercise. Each item is then quantified by multiplying the average hours per week of the activity by an intensity value that is specific for each item. This scale has been proven to have adequate construct validity as well as test-retest reliability. The Barriers to Physical Activity and Disability Scale (BPADS) is the second measurement scale used in this study. Through both quantitative (yes/no responses) and qualitative questions (open-ended questions), a variety of personal and environmental barriers to physical activity were elucidated.

**Setting:** Academic teaching hospital

**Participants:** 8 Adults with Spina Bifida

**Interventions:** 2 questionnaires: Physical Disabilities Scale (PASIPD) and the Barriers to Physical Activity and Disability Scale (BPADS)

**Main Outcome Measures:** Scores from the PASIPD were calculated and scores from the individual factors within the total PASIPD score. Means and standard deviations of physical activity scores will also be reported. Responses from the quantitative portion of the BPADS were tallied for frequency.

**Results or Clinical Course:** Participants (n=8) mean total PASIPD score was 25.73 ± 15.24; mean ± SD. The total score was divided among 5 factors (Home Repair/Gardening = 0 ± 0, Housework = 0.96 ± 1.12, Vigorous Sport = 11.17 ± 15.02, Moderate Sport = 1.6 ± 2.03, Occupation/Transportation = 12.01 ± 10.85). Reasons and concerns for lack of exercise participation included: cost, transportation, lack of knowledge, fear of injury, motivation and lack of energy.

**Conclusion:** Most adult spina bifida are currently not in an exercise program or do not have a set physical activity schedule yet would like to start one. There is nothing in the physical environment that prevents exercise. Most have been told by their doctor to exercise but have not been told how to exercise. Physiatrists need to be more specific in an exercise prescription for adult spina bifida.

**Poster 194**

**Peripheral Neuropathy in Hodgkin’s Lymphoma: Neurolymphomatosis or Guillain-Barre Syndrome. A Case Report**

**Poster 193**

**Barriers to Mobility in Adult Cerebral Palsy**

**Poster 192**

**Exploring the Barriers to Physical Activity in Adult Spina Bifida**

David Berbrayer, MD, BSc (MED), FRCP, DABPMR (University of Toronto, Toronto, Ontario, Canada)

Disclosures: D. Berbrayer: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To explore barriers to physical activity in Adult Spina Bifida

**Design:** This is a descriptive study in which the outcome variable is the barriers to physical activity. The Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) was administered to quantify physical activity levels. The scale includes a total of 13 items which range from leisurely activities such as household cleaning to vigorous exercise. Each item is then quantified by multiplying the average hours per week of the activity by an intensity value that is specific for each item. This scale has been proven to have adequate construct validity as well as test-retest reliability. The Barriers to Physical Activity and Disability Scale (BPADS) is the second measurement scale used in this study. Through both quantitative (yes/no responses) and qualitative questions (open-ended questions), a variety of personal and environmental barriers to physical activity were elucidated.

**Setting:** Academic teaching hospital

**Participants:** 8 Adults with Spina Bifida

**Interventions:** 2 questionnaires: Physical Disabilities Scale (PASIPD) and the Barriers to Physical Activity and Disability Scale (BPADS)

**Main Outcome Measures:** Scores from the PASIPD were calculated and scores from the individual factors within the total PASIPD score. Means and standard deviations of physical activity scores will also be reported. Responses from the quantitative portion of the BPADS were tallied for frequency.

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**Conclusion:** Most adult spina bifida are currently not in an exercise program or do not have a set physical activity schedule yet would like to start one. There is nothing in the physical environment that prevents exercise. Most have been told by their doctor to exercise but have not been told how to exercise. Physiatrists need to be more specific in an exercise prescription for adult spina bifida.

**Poster 194**

**Peripheral Neuropathy in Hodgkin’s Lymphoma: Neurolymphomatosis or Guillain-Barre Syndrome. A Case Report**

Hongmei Wang, MD (Montefiore Medical Center, Bronx, NY, United States), Stephen Erosa, DO, Jay Shah, MD, Michelle Stern


**Case Description:** A 25-year-old man was admitted with weakness and numbness in all extremities for 3 days. With the absence of reflexes in knees/ankles and elevated protein in CSF, Guillain-Barre Syndrome (GBS) was suspected. He achieved somewhat improvement with intravenous immunoglobulin. During subsequent acute inpatient rehabilitation, he developed non-productive cough and worsening leukocytosis. Extensive workup revealed a large mediastinal mass and biopsy confirmed a classical Hodgkin’s lymphoma (HL). Patient continued to exhibit proximal weakness and newly onset neuropathic pain in lower extremities. MRI showed abnormal enhancement of nerves/roots suggesting a focal inflammatory process. EMG was consistent with diffuse polyradiculopathy likely secondary to lymphomatous infiltration. Clinical picture suggested more of neurolymphomatosis.

**Setting:** Acute inpatient rehabilitation unit at a university hospital.

**Results or Clinical Course:** Chemotherapy with doxorubicin, bleomycin, vinblastine, and dacarbazine was started. Neuropathic pain was managed with titrating dose of gabapentin. With comprehensive rehabilitation, patient demonstrated persistent improvement in overall strength.

**Discussion:** Patients with lymphoma may exhibit various neuropathic patterns. Neurolymphomatosis is defined as clinical neuropathy with lymphomatous infiltration of peripheral nerves proven by biopsy. Surrogate criterion includes abnormal enhancement of nerves/roots in MRI due to neoplastic infiltration in the setting of known lymphoma. Inflammatory, dysimmune neuropathies such as GBS or chronic
inflammatory demyelinating polyneuropathy (CIDP) can occur in lymphoma secondary to immune perturbation. Misdiagnoses of neurolymphomatosis as GBS/CIDP are frequent due to presence of demyelinating pattern and initial response to immunomodulatory treatments. In our case, the neurological presentation in a young patient with HL mimicked GBS but further evaluation favored neurolymphomatosis as the diagnosis. Chemotherapy and intensive rehabilitation are the key to recovery.

Conclusion: Lymphoma occasionally affects peripheral nervous system through direct infiltration or immunological disturbance. While providing quality rehabilitation in patients with neuropathy, physiatrist should be vigilant about the possibility of the concomitance of lymphoma.

Poster 195
Generalized Weakness in a Transplant Patient: A Case Report
Cora H. Brown, MD (Temple University Hospital, Philadelphia, PA, United States), Ernesto Cruz, MD
Case Description: A 47-year-old woman with a history of polymyositis, end-stage-renal disease on hemodialysis and post lung transplant on immunosuppressed medications admitted to medical ward with a 2-week course of generalized weakness and a painful lesion of the right lower leg. Examination of the extremities revealed hypotonia, hyporeflexia, decreased motor strength distally in upper extremities but proximally in lower extremities, and intact sensation to light touch. Rheumatology work-up noted elevated CPK and ESR levels. The patient was initially diagnosed with exacerbation of her polymyositis. After receiving high dose of corticosteroids (80 mg daily) and intravenous immunoglobulin she showed functional decline. She was later transferred to acute inpatient rehabilitation where EMG and NCV revealed axonal peripheral polyneuropathy. Finally, the skin biopsy of the lesion was performed to rule out calciphylaxis. Neurontin, oxycodone and local wound care were started to treat her neuropathy and the painful leg ulcer. With her recovery, the patient was transferred to acute inpatient rehabilitation where EMG and NCV revealed axonal peripheral polyneuropathy. Finally, the skin biopsy of the lesion was performed to rule out calciphylaxis. Neurontin, oxycodone and local wound care were started to treat her neuropathy and the painful leg ulcer. With her recovery, the patient was transferred to acute inpatient rehabilitation.

Program Description: Temple University Physical Medicine and Rehabilitation Program, Philadelphia, PA.
Setting: Acute inpatient rehabilitation unit.
Results or Clinical Course: The patient advanced to ambulation and wheelchair independence with improvement of motor strength of the extremities after intense inpatient rehabilitation and avoidance of pain and wound complications with pain medications and local wound care.
Discussion: Calciphylaxis is a rare disorder that can mimic other collagen vascular diseases such as polymyositis in its pathogenesis, presentation, and fulminant course. Inappropriate use of high dose of steroids and immunosuppressant medications act as a secondary insult in development of calciphylaxis in our case.
Conclusion: Physiatrists should maintain a high index of suspicion of calciphylaxis in patients with risk factors as calciphylaxis affords a poor prognosis, if not correctly diagnosed and timely treated, with high incidences of septic complications, pain, and functional disability.

Poster 196
Mechanical Failure of an Intrathecal Baclofen Pump: A Case Report
Jaspreet Singh (SUNY Upstate, Liverpool, NY, United States), Liju John, MD, David Kanter, MD
Disclosures: J. Singh: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 17-year-old boy with cerebral palsy brought in to the ED by his parents when his intrathecal baclofen (ITB) pump critical alarm sounded. In the ED, the alarm was noted to be inconsistent with critical or non-critical sound as it beeped continuously. The patient did not appear to be in any distress; he remained afebrile with a normal heart rate. Upon examination, the pump site revealed no signs of infection. We were unable to interrogate the ITB pump due to programming interference despite several trials with different programmers. Abdominal and Thoracic spine x-rays were negative for any catheter related issues. The pump was presumed to be in mechanical failure. Due to the possible risk of baclofen withdrawal, oral baclofen was given and Neurosurgery was consulted for an emergent replacement.

Setting: Tertiary care hospital.
Results or Clinical Course: In the OR, the pump was found to be in good condition with intact tubing. The catheter access port (CAP) was found to be patent. After removal of the pump the circuit board was analyzed under x-ray and an abnormal solder bridge was identified. This likely caused an electrical short and resulted in continuous alarming and the inability to communicate with the pump.
Discussion: To our knowledge, this is the first reported case of idiopathic circuit board malfunctioning resulting in pump failure.
Conclusion: Although catheter-related issues are a more common problem with ITB pumps, the possibility of pump failure cannot be ignored as this can be life threatening.

Poster 198
Relapsing-Remitting Distal-Variant Neuralgic Amyotrophy: A Case Report
Ali Malik (Larkin Community Hospital, South Miami, FL, United States), Curtis Ladd, DO, Ramon Cuenas-Trisan, MD
Disclosures: A. Malik: I Have No Relevant Financial Relationships To Disclose.
Case Description: 69-year-old male patient was referred for electrodiagnostic (EDx) evaluation of right hand weakness. Patient reported a history of right shoulder pain, followed by distal arm paresis. Resolution of both pain and paresis occurred gradually, over several months. 2 years after recovery, the patient developed similar symptoms on the contralateral side. These symptoms subsided gradually, over several months. Upon presentation to our EDx clinic, patient complained of right hand weakness that was preceded by shoulder pain. Physical examination revealed atrophy of several muscles, and an ulnar claw deformity. Nerve conduction studies (NCS) of the right median and ulnar nerves revealed normal compound muscle action potential (CMAP) onset latencies, with decreased CMAP amplitudes. NCS of these nerves, and the radial nerves, revealed normal sensory nerve action potential (SNAP) peak latencies and amplitudes. However, lateral antebrachial cutaneous nerves showed low SNAP amplitudes and delayed latencies. Electromyography (EMG) revealed chronic neurologic changes of some proximal shoulder muscles, along with active denervation in several distal muscles.

Setting: Electrodiagnostics clinic.
Results or Clinical Course: Clinical presentation, when correlated with EDx findings, was consistent with a relapse of distal-variant neuralgic amyotrophy (NA).
Discussion: NA is characterized by shoulder pain, which progresses to shoulder weakness. Distal-variant NA, in which weakness is limited to the forearm and hand muscles, is uncommon. In their case series, Parsonage and Turner reported only 1 patient with this variant. We present the case, along with EDx findings, of a patient who presented with a relapsing-remitting form of distal-variant NA.
Conclusion: In patients who present with severe brachialgia, followed by weakness confined to forearm and hand muscles, distal-variant NA is a condition that should be considered. This case report highlights an uncommon presentation of distal-variant NA. Early identification of
this condition could help guide clinical management and help prevent unnecessary tests or procedures.

Poster 199
Rehabilitation Outcomes Following Lower Limb Amputation in a Level 1 Trauma Center

Mark F. Mejerian, na (University School, Hunting Valley, OH, United States), Richard D. Wilson, MD, MS, Lynne R. Sheffler, MD

Disclosures: M. F. Mejerian: I Have No Relevant Financial Relationships To Disclose.

Objective: To evaluate the strength of association between patient-specific factors and functional outcomes of lower limb amputee patients who participated in an interdisciplinary inpatient rehabilitation program, at 3, 6, and 12 months post-amputation.

Design: Retrospective chart review.

Setting: Academic medical center.

Participants: The electronic medical records of 224 patients who underwent lower limb amputation were reviewed; 18 records met study criteria.

Interventions: A series of linear regression analyses were performed to identify patient-specific predictors of rehabilitation outcomes at discharge from inpatient rehabilitation and at 3, 6, and 12 months post-amputation.

Main Outcome Measures: The primary outcome measures were the Functional Independence Measure score, discharge ambulation distance and number/ability to ascend and descend stairs, and community mobility independence.

Results or Clinical Course: The number/ability to ascend and descend stairs at discharge was positively associated with community mobility independence at 3 months post-amputation ($\beta=0.64$, $p=0.04$). The association between ambulation distance at discharge to community mobility independence, both at 3 months ($\beta=0.60$, $p=0.06$) and at 6 months ($\beta=0.61$, $p=0.06$) post-amputation, approached significance. FIM Delta (functional gain as an inpatient) was not associated with functional mobility at 3, 6, or 12 months post-amputation ($P>0.05$).

Conclusion: The number of stairs a lower limb amputee patient is able to ascend/descend at discharge from an interdisciplinary inpatient rehabilitation program may be an important predictor of longer-term functional mobility in patients with lower limb amputations.

Poster 200
Characteristics of Patients Diagnosed with Venous Thromboembolism in Inpatient Rehabilitation

Shanti Pinto (University of Pittsburgh Medical Center, Pittsburgh, PA, United States), Gary Galang, MD

Disclosures: S. Pinto: I Have No Relevant Financial Relationships To Disclose.

Objective: To evaluate the risk factors for development of venous thromboembolism (VTE) during inpatient rehabilitation (IPR).

Design: Retrospective case-controlled study.

Setting: Inpatient rehabilitation facility within an academic medical center.

Participants: 2199 patients discharged from IPR between January 1, 2013 and June 30, 2014 who were not diagnosed with VTE prior to IPR admission.

Interventions: Not applicable.

Main Outcome Measures: Development of VTE during IPR stay, transfer to acute hospital, and IPR length of stay (LOS).

Results or Clinical Course: Patients admitted to IPR already on therapeutic full anticoagulation had decreased odds for developing VTE during the IPR stay (OR 0.410; 95% CI 0.204-0.823). Of those admitted not on full anticoagulation, those with prior history of VTE (OR 4.453; 95% CI 2.790 – 7.107), either swelling or tenderness to palpation of the lower extremities at admission (OR 2.167; 95% CI 1.381-3.399), and those admitted primarily for conditions of the brain (OR 2.080; 95% CI 1.285-3.365) or spinal cord (OR 2.304; 95% CI 1.339-3.962) were more likely to develop VTE during IPR stay. Patients diagnosed with VTE were more likely to be transferred to acute (OR 2.267; 95% CI 1.421-3.617), and those that were diagnosed later in the rehabilitation course when clinically symptomatic were more likely to be transferred to acute than those diagnosed on routine Dopplers (OR 4.487; 95% CI 1.791-11.242). Those diagnosed with VTE stayed 4.685 (95% CI 3.018-6.353) days longer, but there was no different in LOS based on when VTE was diagnosed.

Conclusion: Being diagnosed with VTE during IPR increases rate of transfer to acute and IPR LOS. Those who are diagnosed on routine Dopplers at admission are less likely to be transferred than those diagnosed clinically later in the stay but had same IPR LOS. Screening Dopplers should be considered at admission for those at increased risk for developing VTE.

Poster 201
JC Virus Antibody Negative PML IRIS Following Natalizumab Treatment in Multiple Sclerosis: A Case Report

Anand Navarasala (Marianjoy Rehabilitation Hospital, Wheaton, IL, United States), Padma Srigiriraju, MD

Disclosures: A. Navarasala: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 53-year-old man with a history of relapsing remitting multiple sclerosis (MS) diagnosed in 2007 was admitted to an acute inpatient rehabilitation hospital for MS exacerbation. Patient had a history of Natalizumab therapy from 2/2009 to 5/2014. He was sent to the ED following acute right facial numbness, dysarthria, and right sided weakness. He was admitted and treated with IV steroids and intravenous immunoglobulin (IVIG) without benefit. Work up for progressive multifocal leukoencephalopathy (PML) was started. MRI showed enlarging lesion of the right middle cerebellar peduncle. Biopsy was positive for PML with immune reconstitution inflammatory syndrome (IRIS). The patient was admitted under care of his neurologist for a five day course of IV steroid treatment and returned to the rehabilitation hospital afterwards.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: On readmission the patient completed four weeks of acute inpatient rehabilitation. Tremendous progress was made with mobility, transfers, and activities of daily living. The facial weakness improved in addition to the dysarthria. Natalizumab is used for refractory aggressive or refractory relapsing remitting MS when first line treatment (i.e. IFI-1a, IFI-1b, and glatiramer acetate) fails. The benefits are described in the Natalizumab Safety and Efficiency in Relapsing-Remitting Multiple Sclerosis (AFFIRM) trial. A 68 percent reduction in annualized relapse rate compared with placebo treatment at one year was seen. The overall risk of JC virus negative PML following Natalizumab without history of chemotherapy is 1:17,693.

Discussion: The prognosis of natalizumab induced PML-IRIS in patients with MS is good with $\geq$ 80% survival. Inpatient rehabilitation following IV steroid treatment is crucial to maximize functional recovery allowing the patient to safely return home. For patients with MS with a history of being treated with natalizumab any abrupt change in clinical condition should prompt evaluation in acute care to rule out other neurological conditions including stroke, PML, or other infectious causes.
Conclusion: Early recognition and treatment of PML IRIS is necessary to maximize functional recovery. Interdisciplinary inpatient rehabilitation allows patients to regain their functional status prior to diagnosis of PML.

Poster 202
Recurrent Pneumonia Complicated by Sepsis Secondary to Silent Aspiration from Zenker’s Diverticulum: A Case Report
Anand Navarasala (Marianjoy Rehabilitation Hospital, Wheaton, IL, United States), Sara Padalik, DO, Padma Srigiriraju, MD
Disclosures: A. Navarasala: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 73-year-old man with history of recurrent pneumonia complicated by sepsis presented with fevers, chills, and cough to the acute care setting. Chest X-ray showed basilar infiltrates in ED suggestive of pneumonia. Following admission ID was consulted and merrem, vancomycin, and micafungin were started. During the hospital course blood cultures were positive for E. coli. On transfer to the rehabilitation hospital the patient was on chopp diet with thin liquids due to dysphagia. Video-fluoroscopic swallow study (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES) were performed and a Zenker’s diverticulum was discovered. Studies demonstrated penetration and aspiration on initial swallow worse with nectar thick than thin liquid from the diverticulum.
Setting: Acute inpatient rehabilitation hospital.
Results or Clinical Course: The FEES showed residuals in the upper and lower muscle strengths before, immediately after and 7 weeks after allo-HSCT, whereas grip strength and knee extensor strength were evaluated for up to 3 weeks before, immediately after and 7 weeks after allo-HSCT. VFSS and FEES are screening methods that can be done in several weeks after allogeneic hematopoietic stem cell transplantation (allo-HSCT).
Discussion: Zenker’s diverticulum is a rare complication in the elderly population that has a prevalence of 0.01 – 0.11% in the population. It is common in the male population during the 7th to 9th decades. Symptoms include dysphagia, sensation of food or medications sticking in the throat, unexplained weight loss, and chronic halitosis. This patient presented with complications of recurrent pneumonia with sepsis and a long history of pill dysphagia.
Conclusion: In the elderly population with chronic dysphagia and the sensation of food sticking in the throat, a Zenker’s diverticulum must be ruled out. VFSS and FEES are screening methods that can be done in the rehabilitation setting to rule out mechanical causes of dysphagia which can prompt additional studies and surgical necessity. This patient was subsequently scheduled for barium swallow and surgical evaluation by an ENT specialist.

Design: Prospective observational study
Setting: College hospital.
Participants: Allo-HSCT patients (N=30) with a median age of 42.5 years.
Interventions: Not applicable
Main Outcome Measures: Body weight (BW), grip strength and knee extensor strength were evaluated for up to 3 weeks before, immediately after and 7 weeks after allo-HSCT.
Results or Clinical Course: BW did not change 3 weeks before, immediately after and 7 weeks after allo-HSCT, whereas grip strength and knee extensor strength showed significant differences at these time periods. Grip strength and right knee extensor strength were found to significantly decrease immediately after allo-HSCT, as compared to their baseline values of p < .01 and p < .05, respectively.
Conclusion: Muscle strength decreased immediately after allo-HSCT, but rebounded after several weeks. Rehabilitation staff, nurses and physicians should recognise the immediate decrease in muscle strength in patients after allo-HSCT.

Poster 204
The Progression of Hand Arm Vibration Syndrome is Inhibited by Automated Manipulation
Michael Politis, PhD (Carpal Pain Solutions, Inc., Palm City, FL, United States)
Disclosures: M. Politis: I Have No Relevant Financial Relationships To Disclose.
Objective: To test the hypothesis that manual manipulation using an automated massage device can inhibit the progression of Hand Arm Vibration Syndrome (HAVS).
Design: Randomized, single-blinded, controlled study.
Setting: Clinical visit at baseline and telephonic survey at completion.
Participants: 24 consented subjects randomly assigned to Device (n=12) or Self (n=12) groups.
Interventions: All patients were diagnosed with moderate or severe HAVS at baseline by a physician. Device group patients were provided an automated manipulator device (called HAVS Massage) to take home. Self group patients were instructed how to self-massage their hand. Both groups were asked to massage twice daily for 3 months, when their level of HAVS was again determined. A blinded investigator compiled data at 3 months via telephonic survey.
Main Outcome Measures: A Visual Analog Scale (VAS) and modified a Michigan Hand Outcomes Questionnaire (MHOQ) were used to determine HAVS severity level. In each instrument, scores ranged from 0 for "no symptoms" to 10 for "maximum symptoms". A Mann–Whitney U test was used to determine differences between groups.
Results or Clinical Course: 91.6% of Self group patients reported an increase of at least 4 score points, compared to 16.7% of Device group patients. 50.0% and 33.3% of the Device group patients reported no change or a negative change (improvement), respectively. While the N was too small for further analysis, there was an apparent indirect correlation between HAVS severity level. In each instrument, scores ranged from 0 for "no symptoms" to 10 for "maximum symptoms". A Mann–Whitney U test was used to determine differences between groups.

Poster 205
A Customizable, Modular Brace for Carpal Tunnel Syndrome
Michael Politis, PhD (Carpal Pain Solutions, Inc., Palm City, FL, United States)
Disclosures: M. Politis: I Have No Relevant Financial Relationships To Disclose.

Objective: To determine if using a customizable and modular brace design results in more symptomatic relief and satisfaction compared to a generic soft wrist brace among patients with carpal tunnel syndrome.

Design: Randomized, single-blinded, controlled study.

Setting: Subjects' home environment.

Participants: Consented subjects were randomly chosen from Kastoria General Hospital’s database of carpal tunnel syndrome (CTS) diagnoses within the prior 6-12 months. CTS severity ranged from moderate to severe. 81 males (mean age 61) and 73 females (mean age 55) without significant co-morbidities completed the study.

Interventions: Subjects were randomly provided one of two braces; a Generic soft wrist brace or a Micro-Soft Carpal Tunnel Brace. Subjects were instructed to wear their brace nightly, and also daily whenever they anticipated working excessively with their hands. A blinded investigator performed a telephonic survey on each subject at baseline (first day with brace) and at 2 months.

Main Outcome Measures: A modified Michigan Hand Outcomes Questionnaire (MHOQ) was determined CTS severity. The score ranged from 0 for “no symptoms” to 10 for “maximum symptoms”. Subject satisfaction was also surveyed as a separate instrument. Results were analyzed using a Student’s t-test.

Results or Clinical Course: Compared to baseline the MHOQ scores for the Generic group were 86 +/- 27 and 73 +/- 27 for males and females, respectively, at p <.05. In contrast, the MHOQ scores for the Micro-Soft group were 23 +/- 13 and 20 +/- 12 for males and females, respectively, at p <.05. Combined male and female satisfaction rate with the Micro-Soft brace was 86%, in contrast to 48% with the Generic brace. Other ratings in the categories “user friendly”, “ease of customization” and “comfort” were nearly double for the Micro-Soft brace compared to the Generic brace.

Conclusion: I conclude that the Micro-Soft Carpal Tunnel Brace is a highly effective bracing technique for treating carpal tunnel syndrome. Its superior outcome is likely due to its customization capabilities, where a patient can add rigid support anywhere on their limb. It also avoids misapplying a brace, as happens without input from a doctor or other practitioner.

Poster 207
Aminopyridines Improve T25W Testing in Patients with Hereditary Spastic Paraplegia: A Case Series

Benjamin Leshin (Temple/Moss, Philadelphia, PA, United States),
Michael Saulino, MD, PhD

Disclosures: B. Leshin: I Have No Relevant Financial Relationships To Disclose.

Case Description: Three patients with a history of paraparesis, initially diagnosed with multiple sclerosis underwent assessment for ambulation speed (AS) before and after treatment with dalfampridine (4-aminopyridine, 4-AP). All three patients demonstrated improvement in AS by more than twenty percent. All 3 patients were subsequently diagnosed with HSP.

Setting: Outpatient rehabilitation clinic.

Results or Clinical Course: Three patients (2 female, 1 male), ages 43-52 had history of ambulatory impairment due to paraparesis, and were previously diagnosed with multiple sclerosis. All three patients utilized intrathecal baclofen (ITB) therapy for spasticity management. None of the patients were taking oral anti-spasmodic medications. Despite ITB therapy, all three continued to have gait impairment, and two of the three continued to require assistance with a rolling walker. As part of routine clinical care, these patients were treated with dalfampridine. The patients were evaluated using a timed 25 foot walk test (T25W) using home assisted device (if applicable) at their existing ITB dose. Patients then received 10mg dalfampridine twice daily for one month, after which they were retested on T25W with the same assist device. ITB doses and home medications were not changed. Ambulation following dalfampridine therapy demonstrated improvements of 23.8, 22.2, and 25.9 percent improvement in T25W. No adverse effects were observed in these patients. Ambulatory improvement was sustained for at least 12 months in all patients. Subsequent genetic testing revealed that these patients had been misdiagnosed, and were reassigned diagnoses of HSP.

Conclusion: Aminopyridine may improve ambulation speed in patients with history of hereditary spastic paraplegia.

Poster 208
Bone Mineral Density among Individuals with Residual Lower Limb Weakness after Polio

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Maria Cole, Darren C. Rosenberg, DO, Leah Jensen, PT, DPT

Disclosures: B. S. Grill: I Have No Relevant Financial Relationships To Disclose.

Objective: Evidence indicates that individuals with residual lower extremity (LE) weakness after polio have bone mineral density (BMD) deficiencies that may be related to LE muscle weakness. Current protocols on bone densitometry (BDt) measures do not take into consideration that residual muscle weakness after polio may be asymmetrical. The objective of this study was to ascertain whether side of BDt and side of greater LE weakness affect categorization of BMD status.

Design: A retrospective records review.

Setting: Outpatient center

Participants: Individuals with BDt at spine or femoral necks seen at a post-polio center.

Interventions: Not applicable

Main Outcome Measures: T-scores from BDt and the side of greater LE weakness derived from bilateral LE manual muscle testing scores when available.

Results or Clinical Course: Of the 31 eligible individuals, 12 (38.7%) had normal BMD, 15 (48.3%) had low BMD, and 4 (12.9%) were osteoporotic using standard T-score categorization. Of the 26 individuals who had BDt of one or both femoral necks, 8 were tested only on their weaker limb and 7 were tested only on their stronger limb; 11 were tested bilaterally. For those with bilateral BDt, the stronger limb had significantly greater T-scores [mean (SD) = -0.81 (1.14)] than did the weaker limb [mean (SD) = -1.56 (1.02)] with P = .009.

Conclusion: In this small sample of individuals, 61.2% had abnormal BMD based on spine or femoral neck BDt. However, 7 of 26 (26.9%) had BDt done only on their stronger LE. Because T-scores were significantly lower on the weaker LE, testing only the stronger LE may underestimate BMD, leading to under-treatment and thereby to the potential for increased risk of subsequent fracture. Consideration should be given to testing BDt on the femoral neck of the weaker side in individuals with residual LE weakness after polio.

Poster 209
Rapid Functional Recovery in a Patient with Acute Motor Axonal Neuropathy: A Case Report

Rachel Welbel, MD (New York Presbyterian Hospital, New York City, NY, United States), Fabiola I. Reyes, MD, C. David Lin, MD

Disclosures: R. Welbel: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 61-year-old man with a past medical history of hypertension presented to the emergency department with a one day history of bilateral leg weakness. He was vacationing in Mexico and had several days of a febrile, non-bloody diarrheal illness, which resolved 2 days prior to the onset of symptoms. He received 5 days of
IVIG, the first dose was given 2 days after the onset of symptoms. His weakness initially worsened with no muscle contractions in any extremity, tachycardia and decreased PFTs. EMG/NCS performed 2 weeks after onset of weakness found significantly reduced amplitude in all motor nerves tested. Sensory studies were normal. There were absent F waves in all sites tested. Needle examination of multiple muscles revealed reduced recruitment and decreased interference pattern, but no evidence of spontaneous activity. Further testing revealed positive anti-ganglioside Gd1a, Gd1b, Gm1, Asialo-GM1, negative CSF protein and a negative stool campylobacter.

Setting: Acute inpatient rehabilitation unit

Results or Clinical Course: After completion of IVIG, the patient was admitted to the acute inpatient rehabilitation unit. On initial exam, he had areflexia, and trace muscle contractions in all 4 extremities, except for bilateral biceps and triceps strength with gravity removed. At 2 weeks, he regained normal bilateral biceps and trace Achilles reflexes. At 4 weeks, strength improved to anti-gravity with mild to moderate resistance in all muscle groups except for the bilateral toes and hand-grip. By discharge from acute rehabilitation, 6 weeks from onset of symptoms, he had regained full strength in all muscle groups except for left wrist extension and grip strength graded as 4/5. He was ambulating without an assistive device on discharge.

Discussion: This patient had several factors indicating a poorer prognosis including older age, diarrheal illness, and absence of deep tendon reflexes. Despite severe axonal injury and negative predictive factors he had rapid functional recovery. The absence of spontaneous activities on EMG may indicate a less severe form of axonal damage.

Conclusion: Patients with acute axonal motor neuropathy usually have a more severe illness with slower recovery. The absence of spontaneous activities on EMG may be a strong predictor of functional recovery in patients with axonal neuropathy.

Poster 210
Impact of Cognition on Burn Inpatient Rehabilitation Outcomes

Alexander J. Bajorek, MD, MA (Harvard Medical School, Boston, MA, United States), Chloe S. Slocum, MD, Michael Goldstein, PhD, Jacqueline M. Mix, MPH, Paulette Niewczyk, MPH, PhD, Colleen M. Ryan, MD, Jeffrey C. Schneider, MD


Objective: To assess the extent that cognition, as evaluated by cognitive functional independence measure (FIM), impacts inpatient rehabilitation facility outcomes in the burn population.

Design: Retrospective, cross-sectional study of administrative data set.

Setting: Inpatient rehabilitation facilities.

Participants: Data from Uniform Data System for Medical Rehabilitation from 2002 to 2011 for adults with burn injury (N=5085) in the United States.

Interventions: Not applicable

Main Outcome Measures: Total FIM gain, length of stay efficiency, and acute readmission within three days. These results highlight the importance of screening for cognitive deficits. Future work is needed to examine the benefits of cognitive interventions on outcomes in this population.

Poster 211
Severe Parotitis as an Unusual Side Effect of Duloxetine: A Case Report

Angie Lastra, MD (Department of PM&R, Miller School of Medicine at the University of Miami, Miami, FL, United States), Tamar S. Ference, MD

Disclosures: A. Lastra: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 53-year-old Hispanic woman whose past medical history is significant for Fibromyalgia and Depression after working as a detective of a squad that spent September 11 at the morgue in New York City. She had been taking Cymbalta, a serotonin norepinephrine reuptake inhibitor (SNRI), for several years for management of Fibromyalgia with excellent results in reducing pain and improving quality of life. Due to financial burden, she was switched to the generic version of the medication: Duloxetine. Within the next month, she noticed gradual, significant bilateral parotid enlargement and swelling, along with worsening of preexisting xerostomia. Physical examination showed bilateral parotid fullness that was soft, mildly tender, with no palpable mass and no lymphadenopathy.

Program Description: Physical Medicine and Rehabilitation Program

Setting: Ambulatory clinic academic medical center

Results or Clinical Course: Patient’s workup for infectious and autoimmune pathologies was unremarkable. Parotid ultrasound showed small parotid lymph nodes and bilateral glands appeared symmetric with normal echogenicity. The medication was discontinued. The parotid enlargement has persisted, but it stopped progressing and has been unchanged.

Discussion: Duloxetine has been found to be efficacious in the treatment of chronic pain associated with Fibromyalgia and typically has a predictable tolerability profile, with adverse events being transient and mild. This is the first reported case, to our knowledge, of parotid enlargement secondary to generic Duloxetine use. The close proximity of the medication change to the patient’s symptoms onset, along with a negative infectious and autoimmune workup support this case report. Of note, the parotitis may be irreversible, as it has persisted and been stable despite medication discontinuation.

Conclusion: Duloxetine is commonly used in the management of chronic pain conditions like Fibromyalgia. Clinicians need to be aware of the unusual side effect of severe parotitis in patients switching to or using generic version of Duloxetine, as this can act as an additional stress factor for the patient and possibly lead to an irreversible condition accompanied with a significant amount of work up. Patients should be educated and other management options should be offered.

Poster 212
Tibial Nerve Intraneural Tumor Masquerading as Radiculopathy

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Disclosures: B. Leshin: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 38-year-old man presented for electrodiagnostic evaluation of left leg pain and altered sensation of 5 years duration and insidious-onset, with recent worsening symptoms. He described constant burning and stabbing pain in the lateral left foot and toes with associated numbness and tingling. His
symptoms were exacerbated by sitting. Lower limb strength was normal, with decreased light touch and pinprick sensation in the lateral left foot and positive straight leg raise test. Deep palpation of the posterior thigh revealed a subtle nodule that elicited pain radiating to the foot. The left leg nerve conductions included SNAP attenuation by 50% in the sural, 30% in the medial planar and 25% in the lateral planar nerves and prolonged H-reflex. Tibial nerve motor conduction study was normal. Needle EMG of the left abductor digitii minimi quinti and plantar interosseus was normal. The findings suggested a compressive neuropathy of the tibial nerve affecting only the sensory fibers.

Setting: Outpatient rehabilitation clinic.

Results or Clinical Course: Musculoskeletal ultrasound revealed a 2.6x2x2cm soft tissue mass of neurogenic origin in the left tibial nerve, superior to the popliteal fossa, with thickening of the tibial nerve fibers near the mass. MRI confirmed the mass, consistent with a tibial neural sheath tumor such as schwannoma or neurofibroma. Peripheral nerve tumors account for 8-12% of all soft tissue neoplasms. Because they are infrequently seen in electrodiagnostic laboratories and not always palpable, a high index of suspicion may be needed for diagnosis, often requiring MRI and/or ultrasound imaging. This case demonstrates a rare finding of a pure sensory tibial neuropathy due to an intraneural tibial nerve tumor.

Conclusion: Peripheral nerve tumors account for 8-12% of all soft tissue neoplasms. Because they are infrequently seen in electrodiagnostic laboratories and not always palpable, a high index of suspicion may be needed for diagnosis (i.e. younger patients, atypical compression site, prolonged symptoms, insidious onset, no risk factors, etc.), often requiring MRI and/or ultrasound imaging. This case demonstrates a rare finding of a pure sensory tibial neuropathy due to an intraneural tibial nerve tumor.

Poster 213
Bilateral Spastic Equinovarus Treated with Bupivacaine Preoperatively to Determine Tendon Transfer: A Case Report

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Disclosures: E. Yuan: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 39-year-old woman with history of cerebral palsy presented with difficulty ambulating long distances secondary to spastic equinovarus (EQV) deformity of both feet. Pain 7/10. Bilateral (B/L) dorsiflexion (DF) was 0°-5° passively. Plantarflexion (PF) right 30°/left 10°. Modified Ashworth scale (MAS) 3 at the ankles. Strength 4/5 lower extremities except non-testable at ankle secondary to spasticity. Previously managed with Dizapam, Botox, Baclofen and bracing with limited relief of symptoms. Independent with ADLs, occasional single axis cane use and able to work as a waitress. Podiatry recommended surgical correction but the exact mechanism of her equinovarus was difficult to elucidate. Therefore, we performed a bupivacaine (BPV) block to the posterior tibialis in order to assess the cause of the deformity. Injected 40mg of 0.25% BPV and immediately we were able to reduce the feet back to neutral position. This was a clear indication that the EQV deformity was due to soft tissue and not a structurally rigid process as suspected. Patient demonstrates signs of fatigue. Additionally, the patient’s medications and past medical history should be considered prior to starting baclofen. Thrombocytopenia, though an extremely rare adverse reaction, can be corrected by discontinuing Baclofen.

Conclusion: Baclofen has a number of well-known and common adverse reactions, including drowsiness, dizziness, weakness, hypotension and nausea. When initiating Baclofen therapy for spasticity, one should check the complete blood count, especially when the patient demonstrates signs of fatigue. Additionally, the patient’s medications and past medical history should be considered prior to starting baclofen. Thrombocytopenia, though an extremely rare adverse reaction, can be corrected by discontinuing Baclofen.

Poster 215
Unicranial Equinovarus Deformity in a Patient With Spasticity Sparing the Foot: A Case Report

Benjamin Marshall, MD (RIC/Northwestern University School of Medicine, Chicago, IL, United States), Abby Stephens, BS, Christopher Reger, MD

Case Description: The patient was admitted following acute hospital course for exacerbation of her 7 year history of progressive primary autonomic failure (PAF) or Bradbury-Eggleston Syndrome requiring intravenous (IV) control of hypertensive emergency. Her constellation of symptoms had also included tachy-brady syndrome necessitating pacemaker placement, migraines, neurogenic bladder, gastrointestinal motility dysfunction, and recurrent hypertensive urgency episodes. However, she was unable to be discharged home due to severely disabling neurocardiogenic syncope with the inability to tolerate upright posturing and was admitted to inpatient rehabilitation (IPR). On admission she had pre-syncope at 40 degree incline, moderate hospital acquired weakness, low back pain, and was performing self catheterization. She had not tolerated ambulation for several months.

Setting: Academic rehabilitation hospital.

Results or Clinical Course: She progressed well, but slowly and required over one hundred days of IPR. Her course was characterized by initial slow autonomic desensitization with progressively more challenging orthostatic tasks in therapy with intermittent IV fluid requirements and an up titration of oral pressors as well as pacing frequency in coordination with cardiology. Conservative strategies utilized included promoting salt and fluid intake, the use of progressive compression stockings and abdominal binder, and minimizing time spent supine. It became evident that she would be dependent on IV hydration to tolerate upright activities, therefore she had an implantable venous access system placed for home based IV fluid administration. She was discharged home tolerating functional distances for ambulation and could perform stairs.

Discussion: PAF is characterized by isolated autonomic dysfunction without signs of central or peripheral nervous system disease. Some patients progress over time to develop Lewy body (LB) neurodegenerative disorders (i.e. Parkinsonism, LB Dementia, etc.) but generally the course of the disease is marked by a slow progression with prolonged plateaus in symptomology and is treated symptomatically. Conclusion: PAF is a rare but potentially severely debilitating disease that presents as a unique challenge to the physiatrist. This is the first case demonstrating functional and symptomatic benefit from IPR for this condition.

Poster 216
Hydraulic Prosthetic Gait Training with Contralateral Limb Fusion: A Case Report

Cara M. Thomas, MD, MPH (Schwab Rehabilitation Hospital, Chicago, IL, United States), Michelle Gittler, MD


Case Description: This is a case of a 38 year-old refugee from Burma with a right transfemoral amputation and left knee fusion who was evaluated by physiatry for ambulation potential. The patient was in Indonesia when he sustained bilateral lower extremity (LE) fractures after a motor vehicle crash. He developed a right LE thrombus and after failed embolectomy required right transfemoral amputation. Multiple attempts at left LE salvage, including fracture stabilization failed; he developed left knee osteomyelitis and underwent fusion of the left knee. The patient immigrated to the US as a refugee. He required assistance with transfers at the wheelchair level, and wanted to gain functional independence. The patient was fit with a transfemoral prosthesis with hydraulic knee and admitted to acute inpatient rehabilitation.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: In rehabilitation, patient was taught compensatory strategies for sit-to/from-stand, gait and stair performance. The hydraulic knee enabled controlled stand to sit. Patient relied on upper extremity strength using a walker, as well as a lateral right knee to clear the extended left LE during swing through. Ascension of stairs was performed backwards leading with left LE in wide stance followed by controlled weight bearing by hydraulic prosthesis on right limb. Patient descended stairs with forward step to pattern leading with left LE.

Discussion: This is a unique case of advocating for, and obtaining a hydraulic knee as a preparatory prosthesis to enable strategies for ambulation with knee fusion and right transfemoral amputation. Adaptive gait patterns including vaulting, lateral lean, and innovative approaches to stairs resulted in functional independence for this individual.

Conclusion: Individuals with transfemoral amputations and contralateral knee fusion can become successful ambulators using compensatory strategies with appropriate prosthetic components.

Poster 217
Adult Onset Ataxia-Telangiectasia with Left Lower Leg Malignant Sarcoma Requiring Left Knee Disarticulation Amputation: A Case Report

Holly A. Pajor, DO (Schwab Rehabilitation, Chicago, IL, United States), Zainab A. Naji, MD, Mary H. Lawler, MD

Disclosures: H. A. Pajor: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 34-year-old man with recent diagnosis of adult onset ataxia-telangiectasia (A-T) and left lower leg malignant sarcoma presented for a functional evaluation prior to knee disarticulation. The patient was diagnosed with cerebral palsy as an infant but his physical functioning seemed to improve into young adulthood. Approximately 8 years prior to presentation, the patient noticed muscle atrophy with a functional decline. Genetic testing confirmed mutations in the ataxia-telangiectasia mutated (ATM) gene, consistent with a diagnosis of A-T. 1 year prior to presentation he developed a mass on his left lateral leg and biopsy confirmed malignant undifferentiated round cell sarcoma. At presentation prior to planned amputation, he required ankle-foot orthotics (AFOs) and a walker for ambulation. In addition to the mass, physical examination revealed choreoathetoid movement while sitting, ataxic gait upon ambulation, and contractures with intrinsic muscle wasting in the hands.

Setting: Outpatient clinic.

Results or Clinical Course: The patient is scheduled for a knee disarticulation with plan for a prosthesis and subsequent rehabilitation following the amputation. Further developments and description of his course will be discussed.

Discussion: A-T is a rare, neurodegenerative, recessive genetic disorder that is associated with variable immunodeficiency, endocrinopathy, respiratory failure and high risk for malignancy. The ATM gene encodes the ATM protein, a key player in cellular response to DNA damage, increasing the risk for malignancy and limiting chemotherapy treatment options. Our patient has the adult-onset form of A-T, an even more rare and less understood entity. The cancer risk for adult A-T has not been estimated and there are no documented cases of sarcoma in A-T. Furthermore, there are no documented cases of amputation in patients with A-T.

Conclusion: This will be the first documented case of a rehabilitation course and functional outcomes in an adult patient with A-T and left lower leg sarcoma requiring lower limb amputation.

Poster 218
The Effect of Treadmill Exercise on Gait Efficiency During Overground Walking in Adults with Cerebral Palsy

On-Yoo Kim (Department of Rehabilitation Medicine and Research Institute of Rehabilitation Medicine, Seoul, Korea)
Energy efficiency evaluated by O2 cost during overground walking also increased from 28.09 ± 5.32 ml/kg/m to 0.05 ± 0.05 ml/kg/m (P<0.05), whereas O2 rate did not improve significantly after the treadmill walking exercise. On the other hand, gait velocity and O2 cost during the overground walking were not significantly changed in the control group.

Conclusion: Treadmill walking exercise improved the gait efficiency showing decreased energy expenditure during overground walking in adults with CP. The treadmill walking exercise can be an important method for gait training in adults with CP who have higher energy expenditure.

Poster 219
Adult-Onset Pompe Disease with Significant Functional Decline after Prolonged Hospitalization: A Case Report

Kristen McCormick, DO (Rehabilitation Institute of Chicago, Chicago, IL, United States), Alan S. Anschel, MD


Case Description: Patient with 15-year history of Pompe Disease resulting in progressive restrictive lung disease and chronic respiratory failure was admitted to acute care for lower extremity Pyoderma Gangrenosum complicated by sepsis and acute on chronic respiratory failure requiring prolonged mechanical ventilation. He required intermittent Myozyme infusions prior to hospitalization but did not receive the infusions while critically ill. He was transferred to an inpatient rehabilitation facility (IRF) totally dependent for all functional tasks. He was limited primarily by proximal muscle weakness and rapid respiratory compensation with minimal exertion without mechanical ventilation. He was restarted on biweekly infusions of Myozyme and participated in a comprehensive rehabilitation program.

Setting: Inpatient rehabilitation facility.

Results or Clinical Course: Following one month of IRF with Myozyme infusions and intelligent Volume Assured Pressure Support (iVAPS), the patient tolerated more strenuous functional tasks, no longer requiring mechanical ventilation. He improved to Max Assist for many tasks and was discharged home with family.

Discussion: Ezyzmatic supplementation alongside therapeutic exercise is important to the IRF course to promote progression of functional tasks in patients with chronic lysosomal storage diseases and multiple ongoing comorbidities.

Conclusion: Patients with slowly progressive lysosomal storage diseases are rare but become significantly debilitated by conditions that benefit from the multifaceted collaborative approach taken by IRF facilities.

Poster 220
Metronidazole Induced Encephalopathy with Cerebellar and Magnetic Resonance Imaging Findings: A Case Report

Andrea Cordova, MD (Montefiore Medical Center, Bronx, NY, United States), Francis Lopez, MD

Disclosures: A. Cordova: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 60-year-old woman with multiple medical co-morbidities transferred to the acute inpatient rehabilitation unit after a complicated and protracted hospital course including sepsis and epidural extension of a pelvic abscess into the thoracic vertebrae. At the time of the patient’s arrival to the unit, she had been on broad spectrum antibiotics, including Metronidazole, for almost 3 months for the treatment of the thoracic osteomyelitis and epidural abscess. On day 80 of antibiotic therapy, the patient presented with an acute change in mental status, slurred speech, and clumsiness in her hands. Physical examination demonstrated nystagmus on lateral gaze, dysarthria, dysmetria on finger-nose-finger bilaterally, dysdiadochokinesia and alteration in language cadence, which were all concerning for a cerebellar stroke. Initial Computerized Axial Tomography Scan of the Head revealed no acute intracranial findings. A subsequent Magnetic Resonance Imaging (MRI) of the Brain disclosed increased signal involving the dentate nuclei, quadrigeminal plate region, red nuclei, and splenium of the corpus callosum on T2-weighted and FLAIR images without evidence of mass effect, abnormal fluid collection or acute segmental infarct. These findings were consistent with Metronidazole toxicity.

Setting: Acute inpatient rehabilitation unit.

Results or Clinical Course: Metronidazole was immediately discontinued with ensuing near complete resolution of all cerebellar signs and symptoms within 2 days of cessation of therapy. Physical examination on day 3 following termination of Metronidazole revealed no evidence of nystagmus, dysarthria or dysmetria on finger-nose-finger bilaterally and only mild residual clumsiness on fine finger movements bilaterally.

Discussion: Metronidazole is a commonly prescribed antibiotic with potentially severe neurological side effects resulting from toxicity including ataxia, dysarthria and encephalopathy (i.e. cerebellar syndrome). MRI is useful in elucidating the diagnosis of Metronidazole Induced Encephalopathy.

Conclusion: Because metronidazole is such a commonly used antibiotic, physiatrists should be aware of Metronidazole Induced Encephalopathy as a possible differential diagnosis of new onset cerebellar signs and symptoms in the setting of metronidazole therapy.

Poster 221
3 Dimensional (3-D) Printing: A Cost Effective Solution for Improving Global Accessibility to Prosthetics

Kyle Silva, DO (Montefiore Medical Center, Bronx, NY, United States), Hana F. Azizi, MD, Brian W. Lee, DO, David Cancel, MD, Yuxi Chen, MD, Rani C. Kathirithamby, MD


Objective: The primary objective of this abstract is to raise awareness within the rehabilitation community about the use of 3-D printed upper extremity prosthetics as a cost-effective option for increasing accessibility to prosthetic care at a global level. New medical and technological innovations are integral to ensuring affordable access to medical care. 3-D printing involves the addition of successive 2-D layers in order to develop a 3-D construct. Its benefits include the use of cost-effective materials...
Materials in addition to rapid prototyping and design. Over the past five years, major advancements in 3-D printing have been made in the field of prosthetics. Although there is a paucity of high-level research in the literature, proof-of-concept studies have displayed the ability to fabricate passive and body-powered upper extremity prosthetics at a fraction of the cost of traditional prosthetics.

**Design:** A literature review was conducted to perform a cost-comparison of traditional vs. 3-D printed upper extremity prosthetics.

**Case Description:** Not applicable

**Interventions:** Not applicable as this abstract represents a review of literature, proof-of-concept studies have displayed the ability to fabricate passive and body-powered upper extremity prosthetics at a fraction of the cost of traditional prosthetics.

**Setting:** Academic medical center.

**Results or Clinical Course:** The estimated cost of a body-powered upper extremity prosthesis costs $8,000-12,000, while the average partial hand myoelectric prosthesis is $18,700. Available 3-D printed prosthetics for partial hand amputations range from $50-200. A current 3-D myoelectric hand prototype exists with an anticipated goal of fabricating this prosthesis for under $1,000.

**Discussion:** Not applicable

**Conclusion:** 3-D printing is a cost-effective method for producing functional upper extremity prosthetics. With an estimated 10 million individuals worldwide without access to prosthetic use, 3-D printing represents a possible solution to increase accessibility to these devices. The literature is lacking in terms of functional comparisons between 3-D printed and traditional prosthetics. Nonetheless, awareness of 3-D printed options for prosthetics must be increased within the rehabilitation community. By doing so, Physiatrists can adopt a more fiscally responsible approach to prosthetic management and increase the availability of prosthetic care globally.

**Poster 222**

**Unusual Case of Motor Neuropathy Secondary to Herpes Zoster: A Case Report**

All Mirdamadi, MD (Medstar Georgetown University Hospital/National Rehabilitation Hospital, Washington, DC, United States), Cyrus Kao, MD

**Disclosures:** A. Mirdamadi: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 60-year-old woman presented to outpatient rehabilitation setting with a 3-month history of right foot drop, edema and pain. She was diagnosed with breast cancer earlier in the year and was undergoing chemotherapy. She had initially developed skin eruptions over her right buttock, hip, lateral thigh to her big toe and was hospitalized for one week for herpes zoster. Her pain described as “pins-and-needles” progressively worsened over the next several weeks affecting the region affected by shingles rash with concomitant “tightness” in her right gluteal region and over the dorsum of the right foot. Her neuropathic pain was moderately controlled with gabapentin. MRI of the lumbar spine showed encroachment of L5-S1 nerve roots. A neurosurgeon was consulted, and it was concluded the patient’s significant weakness was secondary to herpes zoster given the concordant deficits over the peroneal nerve and rash distribution affecting L5-S1 dermatomes. Her reaction to the infection may have been more extreme because of relative immunosuppression from chemotherapy.

**Setting:** Outpatient physiatry clinic.

**Results or Clinical Course:** On follow-up 8 months after her initial presentation of pain and weakness, patient reported improved function, not needing an ankle foot orthotic for ambulation. Her right dorsiflexion motor improved but was still weak. Pain was well controlled on neuropathic pain medications.

**Discussion:** Herpes zoster usually presents as a self-limiting vesicular rash, often accompanied by sensory involvement such as post-herpetic neuralgia. It is unusual, however for herpes zoster to have motor involvement. A literature search revealed there have been recent isolated case reports of this unusual presentation; some sources have even cited that motor involvement can occur in as much as 3-5% of cases. Motor involvement in herpes zoster is caused by extension of the inflammatory process to the anterior horn motor neurons, with the subsequent development of segmental motor paralysis.

**Conclusion:** While motor involvement in herpes zoster is very rare, it should not be overlooked. Practitioners should be aware of unusual presentations of motor neuropathy as a sequela to herpes zoster causing segmental motor paralysis.

**Poster 223**

**Admission Functional Independence Measure as a Predictor for Transfer to Acute Care Hospital and Discharge Outcomes in Patients Following Left Ventricular Assist Device Placement**

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**Disclosures:** M. B. Sonagere: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To determine factors affecting improvement of functional capacity in patients admitted to acute inpatient rehabilitation after left ventricular device (LVAD) implantation.

**Design:** Retrospective cohort study.

**Setting:** An inpatient rehabilitation unit (IRU) within an urban academic tertiary care medical center.

**Participants:** 32 patients were admitted for inpatient rehabilitation after LVAD.

**Interventions:** Not applicable

**Main Outcome Measures:** 1. Functional Independence Measures (FIM): a) score at Discharge, b) efficiency of change, 2. Length of stay (LOS), 3. Discharge destination.

**Results or Clinical Course:** The study included 32 patients, 75% of which were male, with a mean age of 62.8 years old +/- standard deviation [SD] (9.5 years). Admission FIM scores for patients that completed their inpatient rehabilitation course to be discharged to home (uninterrupted stay) and patients requiring transfer back to acute care hospital (interrupted stay) was significantly different (71 vs 57, p<.05). The mean inpatient rehabilitation length of stay for patients with an uninterrupted stay was 14.3 days versus 15.1 days for those with an interrupted stay. Discharge FIM score for patients with an uninterrupted versus interrupted rehabilitation course was also statistically significant (97 vs 72, p<.004). The FIM efficiency score for patients in the former group of patients was also greater, although did not reach statistical significance (2.15 vs 1.43).

**Conclusion:** Patients admitted to acute rehabilitation units with lower admission FIM scores have a statistically significant higher rate of readmission to acute care, slower rates of functional improvement and lower overall level of independence at the time of discharge.

**Poster 224**

**Effective Acute Inpatient Rehabilitation for Antisynthetase Syndrome: A Case Report**

Jeffrey Cara (Northwestern University/Rehabilitation Institute of Chicago, Chicago, IL, United States), Mark Huang, MD

**Disclosures:** J. Cara: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 61-year-old, previously healthy man with persistent nonproductive cough, fevers to 102 F, and progressive dyspnea on exertion was admitted to the MICU in hypoxemic respiratory failure.
with acute respiratory distress syndrome. An eventual diagnosis of Anti-Jo-1 antisynthetase syndrome (AS) with myositis prompted treatment with IV steroids, IVIG, and tacrolimus. Complications included hypotension requiring multiple pressors, acute kidney injury, acute tubular necrosis, non-ischemic facial droop, and profound proximal muscle weakness. Upon PM&R consultation, initial neurologic examination was notable for 1/5 shoulder abduction bilaterally, 2/5 hip flexion bilaterally, and 3/5 knee flexion and extension bilaterally. Although distal muscles were stronger, 5/5 strength was absent in the remaining 9 areas tested. PT evaluations revealed maximal assist for static standing and maximal assist times 2 for dynamic standing, sit-to-stand, and stand-to-sit. OT evaluations revealed moderate to maximal assist for activities of daily living and sitting balance, maximal assist times 2 for bed mobility, and total assist for transfer to chair via lift.

**Setting:** Inpatient rehabilitation hospital.

**Results or Clinical Course:** The patient underwent 3 weeks of focused physical and occupational therapy resulting in significant functional gains. At discharge, he demonstrated modified independence for transfers, setup for surface ambulation of 772 feet using a rolling walker, and close supervision for ambulation of 20 stairs using a side rail. Per OT, he achieved complete independence for eating; modified independence for upper and lower body dressing; distant supervision for grooming, bathing, toileting, and bathtub transfers; and close supervision for toilet transfers.

**Discussion:** AS is a rare condition associated with myositis and interstitial lung disease. Despite medical treatment, 90% of AS patients suffer moderate to marked reduction of activities, yet little has been written about the utility of rehabilitation. This case was notable for significant functional improvement over 3 weeks of intensive rehabilitation.

**Conclusion:** This patient’s functional improvement demonstrated the significant rehabilitation potential for patients with AS myositis.

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**Poster 225**

**A Complicated Case of a 24-Year-Old Man with Disseminated Histoplasmosis and Subsequent Development of Bacterial Brain Abscesses Following Subcarinal Lymph Node Biopsy: A Case Report**

Matthew Hasley, DO (UT Southwestern Medical Center, Dallas, TX, United States)

Disclosures: M. Hasley: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A healthy 24-year-old Caucasian man developed intermittent urinary retention and numbness and weakness in his legs. He was diagnosed with transverse myelitis based on imaging findings and improvement on steroids. Four months later he developed hemorrhagic papilledema with headache and neck pain, diplopia, dizziness, and vomiting. Brain imaging revealed abnormal leptomeningeal enhancement and a subcarinal mass was found in his chest. Biopsy was unremarkable. However his cerebrospinal fluid returned positive for Histoplasmosis. He was placed on Itraconazole and prednisone with improvement of symptoms. Six months later his symptoms returned with increasing functional and cognitive decline. New chest imaging and an esophagogram confirmed a fistula between the esophagus and the subcarinal mass secondary to his previous biopsy. Brain imaging revealed multiple brain abscesses with ventriculitis thought to be disseminated Histoplasmosis based on preceding clinical findings. Biopsy of the abscess was negative. However, improvement with antibiotics confirmed bacterial origin.

**Setting:** Tertiary Care Academic Inpatient Rehabilitation facility.

**Results or Clinical Course:** On admission to our rehabilitation unit he was dependent in most activities of daily living (ADLs) and severely debilitated. His right arm and bilateral legs had less than antigravity strength. He made considerable improvement clinically and functionally demonstrating ability to propel a wheelchair 300 feet and standing with assistance. He still requires assistance for most ADLs including moderate to maximum assistance for transfers and bed mobility. Presently the patient remains in the rehabilitation unit after 11 weeks.

**Discussion:** This is a rare case of a complication from a minor surgical procedure causing an esophageal fistula seeding abscesses to the brain in the setting of previously diagnosed histoplasmosis. A literature search did not reveal any similar cases with this combination. Fortunately he has improved functionally through inpatient rehabilitation.

**Conclusion:** Any medical procedure is not without risks. Rare complications occur and can cause significant morbidity. Our comprehensive inpatient rehabilitation program has improved this patient’s function considerably since his admission.

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**Poster 226**

**Cystathionine-Beta-Synthase Mutation: An Overlooked Cause of Dyskinesia: A Case Report**

Monique Diaz, MD (Midwest Rehabilitation Associates, Joliet, IL, United States)

Disclosures: M. Diaz: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 62-year-old woman was diagnosed with Parkinson’s Disease (PD) after months of spontaneous arm movements, hand tremor, bradykinesia, cogwheel rigidity, bladder urgency, and impaired cognition. She was simultaneously diagnosed with peripheral neuropathy and anxiety.

**Setting:** Private practice, out-patient.

**Results or Clinical Course:** Prior to onset of symptoms, patient was independent for both mobility and activities of daily living (ADLs). With tremors and bradykinesia she was supervision to contact guard assist for mobility and ADLs. She underwent physical therapy for balance and gait training and was noted to have fluctuating symptoms that seemed inconsistent with the typical course of PD. Diet appeared to affect the severity of disease, and a trial-off of rasagline was performed. While using an elimination diet the patient was able to regain fluidity in body movements attributed to avoidance of certain foods and continued range of motion exercises, but had occasional setbacks. Incidental genetic testing revealed a homozygous Cystathionine-Beta-Synthase mutation, specifically C699T. She was subsequently put on a more specific diet (mainly low sulfur) to avoid build-up of upstream metabolites. Assessment/Results: Following a personalized diet informed by biochemistry, the patient’s mobility and ADLs were upgraded to independent, there was cessation of both tremors and rigidity, and mood and memory improved per caretaker survey. Bladder urgency and neuropathy persisted.

**Discussion:** Metabolic derangement as a result of genetic mutations are not yet part of a standard workup for dyskinesia. Thus it is unknown how many cases of so-called Parkinson’s could be treated with changes to diet and/or supplementation with essential enzyme cofactors. As genetic testing becomes more commonplace, clinicians will need to be mindful of the potential for alternative diagnoses in cases such as dyskinesia or ataxia. Knowledge of corrective treatments is essential to management.

**Conclusion:** Cystathionine-Beta-Synthase mutation is a potential cause for dyskinesia, and dietary restrictions may significantly improve mobility and ADLs as evidenced by this patient case.

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**Poster 227**

**Test-Retest Reliability of the Rating Scale Self-Reported Impairments in Persons with Late Effects Polio (SIPP)**

Jan Lexell, MD, PhD (Lund University, Lund, Sweden), Christina Brogdårdh, PhD, RPT

Disclosures: J. Lexell: Research Grants - Various Swedish government and private research foundations; Non-remunerative Positions of Influence - Swedish Paralympic Committee
Abstracts / PM R 7 (2015) S83-S222

Objective: To evaluate the test-retest reliability of the rating scale Self-reported Impairments in Persons with late effects Polio (SIPP) and to define limits for the smallest change that indicates a real change, both for a group of individuals and a single individual.

Design: Postal survey.

Setting: University hospital outpatient program for people with late effects of polio.

Participants: 51 persons (31 men and 20 women; mean age 72 years) with clinically and electromyographically verified late effects of polio.

Interventions: Not applicable

Main Outcome Measures: The rating scale Self-reported Impairments in Persons with late effects Polio (SIPP) consists of 13 items (impairments) typical of and directly related to late effects of polio, but also impairments that are commonly reported by the patients and indirectly related to their prior polio. The participants responded twice to the SIPP, two weeks apart. Response frequencies at test occasion 1 (T1) and test occasion 2 (T2) were calculated. Test-retest reliability was analyzed by the percentage agreement (PA) of each item, the intra-class correlation coefficient (ICC), the mean difference between the test sessions together with the 95% confidence intervals the mean difference, the standard error of measurement (SEM), the smallest real difference (SRD) and a Bland & Altman graph.

Results or Clinical Course: The PA (same scoring at both test occasions) was >70% for 10 of 13 items. The mean score (SD) was 27.9 (5.7) points at T1 and 28.2 (6.0) points at T2, with no systematic difference between test occasions. The ICC was 0.88, the SEM (the smallest change for a group of individuals) was 2.0 points, and the SRD (the smallest change for a single individual) was 5.6 points, respectively.

Conclusion: The Self-reported Impairments in Persons with late effects Polio (SIPP) has previously been Rasch analyzed and shown good construct validity and internal consistency. This additional analysis of the scale’s psychometric properties shows that the SIPP is a reliable rating scale in persons with late effects of polio. It can therefore be used to evaluate effects of rehabilitation interventions and changes of perceived impairments over time, both for a group of individuals and for a single individual.

Poster 228

Men with Late Effects of Polio Decline More Than Women in Lower Limb Muscle Strength: A 4-year Longitudinal Study

Jan Lexell, MD, PhD (Lund University, Lund, Sweden), Christina Brogårdh, PhD, RPT, Ulla-Britt Flansbjer, PhD

Disclosures: Research Grants - Various Swedish government and private research foundations; Non-remunerative Positions of Influence - Swedish Paralympic Committee

Objective: To assess changes in lower limb muscle strength annually over 4 years in persons with late effects of polio and to identify prognostic factors for changes in muscle strength.

Design: Prospective, longitudinal study.

Setting: University hospital outpatient program for people with late effects of polio.

Participants: 52 ambulant persons (28 men and 24 women; mean age 64 years, SD 6) with clinically and electromyographically verified late effects of polio.

Interventions: Not applicable

Main Outcome Measures: Isokinetic concentric knee extension, knee flexion and ankle dorsiflexion muscle strength and isometric knee extension and ankle dorsiflexion muscle strength were measured with a Biodex® Multi-Joint System 3 PRO dynamometer. All participants were tested annually over four years (a total of five times) and as close as possible to one year between each test. Mixed Linear Models were used to analyze changes in muscle strength and to identify determinants among the covariates gender, age, age at acute polio infection, time with late effects of polio, body mass index and estimated baseline muscle weakness.

Results or Clinical Course: For the men there were significant linear effects of time for all knee muscle strength measurements (from -1.4% for less affected isokinetic knee flexion; P<.05 to -4.2% for more affected isokinetic knee extension per year; P<.001), and for two ankle dorsiflexor muscle strength measurements (-3.3% to 1.4% per year; P<.05). For the women there was a significant linear effect of time only for ankle dorsiflexor measurements (4.0% to 5.5% per year; P<.01). Gender was the strongest factor that predicted a change in muscle strength over time.

Conclusion: Little is known about prognostic factors for changes in lower limb muscle strength in persons with late effects of polio. This prospective, longitudinal study of muscle strength revealed only small changes in muscle strength over the four year period. The strongest predictor of change in lower limb muscle strength was the participants’ gender. Men declined more in muscle strength than women, especially in the knee muscles, but the rate of the decline did not accelerate over time.

Poster 229

Soft Tissue Sarcoma Affecting the Right Shoulder of a Man with Paraplegia from a Remote Traumatic Spinal Cord Injury: A Case Report

Colin K. Franz, MD, PhD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Gayle R. Spill, MD

Disclosures: C. K. Franz: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 50-year-old man with history of complete paraplegia from a remote traumatic T6 spinal cord injury presented with a painful right shoulder mass. MRI revealed a heterogeneously enhancing mass that involved the right deltoid and pectoralis major muscles. Core biopsy demonstrated a spindle cell sarcoma. Physiatry and Surgical Oncology were consulted.

Setting: Tertiary hospital.

Results or Clinical Course: Prior to admission the patient lived alone in an accessible apartment. He had diffuse weakness throughout the right arm, which was at least partly related to pain guarding. He had decreased pin prick sensation and paresthesias in digits 3-5. He was not able to perform transfers to or from his manual wheelchair. Oncology recommended treatment for his tumor with a course of outpatient radiation therapy followed by gross total resection. Despite the possibility of losing his previous level of independence he ultimately opted to proceed with aggressive oncology treatment. He began intensive inpatient rehabilitation after he was given clearance to weight bear through his arm. Currently he is able to perform some simple transfers and manual wheelchair self-propulsion at a supervision level. Further developments will be discussed.

Discussion: Soft tissue sarcomas of the extremity are uncommon. To our knowledge there are no published cases of them occurring in a patient with a traumatic spinal cord injury. The Physiatry pre-operative consult focused heavily on functional prognostication as the potentially curative Oncology treatment plan put him at risk for severe functional detriment. We happily report that the patient is progressing towards his goal of returning back to his apartment with modified independence.

Conclusion: As patients with chronic spinal cord injury live longer, they are at risk for developing cancers and the functional impairment that can be caused by cancer and its treatment. This case illustrates the crucial role a Physiatrist specializing in Cancer Rehabilitation can play in both the functional prognostication and restoration of function.
for patients with chronic spinal cord injury patients who develop cancer.

Poster 230  
Paraneoplastic Cranial Nerve Palsies as the Initial Presentation of Sarcomatoid Carcinoma of the Lung: A Case Report  
Tracy J. Eicher, MD, Sean A. Lacey (Lake Erie College of Osteopathic Medicine - Bradenton Campus, Louisville, KY, United States)  
Disclosures: S. A. Lacey: I Have No Relevant Financial Relationships To Disclose.  
Case Description: A 79-year-old man consulted his doctor because of dysarthria, dysphagia, blurred vision, pain in the left eye, and pruritus accompanying shooting pains in the left V2 dermatome distribution. After admission to the hospital, the patient's symptoms worsened to include bilateral lateral gaze palsy and ptosis. Non-contrast CT scan of the head, CT angiography of the head and neck, CT scan of the abdomen and pelvis, autoimmune panels, lumbar puncture, and infectious disease titers were all negative. There was a persistent absolute neutrophilia, polypharmacy resistant hypertension revealed to be caused by renal artery stenosis, an M-spike on SPEP determined to be MGUS, and a 6mm noncalcified pulmonary nodule on the posterior aspect of the right upper lobe accompanied by a 2.6cm carinal mass, which was then attributed to lymphadenopathy. The patient underwent seven rounds of plasmapheresis, which led to complete resolution of his cranial nerve symptoms by hospital day 24. 45 days later, the patient noticed the onset of similar progression of cranial nerve involvement, and was admitted again after presenting to the ED with the complaint of severe nausea and vomiting. Two weeks into his second hospital stay, he was treated with an additional five rounds of plasmapheresis, without considerable improvement. He was then transferred to a different hospital, where a PET scan was performed, revealing hypermetabolic right subcarinal lymphadenopathy and a hypermetabolic right upper lobe nodule. The nodule was biopsied and revealed to be sarcomatoid carcinoma.  
Setting: In-patient neurology wards.  
Results or Clinical Course: At 2 weeks post diagnosis, the patient had initiated treatment with chemotherapy at a nearby cancer hospital. Additional developments will be discussed.  
Discussion: To our knowledge, this is the first reported case of sarcomatoid cancer presenting with immune mediated paraneoplastic cranial nerve palsies. Small cell carcinoma has been described as affecting the peripheral nerves as a paraneoplastic syndrome, but this is the first documented case of sarcomatoid lung cancer having such a paraneoplastic syndrome.  
Conclusion: A mononeuritis multiplex appearing clinical presentation may be the initial symptomatology of an occult malignancy.

Poster 231  
Paraneoplastic Syndrome Presenting As Gait Abnormality and Sensory Polyneuropathy: A Case Report  
Yana Abayev, DO (Saint Charles Rehabilitation Center, Port Jefferson, NY, United States), Jennifer M. Gray, DO, Jessica Engle, DO, Jun Zhang, MD  
Disclosures: Y. Abayev: I Have No Relevant Financial Relationships To Disclose.  
Case Description: A 63-year-old man with history of testicular cancer and presumed Guillain Barre Syndrome (GBS) 3 months prior presented with worsening numbness, weakness and paresthesias on his right side associated with loss of coordination and unsteady gait. He received IVIG for treatment of presumed GBS without improvement. A right-sided hilar mass was identified on chest x-ray. He underwent right thoracotomy with right middle and lower lobectomies. Post-operatively, patient experienced respiratory insufficiency, lower extremity weakness and sensory polyneuropathy was found on EMG. Examination revealed reduced strength and severe sensory loss in bilateral lower extremities, loss of coordination, loss of proprioception, dysmetria and unsteady gait. He had 5/5 strength in both upper extremities and 2+/4 reflexes throughout.  
Setting: Acute care community hospital  
Results or Clinical Course: Biopsy of the hilar mass revealed neuroendocrine B-cell cancer, and he tested positive for anti-neuronal and anti-Hu antibodies. Throughout his rehabilitation course, he made functional gains including independence in ambulation, grooming, bathing and transfers with a FIM gain of 33. Treatment with excision, chemotherapy, and radiation for small cell lung cancer led to improvement in functional status without improvement in sensory deficits.  
Discussion: Paraneoplastic disorders can be confused with GBS and other neurological syndromes. They are triggered by an altered immune system response to malignancy. Signs and symptoms develop over days to weeks. Antibodies such as anti-Hu, CV2, Ma2, and amphiphysin can be detected. Scant data is available regarding rehabilitation outcomes in such patients. There is a trend to suggest that treatment of the underlying malignancy is successful at halting progression of the sensory polyneuropathy and is associated with improvement in functional status.  
Conclusion: Paraneoplastic syndrome secondary to anti-Hu antibodies is seen in association with sensory polyneuropathy. Prompt recognition of paraneoplastic syndrome is essential to initiate effective treatment of the underlying malignancy and facilitate return of function.

Poster 232  
Severe Sciatic Nerve Palsy from a Gluteal Hematoma after Scoliosis Surgery: A Case Report  
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Case Description: A 59-year-old woman underwent elective posterior spinal fusion, T2 to ilium with bilateral skeletal femoral traction, for progressive scoliosis. There was significant intra-operative blood loss. Peri-operative neurophysiologic monitoring and post-operative neurological examination were normal. On post op day 1, she had persisting anemia with back pain and pain to her right thigh and buttock. A retropertoneal hematoma was suspected. CT scan revealed a large (11cm x 6.4 cm x 4 cm) hematoma within the right gluteus medius muscle. On post-op day 2 she developed a complete right-sided sciatic nerve palsy. Angiography did not reveal a target for embolization and so the hematoma was emergently surgically evacuated. An actively bleeding artery, at the level of the greater trochanter, was identified and ligated. The sciatic nerve was found severely compressed.  
Program Description: Orthopaedic Spine Surgery & Physical Medicine and Rehabilitation.  
Setting: Quaternary academic teaching hospital.  
Results or Clinical Course: Post-operatively she was transferred to inpatient rehabilitation. At 10 weeks post-op, electrodiagnostic studies, demonstrated active denervation with no voluntary recruitment of tibialis anterior, peroneus longus, medial gastrocnemius and long head of biceps femoris. Gluteus medius (superior gluteal nerve) was also involved. Patient was fitted with an ankle-foot orthosis (AFO) for foot drop. She had neuropathic pain and was showing early signs of chronic regional pain syndrome (CRPS).  
Discussion: This is the first report of sciatic nerve palsy due to a compressive gluteal hematoma following scoliosis spine surgery. The etiology for this complication is unclear.  
Conclusion: Gluteal hematoma should be considered in the differential diagnosis of delayed unilateral neurological deficit, particularly in
the context of persistent postoperative anemia. A sciatic nerve injury of this nature may result in significant disability.

Poster 233
Median and Radial Neuropathy Following Visceral Chemotherapy Extravasation: A Case Report

Isaac P. Syrop (New York Presbyterian Columbia/Cornell, New York, NY, United States), Katherine V. Yao, MD, Christian M. Custodio, MD

Disclosures: I. P. Syrop: I Have No Relevant Financial Relationships To Disclose.

Case Description: For the treatment of recurrent well-differentiated liposarcoma of the abdomen, a 65-year-old man was treated with a course of intravenous (IV) gemcitabine/docetaxel. Following infusion of docetaxel via a left antecubital IV catheter, the patient noticed redness surrounding the IV insertion site. Erythema worsened over the next week, associated with pain and weakness in the left hand, specifically in the first and second digits. Over the next month, the erythema improved while the weakness worsened. At four weeks post extravasation, the patient presented to an outpatient rehabilitation center. Physical examination was pertinent for LUE strength of 4/5 in wrist extension/flexion, 4-/5 in extension/flexion of digits 1, 2, 3 and near normal strength of digits 4 and 5. Sensation was decreased in both the palmar and dorsal aspects of the left hand, most noticeably in digits 1 and 2. The patient was prescribed OT for strengthening and ROM of the LUE and referred for electrodiagnostic studies.

Setting: Academic outpatient rehabilitation center.

Results or Clinical Course: At 6 weeks post extravasation, the patient had electrodiagnostic studies performed. Findings were consistent with chronic, incomplete, left median and radial mononeuropathies at the elbow, with the median more affected compared to the radial nerve. These findings were superimposed over a mild, more generalized, sensorimotor polyneuropathy.

Discussion: This is the first reported case, to our knowledge, of a median and radial neuropathy secondary to docetaxel extravasation. Compressive peripheral neuropathy has been shown to occur with IV extravasation, however there is sparse literature describing neuropathy resulting from chemically noxious injuries from extravasation of chemotherapeutic agents. This case adds to the overall literature of vesicant chemotherapy complications.

Conclusion: Median and radial neuropathies are a potential side effect secondary to extravasation of docetaxel when infused using antecubital IV access.

Poster 234
Vaginal Numbness and Sexual Dysfunction as Presenting Symptoms of a Grade III L6-S1 Spondylolisthesis: A Case Report

Reina Nakamura, DO (Rutgers New Jersey Medical School, Upper Montclair, NJ, United States), Jeffrey L. Cole, MD

Disclosures: R. Nakamura: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 46-year-old woman was referred for electrodiagnostic evaluation for complaint of progressive vaginal numbness and sexual dysfunction for 2-3 years. Past medical history was significant for mild rectocele. MRI showed severe degenerative changes at the lumbosacral junction, sharp angulation of the coccyx, and scarring around bilateral pudendal nerves at Alcock's canal. The patient did not initially recall history of trauma, however upon further questioning, remembered a remote accident in which she fell down a flight of stairs. Physical examination was significant for virtually no movement at L5/S1 junction, decreased vaginal sensation, and positive Tinel's sign at Alcock's canal with radiation towards the spine rather than the vagina. Sensation to S2-3 dermatomes was normal. Electrodagnosis showed evidence of bilateral L5 radiculopathy, bilateral collateral sprouting of the paraspinals at S1, bilateral partial denervation potentials of S2-4, and normal bilateral pudendal nerve terminal motor latencies. Given these findings, a more proximal process was suspected. Lumbar spine x-rays were obtained, revealing a spina bifida occulta, and grade III spondylolisthesis at L6-S1.

Setting: Outpatient physiatry office.

Results or Clinical Course: The patient underwent L6-S1 decompression, partial reduction of spondylolisthesis, and spinal fusion. She fully recovered vaginal sensation 3 months later.

Discussion: To our knowledge, this is the first case of a L5-S4 radiculopathy manifesting as vaginal numbness without additional neurological signs or symptoms.

Conclusion: Vaginal numbness and sexual dysfunction may be the only presenting symptom of a lumbosacral radiculopathy.

Poster 235
Exertional Rhabdomyolysis as the Presenting Symptom of Metabolic Myopathy, an Opportunity for Interdisciplinary Care: A Case Report

James Liadis, MD (Medstar National Rehabilitation Hospital, Washington, DC, United States), Caroline Sizer, MD

Disclosures: J. Liadis: I Have No Relevant Financial Relationships To Disclose.

Case Description: A healthy 24-year-old woman performed a short series of squats and developed muscle soreness. The soreness worsened throughout the following day and was accompanied by dark urine, prompting medical evaluation. She was diagnosed with exertional rhabdomyolysis, requiring ICU care. Further history revealed subclinical proximal weakness for years, prompting EMG and muscle biopsy, which pointed towards a metabolic myopathy. Genetic testing is pending. The patient presented to physical medicine and rehabilitation clinic for recommendations regarding safe activity resumption and optimization of function.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: Appreciating the risk for recurrent exercise induced rhabdomyolysis, the patient was instructed on submaximal, brief physical activity with adequate rest and appropriate nutritional support. She was educated on activity precautions to prevent further loss of function. Through collaboration with a neuromuscular physical therapist, the patient began a program for energy conservation and initiation of aerobic exercise. Coordination with her neurologists allowed the interdisciplinary team to maximize her function and allow her to return to college to complete her studies.

Discussion: Rhabdomyolysis, which recurs or occurs with minimal exertion, should raise suspicion of underlying metabolic myopathy. Such patients should be queried on risk factors and previous symptoms, and should receive further diagnostic evaluation. The risk of recurrence and potential complications including acute renal failure, require cautious and structured return to physical activity. The ideal management is via a multispecialty approach which pairs treatment with activity resumption to maximize functional outcome.

Conclusion: Metabolic myopathies predispose patients to exertional rhabdomyolysis. This condition highlights the importance of the interdisciplinary rehabilitation team’s role in maximizing functional outcomes while minimizing risk of complications.

Poster 236
Neoplastic Upper Trunk Brachial Plexus Lesion with Normal Sensory Nerve Conduction Studies: A Case Report

Lisa Williams, MD (Stanford University, Stanford, CA, United States), Joshua H. Levin, MD

Disclosures: L. Williams: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 79-year-old woman with a history of diffuse B-cell lymphoma was referred for electrodagnostic evaluation of acute onset proximal right upper limb pain and weakness after successful completion of chemotherapy treatment. Needle electromyography demonstrated severe abnormalities in upper trunk innervated muscles, without abnormalities in the serratus anterior or cervical paraspinal muscles. Nerve conduction studies revealed normal and symmetric median sensory and lateral antebrachial cutaneous sensory nerve conduction responses. Subsequent MRI of the brachial plexus and PET scan showed interval development of a hypermetabolic neck mass engulfing the entire brachial plexus.

Setting: Tertiary Ambulatory Physical Medicine and Rehabilitation Center.

Results or Clinical Course: The patient continued to demonstrate decreased strength of the right upper extremity despite regular physical therapy and radiation treatments. She is scheduled for a positron emission tomography–computed tomography (PET/CT).

Discussion: To the best of our knowledge, the current case is the first reported case of an upper trunk neoplastic brachial plexopathy with normal sensory nerve conduction studies. A possible explanation of this may be neurolymphomatosis (NL). NL is a rare disease in which neurotropic neoplastic cells infiltrate central and/or peripheral nervous tissue. It is most commonly associated with diffuse B-cell lymphoma. In the current case, we cannot rule out an isolated mass effect on the motor fibers of the upper trunk of the brachial plexus. However, we propose that neurolymphomatosis may be the etiology of the plexopathy, and that this may explain the normal sensory nerve conduction studies through an unknown mechanism.

Conclusion: Electrodagnostic studies may be valuable in contributing to the diagnosis and prognosis of neoplastic brachial plexus lesions. However, the neuro-physiological characteristics of neurolymphomatosis of brachial plexopathies are unknown. Further investigation is needed.

Case Description: A previously healthy 16-year-old male was referred for electrodagnostic workup of right upper extremity weakness in elbow flexion (EF) and shoulder abduction (SA). This began three weeks prior; while dancing at a festival, he was knocked to the ground when a crowd surfer fell onto his head. He denies loss of consciousness, and an emergent CT of the head was negative for pathology.

Setting: Outpatient rehabilitation clinic

Results or Clinical Course: Initial examination showed weakness in EF and SA, with full strength otherwise. Sensory examination was normal. Right upper extremity sensory nerve conduction studies (NCS) were abnormal for low amplitude, but normal peak latency, of the lateral antebrachial cutaneous (LAC) nerve. Needle electromyography (EMG) demonstrated 1+ fibrillation potentials and 2+ positive sharp waves (PSW) in both the deltoid and biceps, along with a decreased recruitment pattern in the deltoid. The patient was prescribed physical therapy and returned for follow-up three months later, at which time he had regained full EF strength and some SA strength. NCS of the LAC now demonstrated slightly slowed peak latency and low amplitude. The biceps was now normal on needle EMG. However, the deltoid was still positive for 2+ fibrillations and 2+ PSWs, though now with a normal recruitment pattern.

Discussion: Traumatic injuries are the most common cause of brachial plexopathy in children. Literature about the natural history is limited, and few studies have been published that demonstrate electrodiagnostically-confirmed improvement of a brachial plexus injury following non-operative treatment. Our patient’s initial studies demonstrated an injury to the lateral cord. Repeat studies, following three months of conservative therapy, demonstrated objective improvement of the biceps. Though the LAC seemed worse on follow up studies, this could be attributed to completion of Wallerian degeneration.

Conclusion: More studies are needed to assess non-operative treatment of traumatic brachial plexus injuries.

Poster 237
Crowd Surfing-Induced Brachial Plexopathy: A Case Report

Zainab A. Naji, MD (Schwab Rehabilitation Hospital, Chicago, IL, United States), Holly A. Pajor, DO, Edward Park, MD

Disclosures: Z. A. Naji: I Have No Relevant Financial Relationships To Disclose.

Case Description: To the best of our knowledge, the current case is the first reported case of an upper trunk neoplastic brachial plexopathy with normal sensory nerve conduction studies. A possible explanation of this may be neurolymphomatosis (NL). NL is a rare disease in which neurotropic neoplastic cells infiltrate central and/or peripheral nervous tissue. It is most commonly associated with diffuse B-cell lymphoma. In the current case, we cannot rule out an isolated mass effect on the motor fibers of the upper trunk of the brachial plexus. However, we propose that neurolymphomatosis may be the etiology of the plexopathy, and that this may explain the normal sensory nerve conduction studies through an unknown mechanism.

Conclusion: Electrodagnostic studies may be valuable in contributing to the diagnosis and prognosis of neoplastic brachial plexus lesions. However, the neuro-physiological characteristics of neurolymphomatosis of brachial plexopathies are unknown. Further investigation is needed.

Case Description: A previously healthy 16-year-old male was referred for electrodagnostic workup of right upper extremity weakness in elbow flexion (EF) and shoulder abduction (SA). This began three weeks prior; while dancing at a festival, he was knocked to the ground when a crowd surfer fell onto his head. He denies loss of consciousness, and an emergent CT of the head was negative for pathology.

Setting: Outpatient rehabilitation clinic

Results or Clinical Course: Initial examination showed weakness in EF and SA, with full strength otherwise. Sensory examination was normal. Right upper extremity sensory nerve conduction studies (NCS) were abnormal for low amplitude, but normal peak latency, of the lateral antebrachial cutaneous (LAC) nerve. Needle electromyography (EMG) demonstrated 1+ fibrillation potentials and 2+ positive sharp waves (PSW) in both the deltoid and biceps, along with a decreased recruitment pattern in the deltoid. The patient was prescribed physical therapy and returned for follow-up three months later, at which time he had regained full EF strength and some SA strength. NCS of the LAC now demonstrated slightly slowed peak latency and low amplitude. The biceps was now normal on needle EMG. However, the deltoid was still positive for 2+ fibrillations and 2+ PSWs, though now with a normal recruitment pattern.

Discussion: Traumatic injuries are the most common cause of brachial plexopathy in children. Literature about the natural history is limited, and few studies have been published that demonstrate electrodiagnostically-confirmed improvement of a brachial plexus injury following non-operative treatment. Our patient’s initial studies demonstrated an injury to the lateral cord. Repeat studies, following three months of conservative therapy, demonstrated objective improvement of the biceps. Though the LAC seemed worse on follow up studies, this could be attributed to completion of Wallerian degeneration.

Conclusion: More studies are needed to assess non-operative treatment of traumatic brachial plexus injuries.

Poster 238
Acute Rehabilitation of Anti-NMDA Receptor Encephalitis in a Child: A Case Report

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Disclosures: D. Barayeva: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 6-year-old African American boy presented with a one month history of multiple hospital admissions due to vomiting, upper respiratory symptoms and new onset seizures. He presented to our institution with hallucinations and increasing agitation. MRI of the brain was normal. Lab testing revealed anti- NMDA receptor antibodies consistent with the diagnosis of anti-NMDA receptor encephalitis. Patient was given two rounds of IVIG, systemic steroids, and weekly rituximab for three weeks. He was treated for mycoplasma pneumonia with a five day course of azithromycin. He was medically stabilized and admitted for acute inpatient rehabilitation. On admission, the patient was found to have a flat affect, brisk reflexes and ankle clonus. His course was further complicated by facial and lower extremity dyskinesias, somniolougy, night terrors and somnambulism.

Setting: Tertiary care hospital.

Results or Clinical Course: The patient received physical, occupational and speech therapy during his hospital stay as well as neuropsychological evaluation. Upon discharge he was able to ambulate distances greater than 150 feet with contact guard and axatic gait. He made impressive gains in rehabilitation with a discharge WeeFIM score of 84 after fifteen days of rehabilitation treatment.

Discussion: Anti-NMDA-receptor encephalitis is an autoimmune disorder with clinical features which include psychiatric sequelae, seizures, cognitive disturbance and movement disorders. It was first described by Dr. Joseph Dalmau in 2005. The associated neuropsychiatric syndrome is usually seen in young African American women who develop changes of behavior, personality and mood. 20-57% of female patients with this disorder are found to have ovarian teratomas. Less than 5% of males with this disorder are diagnosed with a malignancy. The median age of patients with this disorder is 23. The clinical picture may progress to include the development of dyskinesias, autonomic instability, decreased level of consciousness, and hypoventilation.

Conclusion: This case report describes an unusual pediatric case of Anti-NMDA-receptor encephalitis in a 6-year-old African American male with mycoplasma pneumonia and no evidence of malignancy.

Poster 239
Challenges to Rehabilitation in a Patient with an Unclear Diagnosis: A Case Study

Xin Li, DO (Rehab Institute of Chicago, Chicago, IL, United States), Laura E. Black, MD, David Chen, MD

Disclosures: X. Li: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 45-year-old woman admitted to an Academic Inpatient Rehabilitation (AIR) facility after 9 months of functional decline with initial presentation of ataxia and difficulty walking that progressed quickly to cognitive decline, diffuse spasticity, dystonia and ventilatory dependence. After extensive neurological work-up, her disease process was thought to be an amyotrophic lateral sclerosis (ALS)-Parkinson’s disease spectrum disorder with upper motor neuron predominance. Although electrodiagnostic work-up did not find lower motor neuron (LMN) involvement, her persistent ventilator requirement suggested potential LMN involvement consistent with ALS. On admission to AIR, she was requiring moderate assistance with most of her activities of daily living, and ambulated with a walker.

Setting: Academic inpatient rehabilitation (AIR) hospital.

Results or Clinical Course: She continued to decline functionally while in AIR, secondary to profound spasticity that showed marginal improvement with placement of an intrathecal baclofen pump, therapies, bracing, and multiple oral antispasmodics. She required maximal assistance for wheelchair mobility by discharge from a 2.5-month AIR stay.

Discussion: ALS and Parkinson’s disease once thought to be separate diseases are now seen as a spectrum of one disease process. Our patient’s disease is rare and rapidly progressive. To our knowledge, this is the first case reported in literature of rapidly progressive ALS-Parkinson’s disease process.

Conclusion: The framework for rehabilitation of neurodegenerative diseases is divided into early, middle, and late stages of rehabilitation to accommodate a gradual decline in function. Having a specific diagnosis allows the rehabilitation team to use interventions that are known to be effective with that patient population and affords patients and families additional support. Physiatric care can benefit similar patients by treating spasticity, providing assistive devices and care by a multidisciplinary team. Her rapid decline, however, provided significant challenges in an acute rehabilitation setting.

Poster 241
Expiratory Muscle Conditioning in Patients with Multiple Sclerosis Using Functional Magnetic Stimulation
Xiaoming Zhang, Honglian Huang, MD, PhD, Vinoth K. Ranganathan, MS MBA, Vernon W. Lin, MD (Cleveland VA, Cleveland, OH, United States)


Objective: The study was to evaluate the effectiveness of functional magnetic stimulation (FMS) for conditioning expiratory muscles in patients with multiple sclerosis (MS).

Design: A prospective before and after trial.

Setting: Functional Magnetic Stimulation Laboratory, Cleveland Clinic Foundation, Cleveland, OH.

Participants: Two MS patients were recruited to this study.

Interventions: Each patient participated in a six-week FMS protocol for conditioning the expiratory muscles (20 minutes, 5 days/week). A commercially available magnetic stimulator with a round magnetic coil (MC) was used. Expiratory muscle conditioning was achieved by placing the MC at T9 vertebral level. Pulmonary function tests (PFTs) were performed every two weeks.

Main Outcome Measures: Respiratory variables included maximal expiratory pressure (MEP), peak expiratory flow (PEF), and expiratory reserve volume (ERV).

Results or Clinical Course: After 6 weeks of conditioning, the values for main outcome measures were: MEP 77 cmH2O; PEF, 6.0 L/sec; and ERV, 0.72 liter. These values corresponded to 112%, 123%, and 120% of pre-FMS conditioning values respectively. When FMS was discontinued for two weeks, these values had the following decrements (MEP, 3.5%, PEF, 15%, and ERV, 9.1%).

Conclusion: A 6-week FMS conditioning of the expiratory muscles improved voluntary expiratory functions, indicating that FMS may be a potential noninvasive therapeutic technology for training respiratory muscles in persons with tetraplegia; and continual FMS may be required to maintain gains in pulmonary functions.

Poster 242
Quadruple Amputations Secondary to Long-Standing Use of Vasopressors: A Case Report
Vince Si, MD (NYU, New York, NY, United States), Ashish Kumar, DO, Mark Ragucci, MD

Disclosures: V. Si: I Have No Relevant Financial Relationships To Disclose.

Case Description: This is a 38-year-old man who initially presented with emphysematous pyelonephritis. His acute medical course was complicated by severe septic shock and cardiac arrest x 2, requiring a 2 month admission to the intensive care unit. He subsequently developed critical illness neuropathy and ischemia and gangrene to all extremities secondary to long-standing vasopressors, requiring bilateral transradial and transtibial amputations. The patient was admitted to acute inpatient rehabilitation (AIR) to address his deficits in functional mobility and activities of daily living (ADLs).

Setting: Acute inpatient rehabilitation.

Results or Clinical Course: The patient was admitted to AIR with significant weakness, greatest in the lower extremities as he was unable to move them against gravity. Due to his quadruple amputations and weakness, the patient’s functional status was significantly affected. Initially, he required total assist for all functional mobility and basic ADLs. Upon discharge, he made improvements in strength and sitting balance; he improved to minimal assist in bed mobility, moderate to maximum assist in most of his ADLs, and total assist in transfers with 1 person compared to 2 initially. He also had significant wound care requirements, which were managed by optimizing his nutritional status, daily monitoring of surgical sites, and use of Braden Scale Scores. The patient was discharged home with home services under the care of his family.

Discussion: This rare case highlights the complex rehabilitation problems that arise in a quadruple amputee. Communication and collaboration among the interdisciplinary team, the patient, and family are essential for successful rehabilitation of the person with quadruple amputations. Family training was important with our patient to provide continued assistance with ADLs and mobility. Moreover, AIR can optimize the multifactorial nature of wound healing by closely monitoring incision sites and ensuring adequate protein, carbohydrate, and vitamin C intake.

Conclusion: Family training and communication is an integral part of the acute rehabilitation process. Wounds associated with amputations continue to be a challenge. Therefore, the interdisciplinary team of health care professionals to diagnose and treat healing wounds is critical to the overall health of a quadruple amputee patient.

Poster 243
Rare Adult Tethered Cord Syndrome without Spinal Dysraphism: A Case Report
Carrie A. McShane, MD (Vidant Medical Center/East Carolina University, Greenville, NC, United States), George W. Crawl, MD

Disclosures: C. A. McShane: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 32-year-old woman with a history of tethered cord syndrome presented with back pain and left lower extremity tingling. She denied history of spina bifida. At age 20, she underwent lysis of fatty filum. At age 31, her symptoms returned during pregnancy. Six months post-delivery, she presented to the Neurosurgery
Clinic. Her symptoms failed to improve after conservative treatment with physical therapy. Magnetic resonance imaging of the brain showed retethering of the cord with small syrinx. Patient underwent lumbosacral laminectomy, re-exploration of previous tethered cord, and untethering of the spinal cord. Immediately after surgery, her left lower extremity was flaccid with decreased sensation. She was found to have neurogenic bladder as well. There were no nerve root injuries during surgery. She was admitted to inpatient rehabilitation to improve ambulation, bladder management, and activities of daily living (ADL).

Setting: Inpatient Rehabilitation of Academic Medical Center.

Results or Clinical Course: Patient’s left lower extremity weakness improved with therapies. Her urinary retention improved by decreasing water intake to 2 liters per day and scheduling toileting every 3 hours while awake. At discharge, she was modified independent for ambulation and ADLs using a walker and left ankle-foot orthosis.

Discussion: Tethered cord syndrome is defined as an abnormal attachment of the spinal cord at the distal end. The usual presentation is in children with spina bifida. Typical signs and symptoms in children include decreased lower extremity strength, worsened scoliosis, and changed urologic function. In adults, back pain is the most common clinical symptom. Pain can be aggravated by movement and conditions such as pregnancy and childbirth. After surgical intervention, 80% of adults have improvement of back pain.

Conclusion: Adult tethered cord syndrome without spinal dysraphism is rare but can cause back pain and lower extremity weakness.

Poster 244
Resolution of Atypical Guillain-Barre Syndrome in the Setting of Methimazole Treatment: A Case Report

Jacob Peacock, MD (Rusk Institute of Rehabilitation Medicine at NYU, New York, NY, United States), Jennifer Eftychiou, DPT, Jennifer Del Corro-Cao, OTR/L, Jung Hwan Ahn, MD


Case Description: A 77-year-old functionally independent physician was diagnosed with Grave’s disease and treated with methimazole daily for three months prior to hospitalization for progressive lower extremity weakness, paresthesia, areflexia, and truncal ataxia. Workup was consistent with Guillain-Barre Syndrome, and notably negative for agranulocytosis, which has been reported in patients diagnosed with GBS while on anti-thyroid medication. The patient experienced mild improvement after IVIG and physical therapy, and was discharged from acute rehabilitation modified independent at wheelchair level. Two days after discharge, the patient experienced worsened symptoms and work up was notable for a possible endobronchial lesion. The patient was readmitted to acute rehabilitation during the neoplastic workup.

Setting: Acute inpatient rehabilitation.

Results or Clinical Course: After the neoplastic work-up returned negative and persistent symptoms, the patient was trialed off methimazole with careful cardiac monitoring. Initial FIM scores were modified independent for wheelchair mobility but he required maximum assist for standing and total assist for ambulation and stairs. His initial BERG Balance Score was 6/56 indicating significant falls risk. Within one week after stopping methimazole, FIM scores improved to supervision for ambulation, stairs and standing BADLs with standing using a RW. Berg Balance Score improved to 27/56. Significant gains continued and he was discharged home at an independent level for B/IADL and all indoor mobility including stairs using a straight cane. At discharge, his Berg Balance Score was 44/56. Video analysis demonstrates these improvements and resolution of his ataxic movements.

Discussion: Although GBS in the setting of agranulocytosis secondary to methimazole has been observed in literature, this case is unique in that the patient maintained normal range cell counts throughout hospitalization. Continuous assessment by the therapists and physicians allowed for active feedback of the different treatment’s effects on the patient’s function. His rapid improvement after discontinuation of the medication suggests a persistent interaction of the medication with the disease process.

Conclusion: Continued medical evaluation coinciding with acute therapy feedback and treatment can benefit a patient with an atypical disease course.

Poster 245
Novel Assistive Eating Device for Person With Severely Limited Hand Function

Everett C. Hills, MD (Penn State University, Hummelstown, PA, United States), Jennifer Kohler, BS, Brian Leap, BS, James Maguire III, BS, Grace Warkulwiz, BS, Evan Witmer, BS, Reuben Balasundram, OTR/L, Nancy Lokey, RN, CRNR, CBIS


Objective: To create a fork and spoon holder for a patient with Charcot-Marie-Tooth (CMT) disorder who could take the holder anywhere and use it with any provided silverware. A patient-needs assessment, analytical hierarchy process, patent search for existing products, development of engineering specifications, and 3D prototype manufacturing, resulted in the creation of this novel device. Field-testing and feedback enabled the final device to score high marks with the user. The entire design and manufacturing process was accomplished within 16 weeks and under $1000.

Design: The needs were gathered in a focus group interview. Analytical Hierarchy Process rank ordered the priorities within the patient’s criteria. Engineering specifications were created to determine the strength and durability of each part. Discussions and brainstorming sessions were used to eliminate the least favored ideas and the remaining concepts were added to a Pugh Scoring Matrix leading to the overall favored design.

Setting: Observations and interviews with the patient provided insights on the patient’s physical limitations and needs. Information was employed to produce computer programs for 3D printing of parts. Final assembly took place using suitable plastics and manufacturing techniques to ensure a safe device for feeding oneself.

Participants: 70-year-old gentleman with CMT. Five senior engineering students: 4 Biomedical Engineers and 1 Industrial Engineer. Project sponsor is a board-certified physiatrist. An occupational therapist served as a consultant.

Interventions: Materials were tested for strength and parts were machined for ease of fit. Patient feedback was used to make modifications.

Main Outcome Measures: Patient satisfaction.

Results or Clinical Course: The patient commented positively on the “ease of use” inserting/removing the utensil, stability of the fork and spoon to stab or scoop up food consistently, and the ability to rotate the fork. The patient is now happily using this device regularly.

Conclusion: Existing assistive eating devices currently available on the market aren’t universal and only fit specific types of forks or spoons. They do not rotate in the case of forks. This novel assistive eating device allows the individual to use silverware in restaurants, switch between a fork and spoon, rotate the position of the fork and remain inconspicuous while dining with family and friends.

Poster 246
Unilateral Hypoglossal Nerve Palsy with Associated Dysphagia after Prolonged Endotracheal Intubation: A Case Report

Casey Schoenlank, MD (SUNY Upstate Medical Center, Syracuse, NY, United States), Grant Karno, MD, Xiaoli Dong, MD

Disclosures: C. Schoenlank: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 46-year-old man with history of Chronic Obstructive Pulmonary Disease (COPD) was intubated for acute respiratory failure secondary to COPD exacerbation. Three unsuccessful attempts at extubation led to a tracheostomy 1 month after admission. He was gradually weaned off the ventilator to trach collar, and another month later, he was decannulated. He required tube feedings for severe dysphagia.

Setting: Tertiary care adult hospital.

Results or Clinical Course: The patient was admitted to an acute rehabilitation unit after an almost 3-month hospital stay. A detailed physical examination revealed left-sided tongue deviation and swallow slowly improved during and after his rehabilitation stay, and at 2-week follow-up, his diet had been advanced to soft food with supplemental tube feeding.

Discussion: Isolated hypoglossal nerve paralysis is a rare condition. It can be associated with traumatic intubation, tumor, or arterial dissection. We report a case of isolated, left hypoglossal nerve palsy with associated dysphagia in a man who required prolonged intubation. Negative imaging studies and transient course support neuropraxic damage as the cause.

Conclusion: Clinicians should consider isolated hypoglossal nerve palsy in a patient with dysphagia and tongue deviation after endotracheal intubation. This case highlights the importance of a detailed cranial nerve examination in patients with a history of prolonged intubation. Clinical management should focus on diagnosis and functional recovery.

Poster 247
Exacerbation of Granulomatosis with Polyangiitis (GPA) with Complication of Mononeuritis Multiplex in a Child: A Case Report

Diana Bayarvea, DO (Stony Brook University, Stony Brook, NY, United States), Jennifer J. Semel-Concepcion, MD

Disclosures: D. Barayeva: I Have No Relevant Financial Relationships To Disclose.

Case Description: 11-year-old girl with a 3-year history of GPA presented with purpura on the arms, legs, palms and soles, oral ulcers, fever, bloody stools and chest tightness. She was noted to have pulmonary hemorrhage and was intubated. Patient was started on intravenous steroids, plasmapheresis and cyclophosphamide to treat a flare of GPA with good response. CT of chest revealed left sided pulmonary cavities which were subsequently aspirated. Her course was further complicated by development of a pleural effusion and bronchopleural fistula with empyema. She was able to ambulate 150 feet with a rolling walker with contact guard and a left AFO.

Discussion: GPA, formerly known as Wegener’s granulomatosis, is a rare autoimmune disorder which results from antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis of small to medium-sized vessels. GPA is most common in middle-aged adults of northern European descent, and is rarely seen in children. The prevalence of GPA in the United States is estimated to be 3 cases per 100,000. Classical GPA presents with a triad of upper respiratory tract, pulmonary and kidney involvement. While mononeuritis multiplex is commonly seen in adults with GPA, a literature review reveals no previous reports of GPA with concomitant mononeuritis multiplex in children.

Conclusion: Pediatric GPA with mononeuritis multiplex has not been previously reported in literature. Timely diagnosis and rehabilitation are crucial for the patient to maintain function.

Poster 248
Global Initiative for Chronic Obstructive Lung Disease (GOLD) Classification of Individuals with Chronic Obstructive Pulmonary Disease (COPD) before and after Pulmonary Rehabilitation

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Disclosures: A. Miciano: I Have No Relevant Financial Relationships To Disclose.

Objective: To describe the dyspnea severity (DS), activity limitation (AL), exacerbation history (EH), and Global Initiative for Chronic Obstructive Lung Disease (GOLD) classification of individuals in a pulmonary rehabilitation program at pre- and post-intervention periods.

Design: Retrospective cohort study.

Setting: Comprehensive outpatient rehabilitation facility.

Participants: 44 community dwelling elderly adults with moderate to severe COPD.

Interventions: Outpatient pulmonary rehabilitation (PR) program.

Main Outcome Measures: The Modified British Medical Research Council (mMRC) scale as surrogate for DS; the COPD assessment test (CAT) as surrogate for AL, and number of exacerbations the patient has had within the previous 12 months were recorded; these factors categorized the subjects with COPD into four categories—GOLD A, B, C, and D.

Results or Clinical Course: Given the nature of the variables, the CAT variable was treated as continuous and the remainder (mMRC, EH, and GOLD) were analyzed as frequency counts. The pre-PR and post-PR values were: CAT pre-PR mean score (SD) 21.568 (6.5144), post-PR 20.920 (7.1526); mMRC pre-PR <.2 score 27.9%, >.3 score 72.1%, post-PR <.2 score 44%, >.3 score 56%; EH pre-PR <.1 frequency 72.7%, >.1 frequency 27.3%, post-PR <.1 frequency 65.4%, >.1 frequency 34.6%. Using a Wilcoxon Signed-rank Test with exact P-values, there was no directional change from pre- to post-PR in CAT scores (z=0.181, P=.434). Using the Stuart-Maxwell test, there was no change from pre- to post-PR in: mMRC scores (Chisq>3>.7=P=.072); EH (Chisq>2=.45, P=.105); GOLD (Chisq>3=.7=P=.072).

Conclusion: While GOLD is useful for describing the body function/DS, AL, and EH at a point in time, it does not appear to be useful for assessment of COPD in a treatment continuum. The GOLD A-B-C-D classification does not reflect well COPD patients’ functionality, possibly because other components come into play in describing the outcome of COPD, e.g. participation component and personal and
environmental factors. Future research should be on the therapeutic effect of PR on participation restriction.

Poster 249
Lithium Induced Hypothyroidism in a Bipolar Patient Associated with Anterior Compartment Syndrome: A Case Report

Marina M. Ma, MD (Medstar Georgetown University Hospital/National Rehabilitation Network, Washington, DC, United States), Robert D. Bunning, MD

Disclosures: M. M. Ma: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 46-year-old woman with bipolar disorder on lithium presented with persistent pain on her right anterior leg after falling down on hardwood floor 2 weeks prior. Despite unremarkable X-rays, she developed progressive swelling of her anterior leg. Antibiotics were prescribed for suspected cellulitis. She then developed a foot drop and increasing pain. Computed tomography scan revealed extensive fluid collection within the anterior compartment. Irrigation and debridement revealed ischemic and necrotic anterior compartment. Her thyroid stimulating hormone (TSH) which was normal 4 months prior was found to be extremely elevated at 51.40 mIU/L. Further history revealed she had gained 40 pounds accompanied by thickening in bilateral legs in the past 3 months. Levothyroxine was initiated. She was transferred to acute inpatient rehabilitation.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: Examination revealed a right common peroneal nerve palsy with 0/5 ankle dorsiflexion and great toe extension and non-pitting leg edema. On discharge, she was able to walk 500 feet and negotiate 12 stairs independently with a rolling walker and right ankle foot orthosis.

Discussion: Lithium therapy may cause hypothyroidism. Myxedema associated with severe hypothyroidism may predispose to anterior compartment syndrome due to vascular, muscular and connective tissue abnormalities. Increased capillary permeability and decreased lymphatic drainage may cause extravasation of protein-rich fluid in the interstitium and decreased perfusion in the compartmental vessels. Skeletal muscle hypertrophy occurs in 1 percent of cases of myxedema myopathy. Stimulation of fibroblast by thyroid stimulating hormone and diminished degradation of tissue hyaluronate may also alter the collagen-glycosaminoglycan ratio leading to increase in connective tissue contents. Less volume would then be required to elevate intracompartmental pressures.

Conclusion: Acute anterior compartment syndrome, either idiopathic or following a minor trauma, may be caused by hypothyroidism associated with lithium therapy. This case highlights the importance of monitoring TSH levels with lithium therapy.

Poster 250
Levator Ani Syndrome Management with Neuromodulation of Pudendal Nerve

Brian W. Lee, DO (Albert Einstein College of Medicine, New York, NY, United States), Anna M. Lasak, MD

Disclosures: B. W. Lee: I Have No Relevant Financial Relationships To Disclose.

Case Description: This 48-year-old man came to the rehabilitation clinic for anal pain of 12 years. The patient explained that the pain was located in the angle between testicle and anus about 4 cm deep, describing pain to be that of a pressure like pain. The patient admits of feeling pain and incomplete emptiness after defecation but no pain during defecation. Each pain episode has lasted more than 20 minutes. The physical examination was remarkable with tenderness to palpation at the left puborectalis at 10-11 o’clock area.

Discussion: Levator ani syndrome is contributed to paradoxical spasm of puborectalis muscle. During defecation, puborectalis relaxes while smooth muscle in the wall of rectum contracts and internal and external anal sphincters relax. However, if puborectalis does not relax the angle between ampulla of rectum and the upper portion of anal canal does not decrease relating to the fact that the patient said he did not feel like he was defecating fully enough. This case showed that neuromodulation with pelvic floor exercise can provide symptomatic relief of incomplete defecation.

Setting: Neuromodulation with pelvic floor exercise can provide increased quality of life for patients with Levator ani syndrome by reducing feeling of incomplete defecation.

Poster 251
Treatment Outcomes Following OnabotulinumtoxinA in Patients with Cervical Dystonia Naive to Botulinum Toxin Treatment

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Disclosures: C. Singer, Lundbeck: Research Grants - Allergan, TEVA; Other - Ipsen, Auspex

Objective: To evaluate effectiveness and safety of onabotulinumtoxinA treatment for cervical dystonia (CD) in a large botulinum toxin (BoNT)-naïve population in a real-world setting.

Design: A prospective, observational, multicenter registry (Cervical Dystonia Patient Registry for Observation of OnabotulinumtoxinA Efficacy; NCT00836017) examined safety, effectiveness, and treatment utilization of onabotulinumtoxinA in clinical practice.

Setting: Neurology, pain, and rehabilitation clinics.

Participants: Only subjects naïve to BoNT at baseline are reported here.

Interventions: Subjects could receive up to 3 treatments of onabotulinumtoxinA. Dosing and treatment intervals varied due to the real-world nature of the design.

Main Outcome Measures: Assessments (conducted at baseline, at treatment visits, and 4-6 weeks post-treatment) included torque, Eastern Spasmodic Torticollis Rating Scale (TWSTRS), Clinician Global Impression of Change (CGIC), Patient Global Impression of Change (PGIC), Cervical Dystonia Impact Profile-58 (CDIP-58), and adverse events (AEs).

Results or Clinical Course: Of 1046 enrolled subjects, 661 (63.5%) were BoNT-naïve (73.7% female; mean age, 58.0/C6 years; diagnosis to first treatment, 3.2 years). Mean onabotulinumtoxinA dose was 165.2 ± 75.1U, with a mean of 14.6 and 15.2 weeks between treatments 1-2 and 2-3, respectively. Mean TWSTRS total score improved from 39.2 at baseline to 27.1 at final visit (P < .0001). From first to last post-treatment assessment, a significantly higher percentage of physicians reported improvement as measured by CGIC (90.6% vs 94.6%; P < .0001), and significantly higher percentages of subjects reported improvement on the PGIC (82.6% vs
Objective: R. O. Stephenson: I Have No Relevant Financial Disclosures: Jennifer E. Stevens-Lapsley, PT, PhD, Cory L. Christiansen, PT, PhD, United States), Brian Loyd, PhD, Thomas Fields, PT, DPT, Ryan O. Stephenson, DO (Denver VA-University of Colorado, Denver, United States), Shernaz K. Hurlong, DO (Denver VA-University of Colorado, Denver, United States, A large Veterans Affairs Regional Amputation Center.

Modifiable Gait Parameters Associated with Functional Mobility in Lower Limb Amputees

Ryan O. Stephenson, DO (Denver VA-University of Colorado, Denver, CO, United States), Brian Loyd, PhD, Thomas Fields, PT, DPT, Jennifer E. Stevens-Lapsley, PT, PhD, Cory L. Christiansen, PT, PhD


Objective: To quantitatively describe the relationship between health factors, amputation characteristics, spatiotemporal gait changes, and ambulatory mobility in Veterans with traumatic and non-traumatic amputation.

Design: Retrospective cross-sectional study.

Setting: A large Veterans Affairs Regional Amputation Center.

Participants: 81 male Veterans; 49 with traumatic unilateral lower limb amputation (LLA), 32 with non-traumatic LLA; 58 with transfemoral amputation, 23 with transfemoral. Mean age (standard deviation) 57.8 (13.8), BMI of 28.1 (4.8), Comorbidity Index score of 3.2 (1.9).

Interventions: Not applicable

Main Outcome Measures: All participants completed a 2-Minute Walk Test (2-MWT) and a minimum of three trials of over ground walking evaluated using the GAITRite Electronic Walkway system. Differences in spatiotemporal gait parameters, walking speed, and 2-MWT distance were quantified using independent t-tests. Factors contributing to variability in 2-MWT distance were tested using forward stepwise regression.

Results or Clinical Course: Differences were found between the traumatic and non-traumatic groups for step length symmetry ratio (0.93 vs. 0.89, respectively; P < 0.001), 2-MWT distance (146.12m vs. 129.46m, respectively; P < 0.001), and number of comorbidities (2.7 ± 2.64 vs. 3.9 ± 1.92, respectively; P < 0.05). Amputated limb stance time, amputated limb step length, and period of double support were found to contribute to 2-MWT and combined to account for 56% (adj. r² = 0.56) of the variation in distance walked. In this sample, increased amputated limb step length by 1 cm correlated with increased 2-MWT distance of 2.1 meters (P < 0.001).

Conclusion: A shorter 2-MWT distance and increased comorbidities indicates that Veterans with non-traumatic amputation also have complex health conditions that may alter gait mechanics and decreased ambulatory mobility. Spatiotemporal measures of gait—amputation stance time, step length, and double support—are of particular clinical relevance, explaining more variance in 2-MWT distance than age, spatiotemporal symmetry, or health related conditions. These findings provide clinicians with modifiable targets for the improvement of global ambulatory mobility.

Poster 252

Outcomes of Acute Inpatient Rehabilitation for Chronic Graft-Versus-Host-Disease (cGVHD)

Jason Leung, MD (University of Michigan, Ann Arbor, MI, United States), Sean R. Smith, MD

Disclosures: J. Leung: I Have No Relevant Financial Relationships To Disclose.

Objective: To assess the functional gains of chronic graft-versus-host disease (cGVHD) patients in an acute inpatient rehabilitation facility.


Setting: Acute inpatient rehabilitation unit at a large academic hospital center.

Participants: 42 adult patients with chronic graft-versus-host disease (cGVHD) who are admitted for acute inpatient rehabilitation.

Interventions: Not applicable. Chart review.

Main Outcome Measures: Functional Independence Measures (FIM) scores measured on admission, discharge, length of stay, and FIM change per day (FIM efficiency).

Results or Clinical Course: A paired t-test shows p value of .0008 between admission and discharge FIM scores with n = 42, showing that patients significantly improved in FIM scores based on acute inpatient rehabilitation. Mean admit FIM scores for the patient group was 67.8 with a mean discharge FIM score of 77.2. The total average FIM gain during patient length of stay was 9.4 points, with an average FIM Efficiency of 0.44. When the FIM scores are broken down by category, the scores showed mean Admission Motor score = 40.6, Admit Cognitive = 27.2. Comparatively, the mean Discharge Motor = 49.8 and Discharge Cognitive = 27.4. Therefore, the majority of functional gains were motor recovery. Five out of

Poster 253

Rehabilitation Functional Independence Measure Change Following Bilateral Open Reduction Internal Fixation for Pathologic Fracture Due to Severe Vitamin D Deficiency From Gastric Bypass Surgery: A Case Report

Lauren Del Prato, DO (SUNY Upstate Medical University, Syracuse, NY, United States), Shernaz K. Hurlong, DO

Disclosures: L. Del Prato: I Have No Relevant Financial Relationships To Disclose.

Case Description: This is a 38-year-old woman with morbid obesity with a history of Roux-en-Y (RYGB) gastric bypass who presented with bilateral hip pain aggravated by weight bearing without a history of trauma. Despite surgery, she had minimal weight loss with a body mass index of 52. Imaging revealed bilateral subtrochanteric fractures. The patient underwent bilateral open reduction internal fixation (ORIF) with intramedullary nailing. Further workup revealed severe vitamin D deficiency with associated hyperparathyroidism and hypocalcemia. She also developed peripheral neuropathy due to severe pyridoxine deficiency resulting in balance impairment. The patient had been non-compliant with vitamin supplementation following bypass surgery. Following ORIF, she was admitted to acute inpatient rehabilitation. Her course was complicated by a post-op hematoma requiring orthopedic drainage.

Setting: Inpatient rehabilitation facility.

Results or Clinical Course: On admission her case mix index was 1.54 compared to the nation average of 1.25 for bilateral hip fractures. Her Functional Independence Measure change was 34 compared to the nation mean of 30.7 for bilateral hip fractures. The patient had excellent functional outcomes due to an interdisciplined team approach that included nutrition, endocrine and orthopedic interventions.

Discussion: While there is substantial literature reviewing metabolic sequelae following bariatric surgery, the majority is focused on the effect of surgery on bone mineral density as a result of increased bone turnover markers, vitamin D deficiency and hypocalcemia. A smaller percentage of the literature discusses the potential increased risk of bone fractures due to these metabolic changes. There is minimal literature to date that examines rehabilitation outcomes following complications from RYGB.

Conclusion: As the number of patients undergoing RYGB for weight loss management increases, so too will the impact of potential complications. Some impairments related to metabolic sequelae of RYGB respond well to a comprehensive Inpatient Rehabilitation Program. Further investigation regarding rehabilitative approaches and functional outcomes is warranted.

Poster 254

Vitamin D Deficiency From Gastric Bypass Surgery: Fixation for Pathologic Fracture Due to Severe Bone Fractures Due to Severe

Lauren Del Prato, DO (SUNY Upstate Medical University, Syracuse, NY, United States), Shernaz K. Hurlong, DO

Disclosures: L. Del Prato: I Have No Relevant Financial Relationships To Disclose.

Case Description: This is a 38-year-old woman with morbid obesity with a history of Roux-en-Y (RYGB) gastric bypass who presented with bilateral hip pain aggravated by weight bearing without a history of trauma. Despite surgery, she had minimal weight loss with a body mass index of 52. Imaging revealed bilateral subtrochanteric fractures. The patient underwent bilateral open reduction internal fixation (ORIF) with intramedullary nailing. Further workup revealed severe vitamin D deficiency with associated hyperparathyroidism and hypocalcemia. She also developed peripheral neuropathy due to severe pyridoxine deficiency resulting in balance impairment. The patient had been non-compliant with vitamin supplementation following bypass surgery. Following ORIF, she was admitted to acute inpatient rehabilitation. Her course was complicated by a post-op hematoma requiring orthopedic drainage.

Setting: Inpatient rehabilitation facility.

Results or Clinical Course: On admission her case mix index was 1.54 compared to the nation average of 1.25 for bilateral hip fractures. Her Functional Independence Measure change was 34 compared to the nation mean of 30.7 for bilateral hip fractures. The patient had excellent functional outcomes due to an interdisciplined team approach that included nutrition, endocrine and orthopedic interventions.

Discussion: While there is substantial literature reviewing metabolic sequelae following bariatric surgery, the majority is focused on the effect of surgery on bone mineral density as a result of increased bone turnover markers, vitamin D deficiency and hypocalcemia. A smaller percentage of the literature discusses the potential increased risk of bone fractures due to these metabolic changes. There is minimal literature to date that examines rehabilitation outcomes following complications from RYGB.

Conclusion: As the number of patients undergoing RYGB for weight loss management increases, so too will the impact of potential complications. Some impairments related to metabolic sequelae of RYGB respond well to a comprehensive Inpatient Rehabilitation Program. Further investigation regarding rehabilitative approaches and functional outcomes is warranted.
forty-two patients (12%) were re-admitted to acute rehabilitation for a second hospitalization. For this small subset of patients (n=5), their admission FIM (70.8) and discharge FIM (86.5) had a paired t-test value with P = .078 showing a trend towards significance.

Conclusion: Patients with chronic GVHD show significant improvement in physical functioning from acute inpatient rehabilitation as measured by FIM scores. Furthermore, in a small subset of patients readmitted for acute rehabilitation, they also show functional gains despite previous medical decline.

Case Description: The patient is a 57-year-old woman with past medical history significant for autoimmune vasculitis with Wegener’s granulomatosis on chronic steroids, hypothyroidism, diabetes, and steroid induced Cushing’s disease who presented to the hospital for significant lower extremity weakness. Subsequent workup revealed that the patient’s weakness was likely related to steroid induced myopathy. Patient was evaluated by rheumatology and was not a candidate for plasma exchange. Hospital course was complicated by PCP pneumonia requiring intubation. After a prolonged hospital course, patient was noted to require maximum assistance with most ADLs.

Program Description: Acute inpatient rehabilitation.

Results or Clinical Course: Attempts were made during the patient’s acute rehabilitation stay to wean off steroids, however, patient was unable to tolerate oral prednisone doses of less than 60 mg daily without worsening of vasculitis related skin lesions. This steroid dose complicated the management of her diabetes as well as her blood pressure. The patient had frequent bouts of hypotension due to adrenal suppression and had difficulty tolerating therapy in the acute setting.

Discussion: Wegener’s granulomatosis is an autoimmune disorder affecting small vessels with nonspecific symptoms including fatigue, weakness, arthralgias, and neurologic dysfunction. Current treatment regimens include the use of steroids to suppress the disease. Myopathy is a less common side effect and presents as proximal muscle weakness. There are three proposed pathophysiologic mechanisms of steroid induced myopathy: steroids may 1) directly catabolize skeletal muscles; 2) inhibit the IGF-1 cascade leading to myocyte apoptosis; or 3) suppress an intracellular kinase protein, Akt1, which increases ubiquitin-ligase atrogin 1 (MAFbx) promoting muscle degradation.

Conclusion: There is currently no gold standard for the treatment of steroid induced myopathy. Acute inpatient rehabilitation for 3-4 weeks emphasizing aerobic exercise, resistance training, endurance, ADLs, and avoidance of high intensity exercises helps significantly. Future research in therapy protocols for steroid induced myopathy is warranted. Physiatrists need to be aware of the side effects of steroid use and the treatment modalities for steroid induced myopathy.

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**Participants:** Patient with brachial plexopathy of non-dominant upper extremity, patient’s wife, a team of 5 seniors majoring in Mechanical Engineering with 1 member double majoring in fine arts, a nurse specialist in rehabilitation, an occupational therapist with expertise in assistive technology, and a psychiatrist.

**Interventions:** Face-to-face encounters supplemented by video conferences. SolidWorks computer program was used to create images of the various iterations. 3D printing was used to fabricate the parts to be assembled.

**Main Outcome Measures:** Patient perception of ease of use.

**Results or Clinical Course:** A novel combination of magnets and interlocking parts were created to make a simple and reliable means for bringing the two ends of the jacket or coat together to bring the zipper ends together. The two-piece system is small enough to carry in a pocket of a jacket or coat. Total expenditures to make the device were less than $1000 dollars and the project was completed within 16 weeks.

**Conclusion:** A one handed system for zipping up a jacket or coat was successfully accomplished by a team of mechanical engineering students. Employing computer aided designs and 3D printing to make prototypes that could be tested and refined, they made a simple and reliable device for a one-armed man to use. Investigations are underway to explore the usefulness of the device for other patients such as stroke survivors and amputees.

**Poster 258**

**Preserved Bulbocavernosus Reflex in a Patient with Tethered Cord Syndrome: A Case Report**

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**Disclosures:** O. McKay: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 40-year-old man who initially presented with rapidly progressive urinary incontinence in 2011. He self managed his incontinence with a bladder program that consisted of fluid restriction and Valsalva maneuver with urination to ensure emptying. Eventually, his symptoms worsened and he was referred to a urologist that began medications as well as ordered lumbar spine MRI. MRI showed spina bifida occulta with cord tethering to a terminal filament lipoma. He sought neurosurgical consultation and had a cord de-tethering and lipoma debulking with subsequent worsening of his symptoms, which now included fecal incontinence. Through his symptoms he maintained normal sexual function with normal erection and ejaculation. After several episodes of fecal incontinence that provided much fear and embarrassment for him, he was referred for physiatric evaluation. There was an extensive baseline evaluation, which included electrodiagnostic testing as well as the initiation of a bowel and bladder program.

**Setting:** Outpatient practice

**Results or Clinical Course:** Electrodiagnostic testing revealed: 1. Bilateral asymmetric lumbosacral polyradiculitis, left greater than right, involving the L1 through S2 spinal nerve root levels. 2. Bilateral isolated pudendal motor neuropathies with both demyelinating and axonal features. This was in association with chronic patterns of reinnervation in the bilateral internal and external rectal sphincters, which are innervated by the pudendal nerve. 3. Normal bilateral bulbocavernous reflex, with relatively short onset latency for his height. 4. Normal somatosensory evoked potentials of the pudendal nerve suggesting no evidence of underlying central conduction disruption.

**Discussion:** Through electrodiagnosis he was found to have inflammation and abnormal conduction to roots L1 through S2, which makes his normal sexual functioning and normal bulbocavernous reflex more surprising as sacral nerve roots control it.

**Conclusion:** This case may represent an accessory or anomalous more rostral innervation of the bulbocavernous pathway when taken together with his sacral nerve and pudendal nerve findings.

**Poster 259**

**Development of Necrotizing Vasculitic Neuropathy Following Exposure to Minocycline: A Case Report**

John M. Baratta, MD (University of North Carolina, Chapel Hill, NC, United States), Chafic Karam, MD

**Disclosures:** J. M. Baratta: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient is a 33-year-old man with history of acne vulgaris but otherwise healthy. He had been initiated on minocycline 2 years previously with good improvement to acne vulgaris. Approximately 18 months into the minocycline therapy, he developed recurrent episodes of generalized myalgias, arthralgias, and fatigue. The most severe episode occurred in conjunction with a fever (to 103 °F), chills, cold sweats, low back pain radiating to the right testicle, and acute left leg pain and paresthesias from the knees to the toes. Subsequent evaluation in our clinic showed left foot plantar flexion weakness and reduced sensation on the plantar aspect of the foot. On workup, an ANA was mildly positive (1:160) and a thyroid peroxidase antibody level was elevated (19.34). Autoimmune and infectious workups were otherwise negative. Electrophysiology studies demonstrated an isolated left, subacute-to-acute tibial mono-neuropathy. A left gastrocnemius muscle biopsy was performed and showed necrotizing vasculitis.

**Setting:** Tertiary care hospital

**Results or Clinical Course:** Following diagnosis, the minocycline was discontinued. The patient was initiated on oral prednisone taper and cyclophosphamide. At 3-month follow-up after diagnosis, he demonstrated clinical improvement of strength and pain. His constitutional symptoms had fully resolved.

**Discussion:** Minocycline exposure has previously been associated with development of autoimmune syndromes, such as serum sickness, drug-induced lupus, autoimmune hepatitis, and systemic vasculitis. Two additional reports suggest minocycline-associated vasculitic neuropathy in the setting of a systemic, drug-induced lupus-like syndrome. This case series adds to the growing body of literature regarding minocycline-induced autoimmune syndromes. Physicians treating those with neuromuscular conditions should be aware of the association between minocycline exposure and the potential development of vasculitic neuropathies.

**Poster 260**

**Atypical Course of an Anomalous Accessory Deep Peroneal Nerve: A Case Report**

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**Disclosures:** A. Patel: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 61-year-old woman presented for evaluation of dorsal foot pain.

**Setting:** AANEM Accredited Electrodiagnostic Outpatient Laboratory

**Results or Clinical Course:** Nerve conduction studies (NCS) demonstrated a peroneal motor nerve amplitude that was significantly greater on proximal stimulation at the fibular head compared to distal stimulation at the ankle while recording from the extensor digitorum brevis (EDB). Suspicions were therefore raised of a possible accessory deep peroneal nerve (ADPN) innervation. In order to assess a possible ADPN, the typical location, posterior to the lateral malleolus, was stimulated. No response was obtained. Stimulation was then
performed approximately 5 inches proximal to the lateral malleolus and expected results for an ADPN were obtained.

Discussion: The most common anomalous innervation in the lower extremity is the ADPN. When an ADPN is present, the medial portion of the EDB frequently is innervated by the deep peroneal nerve and the lateral portion of the EDB is innervated by the ADPN. In our patient, a response was not observed when stimulation was performed posterior to the lateral malleolus; however, a response was obtained approximately 5 inches proximal to the lateral malleolus along the lateral aspect of the leg. Therefore, our study provided direct evidence suggesting a deviation of the typical course of an ADPN.

Conclusion: Electromyographers must be aware of a potential course deviation from the typical pathway of an ADPN in those patients who are identified as having a possible ADPN.

Poster 261
Bilateral Psoas Hematomas Manifesting as Bilateral Femoral and Obturator Neuropathies after a Taser

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Disclosures: T. Ha: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 34-year-old man presented with a two-month history of bilateral proximal lower extremity weakness, pain and sensory impairment. The onset of symptoms occurred after an altercation with law enforcement that involved the use of a taser. The patient was admitted to the hospital after the taser event and found to have rhabdomyolysis and lower extremity weakness. Pelvic CT and MRI imaging obtained at the outside hospital revealed bilateral psoas intramuscular hematomas with inferior extension into the anterior thighs. On presentation to our hospital, physical examination was significant for bilateral quadriceps atrophy, absent patellar reflexes, and impaired sensation to light touch in the femoral and obturator nerve distribution. Manual muscle testing revealed: Bilateral hip flexion 2/5, knee extension 2/5, hip adduction/abduction 4/5, and ankle dorsiflexion 5/5. Functionally, the patient required minimum assistance for ADLs and modified independence for mobility using a rolling walker. He was ultimately discharged to an acute inpatient rehabilitation facility for intensive rehabilitation with plan for a nerve conduction study and electromyography to be performed.

Setting: Level I trauma center.

Results or Clinical Course: At the rehabilitation facility, the electrodagnostic study demonstrated evidence of severe bilateral femoral and obturator nerve involvement including electromyographic evidence of denervation potentials in related muscles. These findings helped to confirm the diagnosis of femoral and obturator neuropathy. At the time of discharge, the patient was functioning at a modified independent level with ADLs and mobility.

Discussion: To our knowledge, this is the first reported case of psoas hematomas manifesting as bilateral femoral and obturator neuropathy after a taser event.

Conclusion: This case illustrates the possibility of rare and serious musculoskeletal complications of electronic control devices such as Tasers. Such devices cause violent muscle contractions, which may lead to devastating injuries including intramuscular hematomas and associated compressive neuropathies.

Poster 262
How a Flexible Differential Yielded an Elusive Diagnosis: A Case Report

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Disclosures: K. Ross: I Have No Relevant Financial Relationships To Disclose.

Case Description: We present a classic case of a rare disorder, that upon initial presentation was suggestive of other, more common pathologies, but upon further investigation was characteristic for stiff person syndrome (SPS). A 48-year-old Haitian woman presented with 3 years of worsening lower extremity pain, episodic spasms, and increasing frequency of falls and a 2-week history of epigastric and right flank pain. Her symptoms initially began with episodes of sharp lumbar pain radiating down her legs and progressed to weakness, spasticity, and immobility. On physical examination she had increased tone and reflexes of the bilateral lower extremities. She was in debilitating pain and was admitted to the hospital.

Setting: Acute inpatient rehabilitation unit of a major county medical center.

Results or Clinical Course: MRI of the spine and brain were grossly benign. She was found to have abnormal uterine bleeding. Abdominal radiograph revealed extensive uterine fibroids. Lack of significant radiographic or laboratory findings suggested an autoimmune, paraneoplastic, myelopathic, or psychiatric etiology. She was given trials of gabapentin, intravenous morphine, and baclofen without any significant reduction in symptoms. The lack of response prompted a suspicion of SPS. A trial of diazepam led to improvement of symptoms and mobility. She was found to have anti-GAD-65 antibodies, which is specific for SPS, helping to solidify the diagnosis. She progressed from needing moderate assistance with transfers and walking less than 50 feet with a rolling walker with contact assistance to being able to transfer with modified independence and walking 100 feet with a rolling walker with minimal assistance.

Discussion: Stiff person syndrome is a rare neuromuscular disease characterized by baseline muscular rigidity with superimposed episodes of spasms. The estimated prevalence is 1:1,000,000. The average age of symptom onset and diagnosis are 35 and 41.2 years, respectively. Significant impairment due to disease progression may be prevented by early diagnosis.

Conclusion: It is important to be aware of and to consider rare conditions in the differential diagnosis of neuromuscular disease. Recognizing the signs and symptoms of SPS will help yield more timely diagnosis and treatment, and thus better prognosis and quality of life for patients.

Poster 263
Autonomic Dysfunction Associated with Vincristine-Induced Neuropathy: A Case Report

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Disclosures: A. Valimahomed: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 60-year-old woman with acute lymphoblastic leukemia in remission treated with hyperfractionated cyclophosphamide, vincristine, adriamycin, dexamethasone (HyperCVAD), developed ascending paresthesias two weeks post treatment. Associated symptoms included ataxia, lower extremity weakness, and incontinence of bowel and bladder. This independent patient became wheelchair dependent. Imaging of the brain and spine, lumbar puncture, infectious workup, and rheumatologic workup were negative. Electromyography and nerve conduction studies performed 6 weeks after onset of symptoms revealed axonal sensory-motor peripheral neuropathy and myopathy without inflammatory features leading to a diagnosis of vincristine-induced neurotoxicity.

Setting: Acute in-patient rehabilitation unit of a major tertiary hospital.

Results or Clinical Course: She was admitted to in-patient rehabilitation. Initially the patient’s ability to participate and progress in
therapy was significantly limited by orthostatic induced dizziness and presyncopal episodes. Her symptoms were refractory to discontinuation of anti-hypertensive medications, oral and intravenous fluids, and compression garments. Ultimately she required Midodrine, allowing her to tolerate three hours of in-patient therapy daily. The ability to participate in therapy led to an improvement in her Functional Independence Scores (FIM).

Discussion: Vincristine is associated with severe sensory-motor axonal polyneuropathies, which commonly present with numbness, tingling, neuropathic pain, and weakness. The case presented is unique because patients with this disease process are rarely admitted to acute in-patient rehabilitation. In addition, she also suffered from vincristine associated autonomic dysfunction, a rarer and often missed side effect. Autonomic dysfunction may present as orthostatic hypotension, constipation, paralytic ileus or urinary bladder dysfunction and can represent significant barriers to participating in therapy.

Conclusion: Acute in-patient rehabilitation has a role in vincristine induced axonal neuropathy treatment. Health care providers must be cognizant of vincristine-induced autonomic dysfunction, particularly orthostatic hypotension, which may limit the ability to benefit from therapies.

Poster 264
New Lower Extremity Weakness Due To an Iliopsoas Hematoma in a Rehab Patient With a Cardiomebolic Stroke Requiring Anticoagulation: A Case Report

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Disclosures: K. Jiang, No Answer

Setting: Acute inpatient rehabilitation unit of academic medical center.

Results or Clinical Course: A 92-year-old man with a past medical history of coronary artery disease, hypertension, diabetes mellitus, prostate and colon cancer, and transient ischemic attack presented with left hemiparesis and MRI evidence of right middle cerebral artery acute ischemic stroke. This lesion was attributed to an atrial thrombus found on echocardiogram. The patient was transitioned from a heparin drip to warfarin with an enoxaparin transition from a heparin drip to warfarin with an enoxaparin brid e80mg every 12 hours, in addition to his home dose of 81mg Aspirin. He was admitted to acute inpatient rehabilitation with primarily deficits in dynamic balance, coordination, and vision, as his strength was measured as an equal 5/5 in all four extremities. On rehab day two he began to complain of left groin pain interfering with ambulation. Examination revealed tenderness to palpation over the left femur at the insertion of the iliopsoas. Strength of left lower extremity was intact distally, while hip flexion strength and range of motion were limited due to pain, measured as 2/5. At this time the patient’s INR was 1.3 and his hemoglobin had dropped from 12.0 on admission to 8.9. A CT scan revealed a hematoma in left iliopsoas muscle extending from the pelvis to its attachment on femur below the lesser trochanter, and further anticoagulation was held. His groin pain and hip flexor weakness gradually improved over the next 5 days, hemoglobin returned to 10.0 and warfarin was restarted without an enoxaparin bridge.

Discussion: While it is prudent to first consider stroke extension, hemorrhagic transformation, or new lesion in a patient exhibiting new weakness after an acute stroke, other peripheral causes of weakness must be considered as well. Retroperitoneal or iliopsoas muscle hematoma are likely causes of lower extremity weakness in patients with increased risk of bleeding.

Conclusion: Large hematomas can place pressure on the lumbosacral plexus or on the femoral nerve in iliopsoas hematoma leading to neurapraxia. Mechanical fullness alone can also lead to weakness and pain without neurologic compromise, as seen in this case. Initial workup should include CT or ultrasound imaging and monitoring of hemoglobin. While, most cases are self limited, persistent weakness should be evaluated by electromyography.

Poster 265
Occult Group B Streptococcus Osteomyelitis Causing Back Pain in a Non-Verbal Adolescent with Cerebral Palsy: A Case Report

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Disclosures: P. D. Bolikal: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient is a non-verbal 14-year-old girl with spastic quadriplegic cerebral palsy (CP) who presented with severe back pain 10 weeks after undergoing spine surgery for scoliosis. Two weeks prior to presentation, the patient contracted a self-limited gastrointestinal illness and suffered a large seizure. On examination, the patient’s surgical site appeared well healed without any erythema, fluctuance, or tenderness. She appeared comfortable when sitting upright, but cried when placed in a supine position. Plain films done on presentation showed satisfactory positioning of her hardware with no evidence of fractures or loosening. She was treated initially with naproxen and then gabapentin, but had no relief. Bloodwork including a complete blood count (CBC), C-reactive protein (CRP), and sedimentation rate (ESR) were obtained. Her CBC was within normal limits, but her CRP and ESR were elevated. An MRI of her spine revealed enhancement within the L4 and L5 vertebral bodies and L4-L5 disc consistent with osteomyelitis and discitis. An aspirate from the L4-L5 disc was cultured and grew Streptococcus agalactiae (GBS). The patient was treated with IV penicillin for 6 weeks and switched to oral amoxicillin for a total of 6 months.

Setting: Outpatient physiatry clinic

Results or Clinical Course: After diagnosis of occult (GBS) osteomyelitis, the patient was treated with appropriate antibiotics (IV penicillin for 6 weeks then oral amoxicillin for 6 months) and had improvement in her pain.

Discussion: It is important to consider occult infection when evaluating non-verbal children with back pain, especially if they have had instrumentation to the spine. Commonly implicated organisms include Staph species and Gram negative bacteria. GBS infections are typically seen in pregnant women and neonates. Cases of GBS osteomyelitis in non-pregnant adults have been reported, but most of these occurred in the elderly or immunocompromised. This is the first reported case, to our knowledge, of vertebral osteomyelitis caused by GBS in an otherwise healthy child after spine surgery. In this patient, the infection may have seeded in the spine after her gastrointestinal illness weeks earlier.

Conclusion: Back pain in children with CP can be difficult to diagnose. GBS is an uncommon cause of osteomyelitis, but can be treated if diagnosed correctly.

Poster 266
Meloheosteosis: A Retrospective Review of 24 Patients at the Mayo Clinic

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Objective: To assess the clinical features of patients with meloheosteosis treated at our institution from 1972-2010.

Design: Retrospective chart review.

Setting: Tertiary academic medical center.
Participants: 23 patients with "definite" and one patient with "probable" melorheostosis based on radiologic criteria.

Interventions: Not applicable

Main Outcome Measures: We performed a chart review on all patients with melorheostosis to evaluate: age at first visit to our institution, gender, area of body affected, number of bones affected, presenting symptoms, surgical evaluation, and therapies provided.

Results or Clinical Course: Average age at first evaluation at our clinic was 36.5 years, median 41.5 years, range 3-68 years. There was a 4:1 female to male representation. The lower extremity was most commonly affected (66.6%) followed by upper extremity (33.3%), spine (16.6%), and head (8.3%). One third of patients had a single bone involvement with two thirds having multiple bone involvement. Pain was the most common presenting complaint (83.3%) followed by deformity (54.1%), limitation of movement (45.8%), numbness (37.5%), and weakness (25%). Most patients had physician evaluation specifically for melorheostosis (87.5%), Orthopedic Surgery referral (45.8%), physical therapy (33.3%), and occupational therapy (12.5%).

Discussion: This is the largest case review to date of melorheostosis patients from a single institution. The underlying etiology remains unclear in the development of melorheostosis, and there is no definitive treatment. Patients who underwent orthopedic surgery required additional procedures, consistent with the known progressive nature of the disease. Many patients with melorheostosis had pain/disfunction in unaffected areas along the kinetic chain.

Conclusion: Melorheostosis is a rare, progressive sclerotic bone disease resulting in pain, deformity and dysfunction. An interdisciplinary approach should include non-operative and operative evaluation, as well as appropriate therapies. A comprehensive therapy evaluation, including optimizing function at unaffected areas could provide functional benefit. A prospective approach to evaluation including serial imaging and exams would also provide valuable longitudinal data on patient outcomes.

Poster 267
PM&R Fairs Draw Student Interest: A Case Report

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Disclosures: A. A. Nasser: I Have No Relevant Financial Relationships To Disclose.

Objective: The objective was to demonstrate the various aspects of PM&R while generating student interest. With the assistance of the PM&R residents, the club mentor, physician volunteers, and the local rehabilitation hospital this student organization planned and coordinated an event, which drew over 100 interested medical students in its first year on a shoestring budget. With its impressive success, the organization gained a great deal of funding for its second annual fair.

Case Description: The PM&R student interest group, tasked with the duty to bring awareness to a lesser known field of medicine, independently established an annual PM&R fair

Program Description: In planning for this event, it was deemed most efficient to divide the students into groups that would rotate through several stations with different activities. The hands-on activities included: physical examination of the shoulder, diagnostic ultrasound of the shoulder, ultrasound-guided injections of the shoulder, botulinum toxin injections for spasticity, nerve conduction studies and EMG, procthetics and orthotics, wheelchair basics, intrathecal baclofen pumps, manual medicine for lower back pain, spinal injections under fluoroscopic-guidance, bracing for minor sports injuries, and treatment after brain and spinal cord injuries.

Setting: Medical school

Results or Clinical Course: The students were asked to evaluate their experiences and data will be gathered and analyzed to present. The responses showed a majority (46%) of the respondents were only somewhat familiar with the field of PM&R before the event. After exposure to the field through the aforementioned stations, 76% of the respondents said that they are either very likely or likely to do a rotation in a PM&R specialty. Further data will be available for presentation.

Conclusion: The field of PM&R is not as well known as some more traditional fields and as the field grows, so too will the need for capable physicians. Therefore, it is necessary to engage students in this setting to foster a passion for PM&R.

Poster 268
Electromyographic Interpretation in a Patient Diagnosed With Polymyositis and Amyotrophic Lateral Sclerosis: A Case Report

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Disclosures: C. Nguyen: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 66-year-old man diagnosed with Polymyositis by muscle biopsy presents with proximal muscle weakness of the hips and shoulders. His neurological examination for deep tendon reflexes and sensation were normal with absence of pathological reflexes. He required minimum assistance for ADLs and ambulation. He progressively declined with PT and OT eventually requiring SLP for dysphagia. When he developed diffuse fasciculations, brisk reflexes, and pathological reflexes, an EMG was performed with findings of a motor neuron disease and he was diagnosed with ALS. Upon discharge, he had profound lower extremity atrophy with maximum assist for ADLs and completely bed bound. He passed shortly after.

Program Description: University of Texas Health Science Center - San Antonio, TX

Setting: Tertiary care hospital

Results or Clinical Course: Evidence of denervation in the form of PSW and fibrillation potentials in a diffuse pattern involving the bilateral upper and lower limbs with fasciculation potentials noted to all musculature in the limbs and to the bilateral masseter and trapezius. Reduced recruitment of large amplitude and polyphasic MUAP was noted in a diffuse pattern to the bilateral upper and lower limbs. The bulbar musculature of the face does not demonstrate denervation potentials at this time, and motor unit recruitment and morphology is normal. There is no electrophysiologic evidence in any muscle tested of short duration motor unit action potentials, nor of early, or increased, recruitment.

Conclusion: The incidence of inflammatory myopathies is 1/100,000 and ALS 4/100,000, with a combination of 1 in 40 billion. Motor NCS findings exhibit very low amplitude, indicating profound loss of motor units of the anterior horn cells. Findings of diffuse PSW, fibrillation potentials and complex repetitive discharges throughout bilateral upper and lower limbs occur in both Polymyositis and ALS, and are therefore non-specific for either disease process. Global denervation represented by diffuse fasciculations, reduced recruitment, and large MUAP throughout all limbs, including the masseter further supports evidence of a motor neuron disease. There is no evidence of a myopathic disease process, which would present as small MUAP and early recruitment. It is possible that the aggressive nature of ALS may have masked typical polymyositis EMG findings.

Poster 269
Prehabilitation for Shoulder Dysfunction in Breast Cancer: A Pilot Study

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Disclosures: S. Reynolds: I Have No Relevant Financial Relationships To Disclose.
Objective: To evaluate prehabilitation exercises to improve shoulder pain and abduction range of motion (ROM) after breast cancer surgery; to evaluate methods of exercise teaching; to assess postsurgical seroma formation.

Design: Pilot study

Setting: Academic medical center

Participants: 60 breast cancer patients were randomly assigned to either personal exercise instruction, group 1, n = 36, or video only instruction, group 2, n = 24.

Interventions: Shoulder exercises were assigned to both groups 1 month prior to surgery at an outpatient visit. Group 1 received personal instruction on exercises, plus written exercise instruction, and a link to access an online video. Group 2 received only written exercise instruction and a link to access the online video.

Main Outcome Measures: Exercise compliance, pain (via visual analog scale), shoulder abduction ROM (via goniometer), and presence or absence of seroma.

Results or Clinical Course: 76% of study patients chose to exercise. There was no difference in exercise compliance between personal instruction versus video teaching. (75%, 24/32 in-person vs. 77%, 10/13 video only, OR = 1.03). 66% of patients (20/30) lost greater than 10 degrees shoulder abduction ROM at 1 month post surgery. 29% of patients (9/31) had worse shoulder pain at one month post surgery than at baseline (24%, 6/25 exercisers, and 30%, 3/6 non-exercisers). 15% of patients (4/27) had worse shoulder pain at 3 months post surgery than at baseline (8%, 2/25 exercisers, and 100%, 2/2 non-exercisers). Prehabilitation exercise program inferred no additional risk of seroma formation (21%, 7/33 exercisers vs. 22%, 2/9 non-exercisers OR = 0.94).

Conclusion: In-person teaching does not appear superior to video teaching for prehabilitation exercises in breast cancer. A high quality randomized controlled trial is necessary to assess efficacy of prehabilitation for improving post surgical outcomes. Prehabilitation exercises do not appear to increase risk of seroma formation in breast cancer surgery.

Poster 270

Ruptured Abdominal Aortic Aneurysm: A Case Report

Ashley Zakhary, MD (Nassau University Medical Center, East Meadow, NY, United States), Stella M. Ferker, MD, Thomas T. Pobre, MD, Lyn Weiss, MD

Disclosures: A. Zakhary: I Have No Relevant Financial Relationships To Disclose.

Case Description: An 85-year-old woman with history of hypertension, atrial fibrillation, and known abdominal aortic aneurysm (AAA) 11 cm in diameter was admitted to acute inpatient rehabilitation for debility secondary to prolonged hospitalization due to small bowel obstruction. Prior to hospitalization, she was a community dweller independent in both ADLs and ambulation. During her 7-day stay in rehab, her functional status improved noticeably. However, she eventually developed symptoms of impending AAA rupture, including several episodes of vomiting and acute severe back pain.

Setting: Inpatient university hospital

Results or Clinical Course: Urgent CT abdomen/pelvis showed increased AAA diameter with acute dissection, suspicious for impending rupture. The patient refused surgical intervention, and wished to be DNR/DNI. She was treated with comfort measures only. Within several hours, she was hypotensive, hypoxic, and unresponsive and soon thereafter was pronounced dead.

Discussion: AAA is the most common true arterial aneurysm, defined by diameter 50 percent greater than normal. The rate of AAA growth is variable, but they generally expand over time.

Elective AAA repair is recommended when the aneurysms reach a size greater than 5.5 cm in diameter. In patients who choose not to undergo repair but have aneurysms of 5.5 cm or greater, no guidelines exist regarding exercise recommendations and activity restrictions. When AAA is treated with observation, the goal of medical therapy is to reduce the rate of aortic expansion by treating underlying atherosclerotic disease. Recommendations include aspirin, statins, and lifestyle modifications. While current evidence-based guidelines recommend moderate levels of exercise, they do warn against straining and Valsalva. However, current literature on the hemodynamic effects of exercise on AAA expansion is limited by that fact that the data was collected on patients whose AAA were <5.5 cm.

Conclusion: No studies have been performed on patients with large (> 5.5 cm) unrepaired AAA to confirm whether exercise is detrimental or beneficial. Because it is not established to what degree such patients can tolerate intensive therapy, future outcomes studies are warranted. 

Poster 271

Differences in Outcomes between Patients Who Did and Did Not Go to Inpatient Rehabilitation 3 Months Post Injury

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Disclosures: S. Driver: I Have No Relevant Financial Relationships To Disclose.

Objective: The primary objective was to examine differences in functional and psychological outcomes 3 months post-injury between and within (1) patients admitted to an inpatient physical rehabilitation hospital after experiencing acute traumatic injury, and (2) patients who were recommended but not admitted to inpatient rehabilitation.

Design: Prospective, longitudinal study with follow-ups occurring at 3, 6, and 12 months.

Setting: Acute inpatient hospitalization at a Level I trauma center and an inpatient physical rehabilitation hospital.

Participants: 505 patients completed informed consent. Of these, 60 (8.4%) patients were identified with recommendations for inpatient rehabilitation; 50 patients subsequently were admitted to an inpatient rehabilitation facility and 10 were not; 8 of the 10 completed three month follow up at time of analysis.

Interventions: During acute hospitalization and 3 months post-injury, patient-perceived physical and emotional function (Veterans RAND 12 Iten Health Survey, VR12), depression (Patient Health Questionnaire - 8 Item), posttraumatic stress disorder (PTSD) (Primary Care PTSD screen), pain, and work status were obtained.

Main Outcome Measures: Physical and emotional function, depression, PTSD, pain, and return to work.

Results or Clinical Course: There were no differences between the two groups during initial hospitalization. At 3 month follow up, a significant difference was found between groups for both emotional health (P < .008) and depression (P < .001). Within groups, patients who underwent inpatient rehabilitation saw significant improvement (P < .01) in all outcomes from initial hospitalization to 3 month follow-up. Patients who did not undergo rehabilitation only saw significant improvement (P < .0156) in their perceived physical health rating at 3 month follow-up.

Conclusion: Patients receiving inpatient rehabilitation appear to fare better physically, emotionally, and psychologically 3 months after initial injury. These results suggest that admission to inpatient rehabilitation is an important factor in optimizing health after injury. As
such, recommendations across disciplines should be strongly considered when making discharge decisions from the acute care setting. Future research to provide evidence regarding the importance of inpatient rehabilitation in later outcomes post injury should be conducted to maximize later quality of life.

Poster 272
Risk Factors of Reamputation or Amputation of the Contralateral Lower Limb in Amputees with Dysvascular Disease
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Disclosures: G. Vergara-Diaz: I Have No Relevant Financial Relationships To Disclose.

Objective: To identify risk factors leading to reamputation or amputation of the contralateral lower limb in patients with a major lower-extremity amputation (MLEA) due to dysvascular disease.

Design: Retrospective study

Setting: We examined the medical records and ancillary files of adult patients who underwent a lower-limb amputation and were admitted to Spaulding Rehabilitation Hospital (SRH) for inpatient care from August 2013 to August 2014.

Participants: We selected medical records of adults with a dysvascular MLEA, and excluded those of subjects who had an amputation due to complications following unrelated surgical procedures, joint disease, trauma, or cancer. Hence, the medical records of 59 subjects were included in the study.

Interventions: None

Main Outcome Measures: Ipsilateral reamputation or major amputation of the contralateral lower limb.

Results or Clinical Course: Patients were 61.0 ± 13.4 years old, mostly male (68%), white Caucasian (45%), with high prevalence of hypertension (85%), diabetes (81%), dyslipidemia (63%), smoking habit or history (69%), depression (69%) and evidence of coronary artery disease (40%), who underwent a below-knee amputation (83%). 27% of the patients were reamputated, 81% contra-lateral, 60% within a year from the first MLEA. Acute vascular event (P = 0.01), perioperative infection of the stump (P = 0.05), anxiety (P = 0.05), and evidence of peripheral disease in the contralateral limb (P = 0.05), were associated with a new amputation in univariate analysis.

Conclusion: About 25% of the patients who are admitted to the Amputees Clinic are there due to a second reamputation, 80% of which after undergoing bilateral amputation. In about one third of the cases, the reamputation or amputation of the contralateral limb occurred within a year. Acute vascular event at the moment of the first MLEA was identified as the main risk factor associated with a new amputation.

Poster 273
Femoral Neuropathy and Lateral Femoral Cutaneous Neuropathy after Drug Intoxication: A Case Report
Mary E. Matsumoto, MD (University of Pittsburgh, Pittsburgh, PA, United States), Jennifer Shen, MD

Disclosures: M. E. Matsumoto: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 26-year-old man spent the night sitting on the couch obtunded after using heroin. The next morning, he was found unresponsive and brought to the hospital. He was diagnosed with severe rhabdomyolysis (CPK > 100,000). On admission to inpatient rehabilitation, examination of the left leg showed no activation of knee extensors, while all other muscles were normal. There was decreased sensation in the left medial calf and antero-lateral thigh. The left patellar reflex was absent; the right normal. Nerve conduction studies 3 weeks post-injury showed normal left sural sensory, peroneal motor and tibial motor nerve conduction. The only abnormalities on needle electromyography were profuse fibrillations in the left vastus medialis and rectus femoris with no motor unit recruitment.

Setting: Inpatient rehabilitation

Results or Clinical Course: At discharge, patient had not regained any strength in his left quadriceps.

Discussion: The findings in this patient are consistent with severe left femoral neuropathy and left lateral femoral cutaneous neuropathy. Both nerves were likely compressed in the region of the inguinal ligament during the patient’s prolonged period of sitting while obtunded. Compromise of the femoral nerve has been reported in the setting of depressed consciousness. Two well-reported scenarios are femoral neuropathy after pelvic surgery, in which the legs are in a frog legged position; and “Hanging Leg Syndrome”, which involves injury to the femoral and sciatic nerves caused by hyperextension at the hip and compression at the buttock in a patient obtunded due to substance use. This case extends the spectrum of traumatic mononeuropathy syndromes accompanying drug intoxication. Our patient was obtunded in a posture of hip flexion rather than hip extension resulting in a combination femoral and lateral femoral cutaneous neuropathies. Early recognition of this pattern of nerve injury in susceptible patients might lead to interventions to prevent the permanent deficits seen in this case.

Conclusion: Focal nerve injuries occur in the setting of depressed consciousness due to compression or traction. They may not follow classic presentations, but are related to the position of the patient at the time of injury. Injury in the sitting position causes a pattern of femoral neuropathy and lateral femoral cutaneous neuropathy.

Poster 274
Unique Ulnar-to-Median Forearm Anastomosis: A Case Report
Nassim Rad (RIC, Chicago, IL, United States), Jacqueline D. Neal, MD

Disclosures: N. Rad: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 62-year-old man with known carpal tunnel syndrome and diabetes presented to the electrodiagnostic laboratory for evaluation of worsening pain and paresthesias in the upper extremities following a median distribution, left worse than right. Focused physical examination is remarkable only for positive Tinel’s sign at the wrist and Phalen’s maneuver.

Setting: Tertiary care hospital.

Results or Clinical Course: A pseudo-conduction block was noted across the forearm with evaluation of the median motor responses at the abductor pollicis brevis on the left, with similar findings on the right. Further investigation lead to stimulating the left ulnar nerve at both the wrist and elbow while recording at the abductor pollicis brevis. Stimulation of the ulnar nerve at the wrist demonstrated findings consistent with volume conduction. Stimulation of the ulnar nerve at the elbow demonstrated a compound muscle action potential which was approximately equivalent to the drop in amplitude on the median studies.

Discussion: These findings are consistent with the rare ulnar-to-median forearm anastomosis. To date, there are limited case reports identifying ulnar-to-median anastomoses in the forearm, whereas the median-to-ulnar anastomosis (ie: Martin-Gruber anastomosis) is quite common. It is important to be mindful of the possibility of rare anomalies during electrodiagnostic testing, as on previous electrodiagnostic studies in this patient, the anomaly was missed. Knowledge of these anastomoses is important so that real time adjustments to nerve conduction studies can be made, and so that these findings are not mistakenly interpreted as a conduction block or technical error.
Conclusion: While median-to-ulnar anastomoses in the forearm are common, rare ulnar-to-median anastomoses must be recognized to avoid diagnosing inaccurate pathology.

Poster 276
Impact of Critical Illness Polyneuromyopathy in Rehabilitation: A Prospective Observational Pilot Study
Cameron Cunningham, MSc, MD (University of British Columbia, Vancouver, Canada), Heather Finlayson, MD, FRCP, William Henderson, MD, FRCP, Russell O’Connor, MD, FRCP, Andrew Travlos, MBCh, FRCP
Disclosures: C. Cunningham: I Have No Relevant Financial Relationships To Disclose.
Objective: To determine the prevalence and functional impact of Critical Illness Polyneuromyopathy (CIPNM) on inpatient rehabilitation.
Design: Prospective observational study.
Setting: Inpatient rehabilitation.
Participants: Participants had ICU admission ≥ 72 hours, were admitted to inpatient rehabilitation from 2013-2014, were ≥ 19 years old, had no contraindications to electromyography or nerve conduction studies (EMG/NCS), and had no known history of neuropathy, myopathy, neuromuscular junction disorder or diabetes.
Interventions: EMG/NCS to evaluate for axonal neuropathy and/or myopathy in at least one upper and one lower limb.
Main Outcome Measures: Primary outcome measure was prevalence of CIPNM. Secondary outcome measures were Functional Independence Measure (FIM) scores at admission and discharge, FIM gain, FIM efficiency, rehabilitation length of stay and discharge disposition.
Results or Clinical Course: 33 participants were enrolled. 23 (69.7%) had evidence of CIPNM. Average admission FIM score, discharge FIM and FIM gain were 60.0, 97.5 and 30.2 in those with CIPNM versus 74.8, 102.8 and 15.5 in those without. FIM efficiency was 0.37 in both groups. Average rehabilitation length of stay was 117 days versus 63 days and discharge to home was 43% versus 80% in the CIPNM and non-CIPNM groups, respectively.
Conclusion: Our results suggest that CIPNM is very common in rehabilitation inpatients with a history of ICU admission. CIPNM is associated with lower admission FIM scores. Discharge FIM scores were similar between groups, but those with CIPNM had longer lengths of stay and were less likely to be discharged home. Our results will enable design of appropriately powered future studies to further determine the impact of CIPNM on rehabilitation outcomes.

Poster 277
Serotonin Syndrome Masked by Fibromyalgia: A Case Report
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Disclosures: O. Schnitzer: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 56-year-old woman with a past medical history of hypertension, asthma, and fibromyalgia presented to the clinic for management of her fibromyalgia. The patient was well known to the clinic. She was originally diagnosed with fibromyalgia 10 years prior to her visit. She was stable on a medication regimen that included milnacipran, zolpidem, pregabalin, and vitamin supplementation. However, on presentation to the clinic the patient complained of hot flashes, intermittent headaches, and an increase in her generalized pain.
Setting: Tertiary care outpatient clinic
Results or Clinical Course: On further interrogation of the patient history, it was revealed that her primary care physician started her on tramadol. The physical examination revealed a tachycardic patient with flushed skin. She did not have any long tract signs, hyperthermia, dilated pupils, or clonus but she was noted to be mildly agitated and easy to fatigue.
Discussion: Fibromyalgia patients initially have symptoms that can masquerade as serotonin syndrome. However, it is important to differentiate a fibromyalgia exacerbation with a true serotonin syndrome. The physiatrist must maintain a high level of clinical suspicion when evaluating patients with fibromyalgia that develop new symptoms or any changes from their baseline.
Conclusion: A clinical diagnosis of early serotonin syndrome is often difficult in cases with fibromyalgia. Serotonin syndrome can occur when ingesting milnacipran and tramadol as they both can act to raise serotonin levels. Clinicians must recognize the early signs of serotonin syndrome and act promptly to wean patients off of the offending agents.

Poster 278
Axillary Vein Compression Masquerading as Lymphedema: A Case Report
Eric Scholten (Medstar National Rehabilitation Hospital, Washington, DC, United States), Eric Wisotzky, MD
Disclosures: E. Scholten: I Have No Relevant Financial Relationships To Disclose.
Case Description: The patient is a 35-year-old woman with history of breast cancer treated who presented with progressive upper extremity swelling. The patient had a history of poorly differentiated infiltrated ductal carcinoma of her right breast. She was treated with chemotherapy, radiotherapy, and partial mastectomy with axillary lymph node dissection. She noted progressive swelling of the right arm about 5 months postoperatively and was diagnosed with lymphedema based on bioimpedance and clinical findings.
Setting: Outpatient lymphedema clinic.
Results or Clinical Course: The patient was referred for physical therapy for treatment of lymphedema. She wore a compression sleeve and used a pneumatic compression pump at home. However, after prolonged treatment the patient noted little improvement in reduction of her limb swelling. Surgical referral was obtained for further options, and an exploration of the right axilla was performed. Compression of the axillary vein by scar tissue was found and dissected. The patient noted marked decrease in the swelling of right upper extremity postoperatively.
Discussion: Lymphedema is a commonly diagnosed complication of breast cancer treatment. Advances in multiple specialties have increased early detection of lymphedema, hence decreasing the morbidity of lymphedema. Typical treatment includes compression garments, intermittent pneumatic compression, and manual lymphatic drainage. In patients where typical conservative management fails, more aggressive treatment options can be considered to alleviate the cause of lymphedema.
Conclusion: Lymphedema is a common complication of lymph node dissection and radiation in breast cancer patients. It is important for the clinician to consider a multitude of treatment options in order to reduce the complications of lymphedema and to improve cosmesis and function. In cases where lymphedema is refractory to standard treatments, a surgical consultation may be considered. In this case, surgical exploration demonstrated that this patient’s symptoms were in fact vascular, not lymphatic, in origin. This highlights the importance of considering a broad differential diagnosis for patients with edema.

Poster 279
Isolate Inferior Gluteal Nerve Injury Following Blunt Trauma with Resultant Hematoma: A Case Report
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Scores at discharge.

Returned to acute inpatient rehabilitation and had improved functional syndrome (GBS). After treatment with five doses of immunoglobulin, she transferred to tertiary care hospital and diagnosed with Acute Motor Sensory Axonal Neuropathy (AMSAN). For further invasive workup, she was thought possibly secondary to sarcoidosis-related myopathy and after treatment with steroids, she was transferred to acute inpatient rehabilitation for functional upgrading. Prior bronchoalveolar lavage was negative for acute intracranial process. Quadriparesis was worsened with ambulation, severely limiting her mobility over the prior ten days. She denied any left sided, constitutional, bowel or bladder symptoms. Her musculoskeletal and neurological examination was normal except for tenderness over the right gluteal region and weakness in right hip abduction and extension (MRC 4/5).

Setting: Tertiary care hospital.

Results or Clinical Course: EMG was ordered and revealed an isolated inferior gluteal nerve neuropathy with evidence of re innervation. The patient was discharged from the ED with a prescription for physical therapy and follow up with Physical Medicine and Rehabilitation.

Discussion: The inferior gluteal nerve originates from the lumbosacral plexus and passes through the greater sciatic foramen inferior to the piriformis muscle. Inferior gluteal neuropathy is a rarely reported but recognized complication of the posterior approach to hip arthroplasty. It is also subject to injury by compression and ischemia in sedentary individuals and following penetrating trauma. This case demonstrates a unique cause of an isolated inferior gluteal neuropathy from hematomy which can be missed as occurred with this patient on her first visit to the ED. Furthermore, diagnostic imaging of peripheral nerves in the hip is challenging due to the complex regional anatomy. For this reason, electro-diagnostics can be a valuable tool to localize the injury and provide prognosis as seen in this case.

Conclusion: The inferior gluteal nerve’s position makes it vulnerable to injury during hip arthroplasty, prolonged compression, ischemia and penetrating trauma. This case illustrates that inferior gluteal neuropathy can also result from a hematoma and this should be considered in the differential when examining patients.

Poster 280
Acute Motor Sensory Axonal Neuropathy in a Patient with Newly Diagnosed Tuberculosis: A Case Report

Nina Bhupathiraju, MD (Marianjoy Rehabilitation Hospital, Wheaton, IL, United States), Jeffrey M. Derbas, MD, Vasilios Stambolis, MD

Disclosures: N. Bhupathiraju: I Have No Relevant Financial Relationships To Disclose.

Case Description: A previously healthy 54-year-old African American woman presented with a three-week history of progressive weakness, ataxia, decreased appetite, and sensation loss. Previously independent of all activities of daily living, she started requiring increased assistance. Workup revealed diffuse intraparenecral lymphadenopathy, a pancreatic mass, bilateral lung nodules, and a CT-guided pancreatic lymph node biopsy revealed noncaseating granulomas. Electromyography (EMG) was negative for acute findings. Brain imaging was negative for acute intracranial process. Quadriaparesis was thought possibly secondary to sarcoidosis-related myopathy and after treatment with steroids, she was transferred to acute inpatient rehabilitation for functional upgrading. Prior bronchoalveolar lavage studies returned positive for acid-fast Bacilli and she remained back to the acute care hospital to treat disseminated Tuberculosis (TB). She remained extremely ataxic with quadriaparesis and areflexia, had significant proprioception loss, and poor appetite.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: For further invasive workup, she was transferred to tertiary care hospital and diagnosed with Acute Motor Sensory Axonal Neuropathy (AMSAN), a variant of Guillain-Barre Syndrome (GBS). After treatment with five doses of immunoglobulin, she returned to acute inpatient rehabilitation and had improved functional scores at discharge.

Discussion: AMSAN is an axonal and more severe subtype of GBS. A few reported cases have manifested in patients with TB. Symptoms include areflexia, sensory loss, quadriaparesis, and respiratory insufficiency, all of which were present in this case. After treatment with immunoglobulin and once medically stable, the patient was able to make successful functional gains.

Conclusion: Proper diagnosis and treatment are important for a patient’s success in acute inpatient rehabilitation. The patient in this case was making only minimal gains as her initial workup was inconclusive and she was not medically stable before attempting rehabilitation. AMSAN is a subtype of GBS manifested some patients with TB. There is a rapid progression to quadriaparesis and a delayed recovery period, but with appropriate treatment, the patient made appropriate functional progress.

Poster 281
Hepatic Myelopathy as a Complication of Liver Cirrhosis in a Patient with Autoimmune Hepatitis: A Case Report

Michael R. Dearinger, DO (UNC Hospital, Chapel Hill, NC, United States), Paul Thananopavarn, MD

Disclosures: M. R. Dearinger: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 43-year-old woman with autoimmune hepatitis and resulting liver cirrhosis developed hepatic myelopathy with spastic paraplegia. Hepatic myelopathy is a rare complication of liver cirrhosis thought to be secondary to portosystemic shunting of blood that eventually leads to demyelination of the lateral corticospinal tracts. Our patient experienced progressive lower extremity weakness with increased tone. The patient did not experience sensory changes or bowel/bladder dysfunction. The patient had undergone an extensive workup to rule out other causes of spastic paraparesis; this included HIV and HTLV-1 associated myelopathy and ALS. The patient was diagnosed with hepatic myelopathy and underwent a liver transplant eight months after the onset of weakness. In the weeks immediately following her transplant, there was no improvement in the patient’s spastic paraparesis.


Results or Clinical Course: The patient was seen two weeks following transplant for recommendations and prognosis of functional recovery.

Discussion: The patient’s workup was effective in ruling out all other causes of spastic paraparesis, leaving her clinical examination and history to suggest a diagnosis of hepatic myelopathy. A review of the literature indicates that recovery of strength and function is possible following a liver transplant. The amount of time between onset of symptoms and liver transplant may be an important factor in the degree of recovery attained.

Conclusion: Hepatic myelopathy and spastic paraparesis can be a result of liver cirrhosis, and return of lower extremity strength and function is possible following a liver transplant. From a physiatry viewpoint, it is important to be aware of the time course and improvements expected in the years following a liver transplant, as this will help give realistic expectations of return of function. The literature suggests that improvement and even full recovery of strength could be seen in a few years following a transplant. If the transplant occurred within a year of weakness onset. Partial but not full recovery has been documented in patients who received liver transplants beyond two years after onset of weakness.

Poster 282
A Temporary Trial of an Anterior Shell to Evaluate Gait Abnormalities in a Patient Not Responsive to a Semi-rigid AFO: A Case Report

Anna Markh (Montefiore Medical Center, Bronx, NY, United States), Dennis D. Kim, MD
Discussion: This is a case of a 73-year-old woman with right foot drop following spinal cord ganglioma at T7-T8 level s/p surgery. Post-operatively she was issued a semi-solid AFO and a rigid knee extension brace for complaints of foot drop and right knee buckling. However, she did not tolerate the AFO because of severe plantar foot pain and because it did not stop her right knee buckling. The knee brace complicated sit-to-stand transfers and failed to support the weak quadriceps muscles on the right. The patient presented to our rehabilitation clinic complaining of persistent right foot drop and right knee buckling when she walks. She brought into clinic her semi-solid AFO and the knee immobilizer brace.

Setting: Tertiary care hospital.

Results or Clinical Course: We did a trial of a polyethylene anterior shell to convert her semi-solid AFO to a solid AFO and provide dorsiflexion stop to improve her right knee buckling. The patient tolerated it well and reported improvement in knee control during stance and ambulation. This gave us feedback that the patient would benefit from ordering an AFO with dorsiflexion stop.

Discussion: AFOs are commonly used in patients who have weak dorsiflexors, spastic plantarflexors, or difficulty with clearing the foot while walking. There are various AFO designs. Custom features such as ‘stops’ and ‘assists’ allow the provider to tailor the AFO to a patient’s specific needs. For example, a ‘dorsiflexion stop’ or anterior stop is used to limit ankle motion to neutral or slight plantarflexion. As the patient’s center of mass moves forward during gait, the tibial advancement is limited by the AFO creating a knee extension moment. This can improve stability of the knee especially when the quadriceps are weak and the knee buckles. This feature can also be accomplished by attaching an anterior shell to a patient’s pre-existing AFO. We did not find any studies that focus specifically on using a temporary anterior shell attachment to a patient’s pre-existing PLFO or semi-solid AFO to see if they would benefit from a dorsiflexion stop feature.

Conclusion: We have shown in this case report that an anterior shell can be used as an evaluation tool prior to ordering a new expensive AFO.

Poster 283
The Unique Case of Dual Median-Ulnar Innervation of the First Dorsal Interosseous and Abductor Digiti Minimi: A Case Report

Amy Mathews, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Jacqueline D. Neal, MD

Disclosures: A. Mathews: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 67-year-old man presented to the electrodiagnostic laboratory for evaluation of bilateral arm and hand numbness. Patient reported progressive numbness in bilateral arms for many years without an inciting event. Numbness was reportedly most severe in his right hand in no particular peripheral nerve distribution. Physical examination revealed symmetric muscle bulk without weakness in the hand, normal reflexes, and intact sensation.

Setting: Tertiary care hospital.

Results or Clinical Course: Bilateral ulnar compound muscle action potentials (CMAPs) recorded at the first dorsal interosseous (FDI) demonstrated a pseudo-conduction block across the forearm. Further investigation lead to evaluation for a Martin-Gruber anomatosis, recording at the FDI bilaterally and the abductor digiti minimi (ADM) on the left. Distal stimulation of bilateral ulnar and median nerves produced equivalent CMAP amplitudes that were preserved with proximal stimulation. Similarly, distal stimulation of left ulnar and median nerves recorded at ADM produced equivalent CMAP amplitudes that were preserved with proximal stimulation. Note that these responses were recorded with relatively low stimulation.

Discussion: These findings are indicative of a Martin Gruber anomatosis in the forearm with superimposed dual innervation of both the FDI and ADM by the median and ulnar nerves in the hand. Multiple anomalous ulnar/median innervations are rare and only mentioned in few case reports. Due to their unusual presentation, these types of anomalies are difficult to recognize by means of electrodiagnostic study.

Conclusion: It is important for the electromyographer to be mindful of the possibility of numerous ulnar/median anomalies in effort to prevent erroneous diagnoses and perhaps unnecessary surgical interventions.
participate in the study (mean number of visits = 2). Inclusion criteria: less than one year of age and no previous exposure to plagiocephaly cranial remolding therapy or surgical intervention.

Interventions: Not applicable

Main Outcome Measures: Reported measures include patient demographics and birth history (delivery type, presentation, induction of labor, birth aid, shoulder dystocia and torticollis); NBPP factors include palsy side, Narakas score and range of motion (shoulder flexion in adduction and elbow flexions in abduction). Cranial diagonal difference and cephalic index were measured to determine plagiocephaly factors.

Results or Clinical Course: There were a total of twenty babies (71%) observed with plagiocephaly throughout the study (eight resolved). Shoulder dystocia was found to be prevalent among the group (46%) and was more common among the resolved group (88%, P=0.02). Babies in the non-plagio group generally exhibited more active range of motion in shoulder flexion, elbow flexion abduction and adduction than babies with plagio. All other factors had no significant correlations.

Conclusion: High prevalence of plagiocephaly exists among the NBPP population examined. Shoulder dystocia may be an important feature that can be used as a predictive quality in the future. In summary, parents and physicians should encourage infants to use their upper extremity to change position; for example, tummy time, could be introduced in order to strengthen the muscle and potentially reduce chance of cranial asymmetry.

Poster 286
Rectus Sheath Hematoma (RSH) Imitating Right Hip Pain

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Disclosures: P. Shah: I Have No Relevant Financial Relationships To Disclose.

Case Description: An 86-year-old man presented after a fall from his wheelchair at home. CT head showed a large right intraventricular hemorrhage. He was on antiocoagulation prior to admission. The patient had 3 year history of right hip pain and it had not improved with treatment in rehabilitation. Right hip X-ray was unchanged. The following day, there was a palpable mass in the right lower quad, and CT abdomen showed a large RSH. DVT prophylaxis was discontinued and he was started on IV fluids. The following morning, the patient was unresponsive and transferred to the ICU for further monitoring.

Setting: University inpatient rehabilitation neurotrauma unit.

Results or Clinical Course: He was found to have increased anemia and was also treated for urosepsis. He was stabilized and transfused packed red blood cells. He did return to inpatient rehabilitation and was able to continue to participate in therapy. His RSH and right hip pain did gradually improve throughout his stay.

Discussion: Although rare, RSH has become more prevalent and may be responsible for acute onset abdominal wall pain. It occurs more often in elderly female patients who are receiving anticoagulation and it can be missed or incorrectly diagnosed. RSH is due to damage of the superior and inferior epigastric arteries and/or the abdominal wall muscles. Risk factors include poor injection technique, abdominal wall trauma or straining. Fothergill’s and carnett’s sign can help differentiate RSH from intra-abdominal pathologies. Complications of RSH include anemia, hemorrhagic shock, abdominal compartment syndrome, obstructive uropathy and hydronephrosis. Conservative management includes close monitoring, fluid resuscitation and reversal of anticoagulants. Endovascular embolization of the epigastric vessels or surgery with exploration and hemostasis of the hematoma is also an option for unstable patients.

Conclusion: RSH can be life threatening and early diagnosis with conservative management leads to good outcomes without sequelae. Surgery is reserved for the more severe cases, but it is associated with significant morbidity. Protocols should be followed and further defined in regard to stopping and restarting anticoagulation as this can have a profound affect on the patient’s outcome and recovery.

Poster 287
Polyradiculoneuropathy Associated to Chikungunya Virus Infection: A Case Report

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Disclosures: J. C. Galloza-Otero: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 32-year-old female patient with history of chronic right shoulder pain. She was diagnosed with rotator cuff tendinopathy with MRI showing partial supraspinatus tear. She then developed general malaise and multiple joint pain. She was diagnosed with Chikungunya viral infection by ELISA assay. At 3 weeks post-onset of the symptoms her right shoulder pain worsened, and she presented with weakness and a tingling sensation in the right 4th and 5th digits. At 8 weeks she started with similar symptoms on her left upper extremity. She was treated symptomatically with medications for pain and physical therapy. A short-course of steroid medication was also administered.

Setting: Outpatient physiatry and neuromuscular medicine clinic.

Results or Clinical Course: Electrodiagnostic study showed evidence of a polyradiculoneuropathy. At 4 months post-onset, the patient continues with pain and weakness in both upper extremities and neck pain. She has had partial temporary response to steroid therapy with relapse after discontinuation. Physical therapy had short-term relief of pain symptoms. She has recently noticed worsening of weakness in the lower extremities. Further developments will be discussed.

Discussion: Neurologic and musculoskeletal sequelae have been described after infections caused by different strains of arbovirus. These might include chronic inflammatory arthritis, acute flaccid paralysis, peripheral neuropathy, and polyradiculoneuropathy. This is the first reported case, to our knowledge, of a polyradiculoneuropathy associated to an ELISA confirmed case of chikungunya virus infection.

Conclusion: Multiple etiologies may be considered as culprits of acute musculoskeletal complaints after a viral illness. Complex neurological conditions should be taken into account as they may be associated to this recently epidemic, self-limiting viral illness.

Poster 288
35-year-old Woman with Acute Inflammatory Demyelinating Disease (AIDP) after Laparoscopic Roux-en-Y Gastric Bypass: A Case Report

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Case Description: A 35-year-old morbidly obese woman underwent Roux-en-Y gastric bypass surgery complicated by dumping syndrome. Approximately two months after procedure the patient presented to the acute care hospital with weakness in all four extremities with bilateral foot drop. Lumbar puncture revealed elevated protein. Electromyography showed reduction in amplitude in all extremities, but most prominent in lower extremities. The patient was diagnosed with a variant of Guillain-Barre syndrome known as acute inflammatory demyelinating polyradiculoneuropathy (AIDP) and subsequently started on intravenous immunoglobulin gamma for five days with improvement in upper extremity weakness. Subsequently, patient was transferred to acute inpatient rehabilitation for functional upgrading.

Setting: Acute inpatient rehabilitation hospital.

Results or Clinical Course: Correlation between Roux-en-Y gastric bypass and Guillain-Barre syndrome

Discussion: Cases of Guillain-Barre syndrome after bariatric surgery are rare but have been documented in the literature. There is no clear etiology yet identified. However, it is well known that prodromal
infections with Epstein-Barr virus, cytomegalovirus, mycoplasma pneumoniae, and campylobacter jejuni have an association with Guillain-Barre syndrome. Possible theories include the notion that bypass surgery results in a decrease absorption of vital vitamins and nutrients that may weaken the immune system and make patients more vulnerable for infections that may lead to Guillain-Barre Syndrome. Furthermore, the surgery may alter the normal flora of our intestines in such a way that it promotes overgrowth of pathogenic organisms that were previously suppressed.

Conclusion: With the obesity epidemic and subsequent increase in the number of bariatric surgeries performed each year it is reasonable to predict that the number of Guillain-Barre Syndrome cases associated with this type of surgery will also be on the rise. Thus it is important to more clearly delineate an etiology for this association in order to diagnosis and prevent such an occurrence.

Poster 289
Utility of Sonography in Differentiating Neurofibromatosis from Familial Lipomatosis: A Case Report
Lisa Williams, MD (Stanford University, Stanford, CA, United States), Min Kim, DO, Kamala Shankar, MD

Disclosures: L. Williams: I Have No Relevant Financial Relationships To Disclose.

Objective: Familial lipomatosis is a hereditary syndrome of unknown prevalence where multiple discrete, encapsulated tumors are found on the trunk and extremities. Neurofibromatosis is a neuroendocrine abnormality comprised of a set of clinical symptoms and soft tissue tumors known as neurofibromas. Although clinical appearance of these tumors may look similar, the ultrasonographic characteristics are distinct.

Case Description: 55-year-old woman who presented with a ten year history of soft tissue lumps which began 10 years prior on her extremities and progressed to her torso. Her family history was significant for a father with multiple undiagnosed lumps. Physical examination revealed 20-30 subcutaneous, mobile, firm well demarcated nodules, 1-2 small areas of hyperpigmentation on the torso without skin tags or other signs of neurofibromatosis. She had associated pain and dysasthesias on several of the lumps. Further workup including MRI of the lumps on hip were unremarkable. Bedside ultrasound suggestive of lipoma without evidence of peripheral nerve involvement.

Setting: Ambulatory tertiary care physical medicine and rehabilitation clinic.

Results or Clinical Course: Her soft tissue swellings were later confirmed to be lipomas by biopsy.

Discussion: The soft tissue tumors of neurofibromatosis and familial lipomatosis are clinically similar, however, distinct differences may be seen on ultrasound. Familial lipomatosis portends a much better prognosis then neurofibromatosis and ultrasonography may be a useful diagnostic modality in differentiating these lesions.

Conclusion: Ultrasound may be a useful diagnostic modality for differentiating soft tissue lipomas from neurofibromatosis tumors.

Poster 290
Evaluating Osteopathic Manipulative Therapy (OMT) as a Treatment Modality for the Reduction of Chronic Stress in Medical Students
Trevor J. Tyner (Lake Erie College of Osteopathic Medicine, Bradenton, FL, United States), Chase Cavayero, OMS-II, Anthony Philips, OMS-II, Brooke Johnson, OMS-III, Thomas Quinn, DO, FAOCOPM


Objective: To explore the impact of osteopathic manipulative therapy on surrogate markers of psychological distress and autonomic dysregulation.

Design: The experimental treatment protocol consisted of seven minutes of lymphatic and autonomic focused treatments followed by a brief rest period. The placebo group received only “light touch” treatments in the corresponding anatomical regions.

Setting: Existing literature consistently demonstrates higher overall psychological distress amongst U.S. medical students relative to both the general public and demographic-matched peers. Having identified the prevalence of psychological distress among medical students, the next logical step is to investigate possible treatment options. Considering the accessibility of osteopathic manipulative therapy (OMT) in osteopathic colleges of medicine, there is a relative paucity of literature investigating the efficacy of psychobehavioral manipulation in distressed medical student populations.

Participants: 37 (n=37) students were randomly separated into experimental, placebo, and control groups.

Interventions: A period of six weeks of OMT was initiated.

Main Outcome Measures: Objective stress was measured using pre and post intervention samples of salivary alpha-amylase (sAA) and immunoglobulin A (sIgA), while subjective values of stress were measured with surveys repeated at weekly intervals.

Results or Clinical Course: Average change in perceived stress scale (PSS) in the Experimental group from survey 0 to survey 6 significantly differed (p=.033), while average change in placebo and control groups from survey 0 to survey 6 was not significantly different (p=.353 and p=.250 respectively). Independent laboratory analysis revealed a significant difference in average sIgA change between experimental and control groups (p=.007) but not between experimental and placebo (p=.28). The results for salivary alpha-amylase were not significant.

Conclusion: The study findings suggest that brief, structured manipulative treatments may improve the health status of medical students. Further studies should be conducted to explore the role of OMT as an adjunct treatment for psychological distress.

Poster 291
Inpatient Rehabilitation Outcomes of End Stage Renal Disease Patients and Barriers to Rehabilitation
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Disclosures: S. Zhang: I Have No Relevant Financial Relationships To Disclose.

Objective: 1. Assess rehabilitation outcomes of end stage renal disease (ESRD) patients on hemodialysis (HD) in acute rehabilitation. 2. Identify common barriers to favorable rehabilitation outcomes in this group.

Design: This is a retrospective chart review of the selected patients at Penn State Hershey Rehabilitation Hospital (PSHRH).

Setting: Inpatient rehabilitation facility (IRF).

Participants: All patients with ESRD on hemodialysis admitted at PSHRH between 8/5/2010-2/27/2014 and debility patients as control group during the same period.

Interventions: Not applicable.

Main Outcome Measures: Functional independence measure (FIM), FIM gain, FIM efficiency, length of stay (LOS), unplanned transfers to acute care and discharge destination.

Results or Clinical Course: There were 83 HD patients (F 26, M 57) with average age 66.1 year-old and 189 patients with average age of 70.1 year-old in control. FIM improved from 63.8 to 80.9 in HD patients and from 65.3 to 85.7 in control group. Approximately 80% of patients were discharged home for these two groups. LOS were 15.1 days in HD group and 13.3 days in control. FIM efficiency was 1.6 and 1.9 after missed therapy time adjustment. The most common barriers to participate in therapy are fatigue, pain, depression and orthostatic hypotension in HD patients.

Conclusion: ESRD patients on HD show slower but steady improvement compared to the control group primarily secondary to fatigue especially post dialysis fatigue, pain, depression and orthostatic hypotension. Therefore early interventions of these limiting conditions are expected to improve overall inpatient rehabilitation outcomes for HD patients. In addition, all ESRD patients should receive 15-hour therapy over 7-day instead of over 5-day for better tolerance to therapy.
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Poster 292
Correlating Knee Frontal Angle of the Drop-Jump and Single-Leg Step-Down Tests with Three-Dimensional Kinematics of Midstance Running Gait

Rondy M. Lazaro, MD (Virginia Commonwealth University, Richmond, VA, United States), Ryan Chapman, MS, Travis Peck, BA, Max Prokopy, MEd, Eric Magrum, DPT, Robert P. Wilder, MD


Objective: To determine whether knee varus/valgus during the single-leg step-down (SLSD) and drop-jump (DJ) tests correlates with three-dimensional (3-D) measurements of running gait kinetics and kinematics.

Design: Retrospective cross-sectional study.

Setting: University-based gait and motion analysis lab.

Participants: Previously collected data from 40 adult runners (26 females and 14 males) were analyzed.

Interventions: Three-dimensional joint kinematics and kinetics were measured as subjects performed a running trial, SLSD, and DJ. Frontal knee angles during SLSD and DJ were compared to 3-D joint angles, body segment alignment, and ground reaction forces during the midstance phase of running.

Main Outcome Measures: Strength and direction of these relationships between frontal knee angles during the SLSD and DJ tests and 3-D variables during midstance running were measured by calculating Pearson product-moment correlation coefficients.

Results or Clinical Course: For the correlations between SLSD knee varus/valgus and midstance running for the right knee frontal (RKF), right hip transverse (RHT), left knee frontal (LKF), and left hip transverse (LHT) angles, r values were .749, .883, .737, and .524, respectively (P < .001 for all). In the DJ test, r values for LKF, LHT, and RKF were .556 (P < .001), .507 (P < .001), and .405 (P < .009), respectively. RHT angle did not show a strong correlation between DJ and running as it did between SLSD and running (r = .294, P = .065).

Conclusion: Knee varus during the SLSD showed moderate to strong correlations with both knee varus and hip internal rotation during midstance running. Knee varus during the DJ showed weak to moderate correlations with midstance knee varus and hip internal rotation. Both the SLSD and DJ tests may be used to evaluate an athlete’s biomechanics, though the SLSD more accurately reflects biomechanics during running than the DJ does.

Poster 294
Percutaneous Cartilage Bone Interphase Optimization for Functional Restoration in Knee Osteoarthritis

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Disclosures: V. B. Vad: Ownership or Partnership - Vad Scientific LLC; Consulting Fees or Other Remuneration - Mitek Sports Medicine, Ferring Pharmaceuticals, Inc., Merz Pharma GmbH & Co.

Objective: Assess the efficacy of percutaneous cartilage bone interphase optimization (PeCaBoo) in improving pain and function associated with knee osteoarthritis.

Design: Prospective cohort study. Pain and function data collected at baseline, 3 months, and 6 months post-procedure. MRIs obtained pre- and 3 months post-procedure.

Setting: Private practice at a major hospital in Pune, India.

Participants: Ten study subjects total. Two participants had grade 4, two had grade 2, and six had grade 3 Kellgren-Lawrence medial compartment knee osteoarthritis.

Interventions: Participants initially received 300 micrograms of granulocyte colony stimulating factor (GCSF) injected subcutaneously to stimulate bone marrow and production of VESL. The next day, a repeat GCSF injection was performed followed by withdrawing 60cc of blood. The blood was spun and the layer containing VESL along with platelet-enriched plasma (PRP) were isolated using the standard PRP isolation kits equaling to 3cc in volume. Each patient then underwent arthroscopy with debridement. Each patient was then injected with 1cc of VESL and PRP combination in the superior and inferior chondral-bone interphase using the PeCaBoo delivery system under fluoroscopic-guidance with intravenous sedation followed by injection of 0.1cc of 10% calcium chloride. An additional 1cc of VESL and PRP combination was injected intra-articularly in the knee joint. Patients were instructed to walk daily with weight-bearing as tolerated at 48-hours post-procedure.

Main Outcome Measures: Western Ontario and McMaster University Osteoarthritis Index (WOMAC), 10cm Visual Analog Scale (pain), MRI evaluation of cartilage matrix.

Results or Clinical Course: The average WOMAC score pre-treatment was 55 and post-treatment was 36 at six months for all ten patients (P < .01). The average visual analog scale score was 67mm pre-treatment to 34mm post-treatment at six months (P < .01). Finally, the cartilage matrix was increased on the average of 41 percent based on MRI (range 0-108 percent).

Conclusion: Arthroscopically-assisted PeCaBoo may have potential in improving pain, function, and cartilage matrix integrity associated with knee osteoarthritis.

Poster 295
Twice Missed on MRI- Atraumatic Rupture of the Extensor Pollicis Longus Tendon after Casting for Dristal Radius Fracture in a Healthy 46 Year Old: A Case Report

Brennan J. Boettcher, DO (Mayo Clinic, Rochester, MN, United States), Jeffrey Brault, DO

Disclosures: B. J. Boettcher: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 46-year-old, right handed, healthy woman sustained a left distal radius fracture from a fall. After 5 weeks in a short arm cast, she developed numbness in the thumb and an acute inability to extend her thumb with no associated trauma. The cast was removed two days later, and she was placed in a wrist splint with the presumptive diagnosis of neurapraxia. She underwent multiple re-evaluations over 2 years without improvement in thumb extension, and ultimately an MRI was ordered of her wrist. The report revealed an intact EPL tendon. The patient was referred to our clinic for further evaluation. Examination was significant for no active left thumb extension and soft tissue swelling over the left dorsal wrist. Point of care ultrasound revealed a tendon in the location of the third dorsal compartment, which did not move with passive extension and flexion of the thumb. MRI review by a second radiologist with extensive experience in wrist MRI revealed extensor tenosynovitis in second and third dorsal compartments with an intact EPL. Formal diagnostic ultrasound revealed no EPL tendon present at the level of Lister’s Tubercle. There was a 4cm separation with the distal end located at the level of the scaphoid and the proximal end in the muscle bed in the distal forearm. Retrospective interpretation of MRI revealed only 4 tendons in the 4th dorsal compartment, with one slipped into position of the EPL in the 3rd dorsal compartment. The patient was referred for surgical repair. Operative findings confirmed tear of EPL tendon and spurring at Lister’s tubercle. An Extensor Indices Proprius (EIP) to EPL tendon transfer and debriding of the Lister’s Tubercle spur was performed.

Setting: PM&R Hand Clinic.

Results or Clinical Course: The patient had a technically successful surgical repair with an EIP to EPL tendon transfer as well as debridng of the spur on Lister’s Tubercle.
Poster 296

Effects of Hyaluronic Acid Injections in Patellar Tendinopathy Induced during Detraining

Antonio Frizziero, Assistant Professor (University of Padua, Padua, Italy), Francesca Salamanna, PhD, Milena Fini, MD, Elisabetta Falciere, MD, Marina Marini, MD, Stefano Masiero, MD

Disclosures: A. Frizziero: I Have No Relevant Financial Relationships

Poster 297

Ultrasound-Guided Knee Corticosteroid Injection Utilizing the Anteromedial Joint Line (AMJL) Approach in an Athlete with Medial Joint Line Pain: A Case Report

alcinto S. Guirand, MD (spaulding Rehabilitation Hospital, Boston, MA, United States), Minna Kohler, MD


Post 298

Arthrex Angel System® Parameters for High Platelet, Low Erythrocyte, Low Neutrophil Platelet-Rich Plasma: A Quality Control Study

Ryan Hubbard, MD (Mayo Clinic, Rochester, MN, United States), Jacob L. Sellon, MD, Rentaro Onishi, MD, Jay Smith, MD

Disclosures: R. Hubbard: I Have No Relevant Financial Relationships To Disclose.

Poster 299

A 47-year-old recreational marathoner presented with left knee pain and suprapatellar swelling S/P corticosteroid (CS) injection by an orthopedist with minimal improvement in pain. Prior MRI revealed a grade two MCL sprain. Examination of the left knee demonstrated suprapatellar swelling, medial joint line tenderness, discomfort with knee flexion, extension and valgus stress. Apley’s grind, anterior and posterior drawer tests were negative. In-office ultrasound (US) examination revealed a suprapatellar effusion, synovial thickening, partial tear of the MCL, and mild hypoechogenicity of the medial meniscus with protrusion consistent with meniscal injury. US-guided arthrocentesis/CS injection using a superolateral approach was provided with immediate pain relief and improved range of motion.

Setting: Tertiary center outpatient clinic.

Results or Clinical Course: The patient returned one month later with left knee medial joint line pain after increasing training mileage. Follow-up US revealed corticosteroid remnant within the suprapatellar synovium with no synovial thickening. Medial meniscus hypoechogenicity and MCL sprain/tendinosis persisted. US-guided anteromedial joint (AMJL) line CS injection was provided with successful pain relief. He resumed training and completed his marathon without difficulty.

Discussion: Meniscal injuries often present with joint line tenderness, effusion, and synovial thickening. US-guidance for complete joint effusion evacuation and CS injection using a superolateral approach can successfully resolve effusion and diffuse synovial thickening, but medial joint line pain can persist. The AMJL approach to US-guided injection can target remaining soft tissue abnormality to resolve localized pain.

Conclusion: In patients with medial meniscal injury with persistent medial joint line symptoms, US-guided injection using the AMJL approach should be considered as it may improve patient outcomes through more targeted therapy. There are currently no studies examining the efficacy of US-guided knee injection utilizing the AMJL approach versus alternative site or blind injection; future studies are warranted.

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an average of 4.40 mL and 3.07 mL of PRP, respectively ($p = .0015$). BV also positively correlated with PLT dose, as 180 mL and 120 mL of blood produced a mean $1.42 \times 10^9$ and $5.29 \times 10^9$ platelets, respectively ($p = .0052$). HCT setting influenced PMN concentration, with 1% and 2% yielding means 0.124 and 0.413 PMN concentrations compared to WB, respectively ($p = .0032$). There were significant gender differences in amount of PRP produced, with males and females producing an average of 4.67 mL and 3.28 mL, respectively ($p = .0032$).

**Conclusion:** Using 1%-2% HCT and 120-180 mL BV parameters, the Arthrex Angel System is capable of reliably producing PRP with high PLT concentrations, <10% of baseline RBCs and significantly reduced PMNs. Among the parameters tested, the 180 mL BV setting maximizes PRP volume and PLT dose. The 1% HCT setting yields lower PMNs than the 2% setting, though both significantly decrease PMNs relative to WB. Men produced more PRP volume, and thus, total PLT dose compared to women under the same system parameters.

**Poster 299**
Diagnosis of an Extensor Hallucis Longus Tendon Loose
Body by Dynamic Ultrasound- A Case Report

Maria I. Bascaran, MD (Harvard Medical School, Boston, MA, United States), Jonathon Wolf, MD, DiGiovanni Christopher, MD, Minna Kohler, MD

**Disclosures:** M. I. Bascaran: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 37-year-old woman presented with pain in the dorsomedial aspect of her left foot two years after undergoing a Lapidus arthrodesis with bunionectomy. Plain films showed fusion of first tarsometatarsal joint (TMT) and medial-middle cuneiform joint effusion. MRI showed normal appearance of the left extensor hallucis longus (EHL). Extremity examination revealed tenderness of the first TMT joint with clicking sensation on extension. The hallucus was unable to flex beyond neutral. Active extension was limited to neutral while passive extension was normal.

**Setting:** Tertiary care musculoskeletal ultrasound clinic.

**Results or Clinical Course:** Diagnostic ultrasound visualized a hyper-echoic linear density, consistent with a bony fragment, within the EHL tendon substance overlying the first TMT joint. Dynamic imaging of the tendon during passive first MTP flexion and extension movement showed tendon excursion reproduced pain and clicking sensation at the location of the bone fragment due to EHL tendon impingement. Further developments will be discussed.

**Discussion:** Loose bodies within a tendon are rare. In this case, in-office ultrasound revealed a small osseous fragment embedded in the EHL tendon which was unable to be identified by x-ray or MRI. The cause of the loose body is unknown, but it may have originated from the prior Lapidus procedure, which involves bony preparation and fusion of the first tarsometatarsal joint; perhaps a small fragment subsequently embedded itself within the tendon.

**Conclusion:** Ultrasound has higher spatial resolution than MRI. These findings support the ability of ultrasound to identify superficial bony fragments that may be too small to visualize by other imaging modalities. Dynamic ultrasound can directly visualize the bony fragment causing tendon impingement with provocative physical examination maneuvers to identify the etiology of pain with movement.

**Poster 300**
Diagnostic Musculoskeletal Ultrasonography of a Metatarsal Stress Fracture: A Case Report

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**Disclosures:** M. Gharib: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 57-year-old woman developed acute onset right foot pain during a recent vacation and an increase in walking activity. She localized mechanical pain to the dorsum of the right foot. On clinical examination, there was tenderness to palpation of the right second metatarsal shaft associated with soft tissue swelling. Initial plain radiographs were interpreted as normal. Real-time ultrasonography was obtained using a linear 8-13 MHz transducer. The dorsum of the metatarsal bones was imaged in longitudinal and transverse views. An irregularity was seen in the distal second metatarsal diaphysis with cortical disruption and periosteal elevation, but without surrounding hyper-vascularity on power Doppler mode.

**Program Description:** Right forefoot pain secondary to metatarsal bone stress fracture.

**Setting:** Outpatient musculoskeletal clinic.

**Results or Clinical Course:** The patient was diagnosed with second metatarsal stress fracture. She was placed in a walking shoe for three weeks followed by a gradual return to her established walking program.

**Discussion:** Stress fractures occur as a result of chronic overload or an abrupt increase in activity. Patients often present with mechanical pain and tenderness over the metatarsals. Plain radiographs may be normal, or show only subtle changes that may be overlooked. Currently, Magnetic resonance imaging (MRI) and bone scintigraphy are considered the gold standard, with few studies done to evaluate the utility of ultrasonography for diagnosis. In one study, ultrasonography had a sensitivity and specificity of 83% and 76%, respectively. An algorithm was proposed for the early diagnosis of metatarsal stress fractures including ultrasonography. Hypoechoic periosteal elevation, cortical disruption, and increased vascularity observed on Doppler are common findings. Currently, there are no well-defined diagnostic criteria for metatarsal stress fractures.

**Conclusion:** Ultrasonography has clinical utility in the diagnosis of metatarsal stress fractures. It is inexpensive, portable, safe, and non-invasive. Few studies have demonstrated the use of ultrasonography for the diagnosis of metatarsal stress fractures. Further studies should be considered to define the diagnostic criteria in order to optimize the sensitivity and specificity of testing and further describe limitations using ultrasound imaging.

**Poster 301**
Vertical Overhead Motion in the Rehabilitation of Lateral Elbow Injuries: a Biomechanical Study

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**Disclosures:** R. H. Manocha: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To quantify elbow stability during simulated rehabilitation exercises with the arm in the vertical overhead position. Following injury to the lateral collateral ligament (LCL), therapists often prescribe exercises with the arm overhead, as this is thought to enable the triceps and gravity to compress the elbow joint, increasing joint stability. This effect has yet to be proven biomechanically.

**Design:** Cadaveric kinematic study.

**Setting:** Bioengineering laboratory.

**Participants:** 7 fresh-frozen cadaveric upper extremity specimens with no pre-existing pathology.

**Interventions:** Specimens were tested in a custom elbow motion simulator that enabled motion via computer-controlled pneumatic actuators and motors attached to relevant tendons. Specimens were examined in 3 arm positions (vertical overhead, vertical dependent, varus) and underwent passive and simulated active elbow flexion and extension with the forearm maximally pronated. 3 injury patterns were studied (intact, partial LCL injury, complete LCL injury).

**Main Outcome Measures:** Ulno-humeral external rotation angle.
Results or Clinical Course: During all types of simulated rehabilitation exercises following both partial and complete LCL injury, vertical overhead positioning enhanced elbow stability as compared to other arm positions (P < .05). However, during elbow extension in the vertical overhead position following complete LCL injury, simulated active motion did not significantly improve stability as compared to passive motion (P = .071).

Conclusion: There is a biomechanical basis for doing exercises in the vertical overhead position following LCL injury. Previous studies show that muscle activation improves elbow stability when the arm is independently positioned. This investigation found, however, that the impact of active versus passive motion may be less significant when exercises are done with the arm overhead. Initiating earlier range of motion in the "safer" overhead position may prevent the development of elbow flexion contracture, a common occurrence post-ligamentous injury. Cadaveric studies can be used to elicit optimal rehabilitation strategies without causing patient discomfort.

Poster 302
Does Insulin Therapy Retard Osteophyte Formation in Knee Osteoarthritis in Type 2 Diabetes Mellitus?
Dha Shehab, BMBCH, FRCP (Kuwait University, Kuwait, Kuwait), Khaled Al Jarallah, BMBCH, FRCP, FACF, Nabila Abdella, FRCP (Lond,UK)


Objective: Published data on the effect of insulin therapy in the progression of osteoarthritis (OA) is sparse. Our objective was to investigate whether radiographic changes observed in knee osteoarthritis (OA) in Type 2 diabetes mellitus (T2DM) patients on insulin therapy differed from those not on insulin.

Method: A cross-sectional study.

Setting: General hospital, outpatient clinics.

Participants: 300 subjects (200 T2DM patients and 100 control subjects). Patients were categorized into three groups, T2DM patients not on insulin (G1, n = 99), T2DM patients on insulin (G2, n = 101) and non-diabetic control group (G3, n = 100).

Interventions: Plain X-ray Antero-posterior (AP) weight bearing and lateral views of the knee were used to assess the changes of knee OA.

Main Outcome Measures: Knee OA were assessed and graded using Kellgren-Lawrence (K-L) scale and the Osteoarthritis Research Society International (OARSI) Atlas grading scale.

Results or Clinical Course: 600 knee X-rays were evaluated. Significant association (P < .0001) was observed for OARSI-Joint Space Narrowing (JSN) and for osteophyte formation between the three groups. Comparing G2 and G3, the significant association (P < .0001) was retained for both JSN and for osteophyte formation. Comparing G1 and G2, significantly lesser osteophyte formation were noted in G2 patients compared to G1 patients (12.9% vs. 19.7%, P = .04). Multivariate logistic regression analysis showed that G2 group had less chance of osteophyte formation than both G1 group and G3 group, (odds ratio = 2.970, P = .006 and odds ratio = 0.108, P < .001, respectively) after inclusion of confounders such as age, gender and BMI.

Conclusion: Insulin therapy might retard the radiographic osteophyte formation than both G1 group and G3 group, (odds ratio < .0001) was observed for OARSI-Joint Space Narrowing (JSN) and for osteophyte formation between the three groups. Comparing G2 and G3, the significant association (P < .0001) was retained after Visit 1 to Visit 2, correlation analyses did not find any statistically significant or clinically relevant associations between Tsui tremor and any of the TWSTRS scores (all correlation coefficients less than 0.1 and all p > .05).

Conclusion: No associations were found between Tsui tremor (severity or duration) and the TWSTRS (Total and subscales), suggesting that tremor is an independent symptom of CD.
Twenty-one muscles were selected for injection at Visit 1; of these the 5 most commonly injected were splenius capitis (93% of patients), sternocleidomastoid (SCM) (91%), trapezius (63%), levator scapulae (42%), and the semispinalis capitis (27%). Other muscles were injected with a frequency between 0.4–6%. The mean total injected volumes were 1.05 ±1.16 mL for splenius capitis, 0.68 ±0.78 mL for SCM, 0.67 ±0.58 mL for trapezius, 0.42 ±0.26 mL for levator scapulae and 0.56 ±0.33 mL for semispinalis capitis. Mean number of injection points were: splenius capitis (2.7 ±1.5), SCM (2.2 ±1.2), trapezius (2.7 ±1.6), levator scapulae (1.5 ±0.7), and semispinalis capitis (2.0 ±1.3). At Visit 2 the frequency of muscles injected, the injected volume, and injection points were similar to Visit 1. Injection guidance techniques were used in 37% (SCM) to 57% (levator scapulae) of Visit 1 injections, and this did not change at Visit 2. Analyses by study center revealed that when an injector uses guidance for one muscle, they generally use it for all muscles.

Conclusion: In these interim analyses, 5 muscles were identified as being most frequently injected for CD, with other muscles being injected at much lower rates. The muscles and injection method (volume and number of injection points) are in line with recommendations in the literature and did not change between visits.

Poster 305
Patterns of Cervical Dystonia of Patients Receiving BoNT-A Treatment

Peter Misra, MD, FRCP (National Hospital for Neurology & Neurosurgery, London, United Kingdom), Richard Trosch, MD, Pascal Maisonobe, MSc, Savary Om, MD

Disclosures: P. Misra: Consulting Fees or Other Remuneration - Ipsen Pharma

Objective: To characterize the dystonic pattern of patients with cervical dystonia (CD) treated with botulinum neurotoxin type A (BoNT-A) in clinical practice.

Design: A meta-analysis was conducted on the baseline data from 3 observational studies. Data from a pre-planned interim analysis were used for one study (INTEREST IN CD2).

Setting: 2 international studies (INTEREST IN CD1 & 2, encompassing 9 and 8 countries, respectively) and 1 US registry (ANCHOR-CD).

Participants: 752 patients with idiopathic CD.

Interventions: Not applicable

Main Outcome Measures: Clinical examination

Results or Clinical Course: Most patients (92%) presented with focal dystonia, followed by 5% with segmental dystonia, 2% with multifocal dystonia and 1% with generalized dystonia. The predominant dystonic posture in the majority of patients was a pattern of rotational torticollis (71%) followed by 20.4% of patients with laterocollis, 4.4% with retrocollis and 2.5% with anterocollis. Only 23.6% of patients had a simple pattern of CD, while 76.4% had a complex pattern (>2 patterns and associated components); 22% of patients had at least 4 documented patterns. Overall, 27.8% of patients had rotational torticollis as a secondary pattern, 39.4% had laterocollis, 16.6% had retrocollis, 11.7% had anterocollis, 14.1% had a lateral shift of the column and 6.1% had a sagittal shift. Shoulder elevation was also a relatively common secondary pattern (31.6%). Almost half of patients (49%) had a head tremor, which was mostly mild. Of those patients with tremor, 52% had occasional tremor and 48% had continuous tremor.

Conclusion: Most patients presenting for routine injections of BoNT-A for CD have a predominant pattern of rotational torticollis/laterocollis. The majority had a complex pattern of CD, and almost half of all patients were experiencing tremor. These data highlight the need to tailor treatment to each individual patient.

Poster 306
Clinical Characteristics of Cervical Dystonia: Differences between Patients Previously Treated with Botulinum Neurotoxin Type A and Naïve Patients

Peter Misra, MD, FRCP, Richard Trosch, MD, Savary Om, MD, Pascal Maisonobe, MSc (Ipsen Pharma, Boulogne-Billancourt, France)

Disclosures: P. Maisonobe: Employment - Ipsen

Objective: To compare the clinical characteristics (as assessed by Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS)) of naïve patients with cervical dystonia (CD) presenting for treatment to those previously treated with BoNT-A who are at the end of their injection cycle and requiring reinjection.

Design: A meta-analysis was conducted on the baseline data from 3 observational studies. A pre-planned interim analysis were used for one of the study (INTEREST IN CD2).

Setting: 2 international studies (INTEREST IN CD1 & 2, with 9 and 8 countries, respectively) and 1 US registry (ANCHOR-CD).

Participants: 752 patients with idiopathic CD (616 previously treated with BoNT-A and 136 naïve).

Interventions: Not applicable

Main Outcome Measures: TWSTRS

Results or Clinical Course: There were no significant differences between subgroups in terms of patient demographics, but small differences in the predominant pattern of CD (previously treated vs. BoNT-A naïve) were noted: (rotational torticollis: 73% vs. 64%; laterocollis 19% vs. 26%; retrocollis 4% vs. 6%; other patterns <3% of patients). Previously treated patients had received a median of 8 (range 1–99) injection cycles; median time since their first BoNT-A injection was 44.7 (range 2–280) months. Overall, 60% had previously been treated with abobotulinumtoxinA, Dysport (median dose 500 U), 37% with OnabotulinumtoxinA, Botox (190 U) and 3% with IncobotulinumtoxinA, Xeomin® (150 U). BoNT-A naïve patients trended towards having higher TWSTRS total (mean±SD) (38.4±12.4 vs. 34.5±11.7), disability (11.7±6.6 vs. 9.8±6.0) and pain scores (8.9±5.1 vs. 6.6±5.0) at baseline. TWSTRS severity scores (mean±SD) were similar (17.9±5.0 vs. 18.0±4.7, respectively for BoNT-A naïve and previously treated patients).

Conclusion: When compared to previously treated CD patients, ‘new’ patients presenting for treatment with BoNT-A tend to have higher levels of pain and disability. This suggests that continued treatment reduces the severity of CD pain and disability or that the therapeutic effects of their prior injection series has not yet worn off and the benefits of BoNT-A may last longer than patients perceive.

Poster 307
Osteitis Condensans Ilii and Acetabular Labral Tear after Pregnancy: A Case Report

Jennifer E. Miller, MD (Spaulding Rehabilitation Hospital/Harvard Medical School, Charlestown, MA, United States), Vaishali Mittal, Minna Kohler, MD

Disclosures: J. E. Miller: I Have No Relevant Financial Relationships To Disclose.

Case Description: Patient presented with a 5-year history of chronic right greater than left hip pain which began after her first pregnancy. Examination demonstrated pain with right hip range of motion, and tenderness of the bilateral sacroiliac (SI) joints and right greater trochanter. MRI revealed edema adjacent to the inferior aspect of the iliac side of the SI joints bilaterally, corresponding with areas of sclerosis seen on a prior abdominal CT, and a minimally displaced anterosuperior...
A 25-year-old man with no medical history presented to the emergency department with acute onset low back pain, bilateral thigh pain, and dark urine after a two hour workout consisting of five-hundred pound dead-lift squats. The patient denied bowel/bladder incontinence, focal neurologic deficits, and displayed pain limited lower extremity weakness. He was found to have an elevated creatinine kinase and was started on treatment for rhabdomyolysis. On hospital day three the patient reported worsening low back pain. Magnetic resonance imaging and compartment pressure measurements were ordered. Imaging showed edema and enhancement of the posterior thigh and lumbar paraspinal muscles, and compartment pressures were elevated in these areas as well. Emergent fasciotomies of the lumbar paraspinals and posterior thigh compartment was performed. The patient was ambulatory on discharge with significant decrease in pain.

Setting: Inpatient hospital setting — Medical Floor.
Results or Clinical Course: Upon 9 week follow up, the patient recovered fully with no motor or sensory deficits other than mild numbness at the site of lumbar fasciotomies.

Discussion: Acute compartment syndrome (ACS) is commonly reported in the extremities. However, increased compartmental pressure can compromise perfusion of any fascial compartment. The muscular hypertrophy that occurs over time with chronic exercise reduces the volume available within the fascial compartment and contributes to compartment non-compliance. ACS involving the thigh has reported incidence of 0.027%, and there have been few case reports describing acute paraspinal muscle compartment syndrome.

Conclusion: Compartment syndrome is a life-threatening condition that places the patient at risk for multi-organ failure without prompt intervention and early recognition of the diagnosis. Few cases of ACS have been reported in the literature regarding the thigh or lumbar paraspinals. However, to the authors’ knowledge this is the first reported case of combined paraspinal muscle and posterior thigh exercise induced ACS.

Poster 311
Neck Strength in Healthy Adults: Normal Ranges, Correlations to Anthropometric Measurements, and Reliability of Measurement
Eva Catenaccio (Albert Einstein College of Medicine, New York, NY, United States), Atira H. Kaplan, MD, Weiya Mu, BA, Oren Jaspan, BA, Tamar Glattstein, BA, Malka Zughft, BA, Namhee Kim, PhD, Michael L. Lipton, MD, PhD

Disclosures: E. Catenaccio: I Have No Relevant Financial Relationships To Disclose.

Objective: Characterize neck strength (NS) across a population of young, healthy adults and its relationship to anthropometric characteristics. Characterize the reliability of repeated electronic dynamometry for NS measurement using both fixed frame (FFD) and handheld (HHD) approaches.

Design: Cohort study.

Setting: University research center.

Participants: 101 healthy volunteers (49 males, 52 females), ages 18-35.

Interventions: Not applicable

Main Outcome Measures: NS was measured in isometric extension (EXT), forward flexion (FF), and right (RLF) and left lateral flexion (LLF) in 101 subjects using the microFET2 dynamometer (Hoggan Scientific) mounted on a wall frame. Anthropometric characteristics including height, weight, BMI, neck length, neck circumference, and head circumference were measured. Two methods of NS measurement — FFD and HHD — were compared in a subset of subjects (4 in the FFD group, 5 in the HHD group) who were tested 4 times over 2 weeks.

Results or Clinical Course: Men had significantly higher average NS in all directions compared to women (unpaired t-tests, p < .001). In men, but not women, average NS in all four directions showed significant correlations with most of the anthropometric measurements (false discovery rate corrected, alpha = 0.05). Intra-session reliability for both methods of measurement was excellent (Intraclass correlation coefficient (ICC) > 0.75). Inter-session reliability of FFD was excellent for EXT and FF (ICCs > 0.75) and moderate for RLF and LLF (ICCs > 0.48). Inter-session reliability of HHD was excellent (ICC > 0.70), but failed to capture subject strength over a tester strength threshold of approximately 60lbs of force.

Conclusion: Anthropometrics may fail to appropriately characterize women’s cervical strength. Both FFD and HHD seem to be reliable approaches for NS measurement, but HHD depends on tester strength and may fail to capture the full range of NS. Using appropriate NS measurement methods is important when considering the role of NS in relation to concussion risk in athletes or interventions targeting chronic neck pain.

Poster 312
Diagnosis of a Lisfranc Ligament Tear in a Division 1 College Athlete Using Point-of-Care Musculoskeletal Ultrasound: A Case Report
Uvieoghene O. Ughwanogho, MD (Spaulding Rehabilitation Hospital/ Harvard Medical School, Charlestown, MA, United States), Anne H. Johnson, MD, Minna Kohler, MD


Case Description: 21-yr-old Division 1 college athlete with 5-week history of insidious pain along the right dorsal midfoot made worse with forefoot loading. Examination was significant for tenderness with palpation of the dorsal midfoot at the region of the Lisfranc joint and second metatarsal phalanges. Weightbearing x-rays showed no evidence of fracture. MRI showed an intact Lisfranc ligament with possibly increased signal, clinically raising suspicion for Lisfranc ligament injury.

Setting: Tertiary center outpatient clinic

Results or Clinical Course: Point-of-care musculoskeletal ultrasound (MUS) examination of the dorsum of the foot demonstrated hypochoogenicity and thickening of the Lisfranc ligament at the medial cuneiform, 2nd metatarsal base. There was a partial anechoic defect at the medial aspect of the ligament consistent with a partial tear, confirming clinical suspicion. Dynamic view of the medial-cuneiform-M2 joint articulation showed no instability.

Discussion: The Lisfranc ligament complex serves as a vital midfoot stabilizer. As a result, pathology within the complex can often be a source of midfoot pain. While standard radiograph remain the mainstay of diagnosing Lisfranc ligament injuries, up to 20% of such injuries seen in the emergency department (ED) are misdiagnosed due to false negative rates. MRI can be unrevealing as well. Point-of-care MUS has higher spatial resolution for smaller, superficial structures than MRI and can aid in the diagnosing of Lisfranc ligament tears by providing direct visualization of the dorsal segment of the Lisfranc ligament complex.

Conclusion: MUS is a readily available, less time consuming, and cost-effective imaging modality that can aid clinicians in the diagnosis of Lisfranc ligament injuries. Dynamic MUS additionally allows for instability assessment. Given the high false negative rates of standard radiographs, MUS would serve as a practical, and perhaps more optimal diagnostic tool for investigating Lisfranc ligament injuries.

Poster 313
How a Seemingly Minimal Physical Examination Finding Unveiled a More Serious Condition: A Case Report
Joshua Rothenberg, DO (Miller School of Medicine at the University of Miami, Miami, FL, United States), Kimberly Ross, Alexander Harrington, BS, MBA, Alberto Panero, DO

Disclosures: J. Rothenberg: I Have No Relevant Financial Relationships To Disclose.

Case Description: Cerebral contusion following a concussion is a severely debilitating and possibly life-threatening condition that is not readily uncovered in American football players. We describe the case of a 16-year-old high school male who presented to a university-based concussion clinic 5 days post helmet-to-helmet collision with symptoms of nighttime headaches, dizziness, and difficulties with concentration and word finding. Neurocognitive evaluation demonstrated decreased visual and verbal memory, along with a very high concussion symptom score on the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT®).
Unusual Calf Pain in a Young Athlete: A Case Report

Case Description: A 23-year-old long distance runner with right calf pain starting 4 months after weighted calf presses. Pain was initially sharp but transitioned to achy/burning pain with associated exercise induced fatigue of the upper calf. Symptoms progressed with development of blanching, numbness and coolness in his first 3 toes when power walking. Physical examination revealed mild tenderness of right medial gastrocnemius and diminished pulse when compared to contralateral foot with no leg discoloration, coolness or sensory deficits. Of note, he was seen by 3 physicians prior to evaluation. MRI arthrogram was ordered showing an anomalous course of the medial gastrocnemius with a fibrous band causing 2cm of high-grade popliteal artery stenosis which worsened with plantar flexion (PF). Post-exercise muscle edema was present suggestive of ischemic changes. Right ankle brachial indices were normal at rest but decreased with both dorsiflexion and PF, with a great toe pressure of 0 mmHg upon PF. Of note, the left gastrocnemius had a fibrous band but no popliteal artery compression.

Setting: Tertiary care hospital.

Results or Clinical Course: Anticoagulation was started until fibrous band excision with right popliteal thromboendarterectomy and patch angioplasty could be done. Three weeks post-op the patient remains symptom free.

Discussion: Popliteal artery entrapment syndrome (PAES) is frequently diagnosed by sports medicine specialists. The condition is either unknown or frequently overlooked by non-sport specialists, possibly because athletes are generally healthy without atherosclerosis risk factors. True incidence is unknown, however prevalence is 0.16-3.5%. Interestingly, in young patients with intermittent claudication PAES is found in 40% of the cases.

Conclusion: Claudication like symptoms in a young athlete should be considered PAES until proven otherwise in order to avoid further morbidity and limb loss. More awareness of PAES will be beneficial, not only in the sports medicine field but among non-sports specialists as well.

Poster 316
The Importance of Image Guidance in Glenohumeral Joint Injection Accuracy

Ryan Mattie, MD (San Jose, CA, United States), David J. Kennedy, MD

Participants: 162 patients comprising 165 glenohumeral joint injections.

Interventions: All GHJ injections were initially placed via anatomic landmark guidance by either a PM&R interventional fellow (inexperienced provider) and a PM&R attending physician with more than 5 years of post-fellowship practice (experienced provider) using either an anterior or posterior approach.

Main Outcome Measures: Analysis of accuracy rates was undertaken, specifically comparing the physician level of experience, as well as an anterior versus a posterior approach.

Results or Clinical Course: The overall accuracy of a blind glenohumeral joint (GHJ) injections between PM&R interventional fellows (inexperienced provider) and a PM&R attending physician with more than 5 years of post-fellowship practice (experienced provider) using either an anterior or posterior approach.

Design: Retrospective analysis of prospectively collected data.

Setting: Outpatient academic interventional suite.

Participants: 162 patients comprising 165 glenohumeral joint injections.

Interventions: All GHJ injections were initially placed via anatomic landmark guidance by either a PM&R interventional sports and spine fellow or by an attending PM&R physician. Once the fellow or attending physician felt the needle was correctly positioned in the GHJ space, contrast medium utilizing live fluoroscopy was injected to determine if intra-articular placement had been obtained.

Main Outcome Measures: Analysis of accuracy rates was undertaken, specifically comparing the physician level of experience, as well as an anterior versus a posterior approach.

Results or Clinical Course: The overall accuracy of a blind glenohumeral joint injection, regardless of the provider level of experience, was 45.5%. The inexperienced provider was accurate 37.6% of the time, and the experienced provider was accurate 64.6% of the time. The difference in provider accuracy based on level of experience was shown to be statistically significant at P < .05. One-hundred and fifty injections were performed using the anterior approach, with 71

Poster 315
Unusual Calf Pain in a Young Athlete: A Case Report

Melissa Learned, MD (Univ. of Ark for Medical Sciences, Little Rock, AR, United States), Alexandra Rivera Vega, MD, Guillermo Escobar, MD, Roopa Ram, MD

Disclosures: M. Learned: I Have No Relevant Financial Relationships To Disclose.

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Setting: Tertiary care hospital.

Results or Clinical Course: Anticoagulation was started until fibrous band excision with right popliteal thromboendarterectomy and patch angioplasty could be done. Three weeks post-op the patient remains symptom free.

Discussion: Popliteal artery entrapment syndrome (PAES) is frequently diagnosed by sports medicine specialists. The condition is either unknown or frequently overlooked by non-sport specialists, possibly because athletes are generally healthy without atherosclerosis risk factors. True incidence is unknown, however prevalence is 0.16-3.5%. Interestingly, in young patients with intermittent claudication PAES is found in 40% of the cases.

Conclusion: Claudication like symptoms in a young athlete should be considered PAES until proven otherwise in order to avoid further morbidity and limb loss. More awareness of PAES will be beneficial, not only in the sports medicine field but among non-sports specialists as well.

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Results or Clinical Course: The overall accuracy of a blind glenohumeral joint injection, regardless of the provider level of experience, was 45.5%. The inexperienced provider was accurate 37.6% of the time, and the experienced provider was accurate 64.6% of the time. The difference in provider accuracy based on level of experience was shown to be statistically significant at P < .05. One-hundred and fifty injections were performed using the anterior approach, with 71
(47.3%) showing intra-articular flow. Fifteen injections were performed using the posterior approach, and 4 (30.8%) had intra-articular flow. There was no statistically significant difference between the anterior and posterior approaches regardless of physician level of experience.

Conclusion: The results of this study suggest that image guidance is an important utility for accurate navigation into the glenohumeral joint space. Although the experienced physician had a significantly higher accuracy rate with blind GHJ injections than those physicians at the fellowship level, the experienced physician still missed the intra-articular space on initial attempt more than 30% of the time. Neither the anterior nor the posterior approach proved to be significantly more accurate for blind GHJ injections regardless of provider experience.

Poster 317
Effect of Extracorporeal Shock Wave Therapy for Guyon’s Canal Syndrome (Case Series)

Jeong Hwan Seo, MD, PhD (Chonbuk National University Hospital, Jeonju-si, Korea (the Republic of)), Myoung Hwan Ko, MD, PhD, Sung Hee Park, MD, PhD, Gi wook Kim, MD, Yun Gyu Sang, MD

Disclosures: J. Seo: I Have No Relevant Financial Relationships To Disclose.

Objective: Guyon’s canal syndrome is caused by entrapment of the ulnar nerve in the Guyon canal as it passes through the wrist. Conservative and surgical approaches are used for management of Guyon’s canal disease but it is known that the effect of treatments are not satisfactory. The purpose of this study is to show the effect of extracorporeal shock wave therapy (ESWT) as a new strategy for Guyon’s canal syndrome.

Design: Guyon’s canal syndrome was detected by electromyography. Four patients were diagnosed. ESWT was applied to four hands of patients with Guyon’s canal syndrome, twice a week for 6 weeks, with an average of 1500-2000 shocks at 0.03 mJ/mm². Outcome measures including nerve conduction study and the visual analog scale (VAS) were performed at baseline and at 6 weeks after the treatment.

Results or Clinical Course: Our results showed a significant reduction in theVAS at 6 weeks after treatment compared with the baseline. For the electrophysiologic parameters, there were shortenings of sensory and motor latencies and better action potential amplitudes after treatment.

Conclusion: ESWT can be useful method for treating with Guyon’s canal syndrome. Furthermore, it has the advantage of being noninvasive.

Poster 318
Undiagnosed Stress Fracture and Osteonecrosis of the Tibia in an Active Transtibial Amputee: A Case Report

Mary Caldwell, DO (McGaw/Northwestern/Rehabilitation Institute of Chicago, Chicago, IL, United States), Todd Kuiken

Disclosures: M. Caldwell: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 77-year-old healthy man, history of traumatic transtibial amputation at age 12, presented with right residual limb pain for 2 years. Pain began gradually, located at the distal aspect of the residual limb, occurring only with weight bearing. Multiple sockets trialed over the past 2 years, as well as gabapentin, without relief. To continue working full time as a farmer, patient switched to crutch ambulation the previous year with occasional prosthesis use.

Program Description: Rehabilitation Institute of Chicago.

Setting: Outpatient amputee clinic.

Results or Clinical Course: Examination pertinent for 20% of the tibia remaining and minimal muscle mass. Tenderness posteriorly at the distal edge of lateral tibia to deep palpation. MRI of the knee revealed imaging consistent with a distal tibial chronic stress fracture and osteonecrosis. The patient was referred to orthopedic surgery for revision to remove the necrotic bone.

Discussion: We report a unique case of an undiagnosed stress fracture in an amputee for 2 years, complicated by osteonecrosis. In this case, it is difficult to determine the etiology of either pathology, or which pathology preceded the other. Stress fractures in adaptive/non-adaptive athletes have been reported from overuse with heavy-load repetitive exercise and improper asymmetric mechanics. It is possible that repetitive farming activities (with no clear socket challenges) led to stress fracture; while failure to offload, led to osteonecrosis. However, it is also possible, given his age, that the osteonecrosis was caused by poor blood supply to the region.

Conclusion: In a previously active amputee with gradual onset of residual limb pain, and without improvement to a conservative approach, unusual pathologies and MRI should be considered.

Poster 319
An Unexpected Presentation and Treatment for Unilateral “Foot Drop” in a Triathlete: A Case Report

Humaira Ashraf, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Joseph M. Ihm, MD


Case Description: A 40-year-old man triathlete presented with progressive left great toe catching with ambulation. At the time of evaluation, he only maintained left lower limb ground clearance by crutch ambulation the previous year with occasional prosthesis use.

Results or Clinical Course: His presentation was concerning for foraminal stenosis. A single photon emission computed tomography (SPECT) scan was performed using the posterior approach, and 4 (30.8%) had intra-articular flow. Outpatient amputee clinic.

Program Description: Rehabilitation Institute of Chicago.

Setting: Outpatient musculoskeletal clinic.

Results or Clinical Course: Magnetic resonance imaging of the spine showed normal presynaptic dopamine uptake. He was referred to a movement disorder specialist and given a diagnosis of action-induced dystonia. He was started on a low dose trial of trihexyphenidyl, a M1 muscarinic antagonist to control spasticity. The patient reported improved control of muscle tone and gait. Based on this response, he was scheduled for gait analysis and targeted botulinum injections.

Discussion: Action-induced dystonia is an uncommon abnormality of gait that may be incorrectly diagnosed as a psychosomatic condition or young-onset Parkinson’s Disease. Our patient benefited from an
anti-muscarinic agent that selectively blocks smooth muscle receptors. While less than 5 cases of running-induced dystonia have been reported in the literature, this is the first case to our knowledge that responded to trihexyphenidyl.

Conclusion: Obtaining a task specific history may be necessary to reveal the dynamic nature of action-induced dystonia and suggests the need for gait analysis. A trial of trihexyphenidyl may help improve gait and muscle function in this rare disease entity.

Poster 320
Case of Thoracic Disc with Anterior Chest and Left Arm Pain Mimicking Cardiac Disease
Bindu Sundar, DO (RIC, Chicago, IL, United States), Monica Rho, MD
Disclosures: B. Sundar: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 33-year-old man with left-sided chest and arm pain initially presented to the emergency department. Pain was radiating to his anterior chest wall and down his left upper extremity (UE) with tingling/numbness in the fingers. Cardiac workup was negative. Follow up with his primary care doctor resulted in diagnosis of carpal tunnel syndrome and treatment with oral steroids and wrist splint, resulted in minimal relief. Electrodiagnostics of the left UE and MRI of cervical spine were negative. Patient presented to our clinic after all this work up was negative. Physical examination demonstrated 5/5 strength in the bilateral upper and lower extremities. Sensation was decreased in the T5 dermatome on the left. Increased pain radiating to anterior chest wall with seated thoracic flexion and rotation to the right, relieved by cervical extension. Positive UE dural tension signs with radial bias on the left.
Setting: Outpatient sports and spine clinic.
Results or Clinical Course: We ordered MRI thoracic spine, which demonstrated a significant left paracentral disc protrusion at T3-4 with no cord edema. At T6-7 there was a large right paracentral disc extrusion that migrated superiorly and impinged the right half of the spinal cord shifting the spinal cord to the left. We initiated McKenzie physical therapy focusing on cervical and thoracic extension based exercises. At follow-up after 10 sessions of PT his symptoms were reduced by 70-80%.
Discussion: This is a case of thoracic radiculitis mimicking cardiac disease, carpal tunnel syndrome and cervical radiculitis. This case presents a unique differential for patients presenting with left sided chest pain with upper extremity radiculitis with negative electrophysiology and cervical imaging.
Conclusion: Symptoms from a thoracic disc protrusion can overlap with many other clinical pathology and should be considered on the differential in an individual with anterior chest wall and upper extremity pain.

Poster 321
Ultrasound Evaluation of Thoracic Radiculopathy in Scoliosis after Fusion: A Case Report
Oluwaseyi A. Gbade-Alabi, MD (Walter Reed National Military Medical Center, Bethesda, MD, United States), Yin-Ting Chen, MD
Case Description: A 53-year-old woman with history of idiopathic scoliosis status post T2-to-iliac fusion and T12-to-L2, L5 hemi-laminectomy 10 years ago. Patient progressively developed right-sided abdominal swelling, bloating, constipation, pain, paresthesia, and right-sided truncal weakness. Workup and treatment by Gastroenterology were unhelpful. Patient was seen in PM&R for evaluations, which included radiography, ultrasound examination, and ultrasound-guided electromyography (EMG).
Setting: Outpatient tertiary care outpatient clinic.
Results or Clinical Course: Spine radiographic studies demonstrated stable lumbar levoscoliosis without any hardware loosening. Ultrasound showed thin and fibrotic right obliques, abdominis transversalis, and rectus abdominis muscles compared to the left side, without volitional contractions. Ultrasound-guided EMG of the right T5-6 and T9-10 intercostal muscles, right rectus abdominis, and right internal obliques demonstrated severe denervation. Abdominal binder was provided for patient to improve abdominal discomfort.
Discussion: Chronic thoracic radiculopathy is a rare condition, and in this case it led to a very unusual presentation. The combination of ultrasound evaluation and electrophysiological assessment with ultrasound guidance was instrumental in making the diagnosis in this unusual case.
Conclusion: History of spinal fusion with progressive truncal weakness and abnormal abdominal muscle tones should alert physiatrist to the possibility of thoracic radiculopathy. The use of ultrasound can facilitate neuromuscular assessment through direct visual assessment and guided electromyography assessment.

Poster 322
Atraumatic Spinal Accessory Neuropathy in the Setting of a C7 Radiculopathy in a Weight-lifter: A Case Report
Bradley Schuessler (University of Kansas Medical Center, Kansas City, KS, United States), Casey Smith, MD
Disclosures: B. Schuessler: I Have No Relevant Financial Relationships To Disclose.
Case Description: MT is a 31-year-old male weightlifter with a one-year history of neck and right periscapular pain. He first noticed pain and weakness with overhead pull downs and tricep dips, but does not recall an inciting event. His pain improved with two weeks rest, but returned after resuming weightlifting. He also noted neck pain, numbness, and weakness which radiated into the posterior aspect of his right upper extremity. The patient was evaluated and diagnosed with cervical radiculopathy. Conservative treatment was ineffective, and he presented for further workup. Musculoskeletal (MSK) examination revealed mild atrophy of the right trapezius and tricep muscles. On neurologic exam, right trapezius and right wrist extension were 4/5. All other exams were negative.
Setting: University of Kansas Spine Center.
Results or Clinical Course: MRI of the cervical spine revealed a C6-C7 disc protrusion. EMG showed mild, right spinal accessory neuropathy. The patient was diagnosed with right C7 radiculopathy with concurrent spinal accessory neuropathy, and a focused comprehensive rehabilitation program was prescribed for both conditions.
Discussion: Spinal accessory nerve (SAN) injury is most often associated with posterior neck surgery or trauma. Patients with spinal accessory neuropathy complain of shoulder pain and weakness, particularly with overhead activity. Trapezius muscle weakness can cause shoulder drooping, lateral scapular winging, weak shoulder shrug, and trapezius muscle atrophy. Comprehensive MSK and neurologic exams are imperative in evaluating patients with atypical symptoms of neck or back pain, as concurrent neurologic or MSK conditions may be present. Physiotherapy is the preferred initial management of SAN injury, but surgical intervention is recommended if there is no improvement. The etiology of spinal accessory neuropathy can be difficult to distinguish. In our patient, the amount of muscle hypertrophy likely contributed to compression of the nerve.
Conclusion: Spinal accessory neuropathy is an uncommon cause of periscapular pain. Establishing a broad differential diagnosis is vital to providing optimal care to patients with complaints of MSK changes. It is important to perform a comprehensive history and a
thorough MSK and neurologic examination in evaluating these patients.

**Poster 323**
Sphenopalantine Ganglion (SPG) Block for Management of Chronic Post-Traumatic Headaches after a Sport-Related Concussion: Case Report

Walter Sussman, DO (Emory University, Atlanta, GA, United States), R. Amadeus Mason, MD, Ken Maunzer, MD

Disclosures: W. Sussman: I Have No Relevant Financial Relationships To Disclose.

Design: Case Report

Case Description: The patient sustained a concussion during a helmet-to-helmet hit. At three-weeks after the concussion, the patient continued to be symptomatic. The patient had an Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) symptom score of 15. By week-six, the ImPACT symptom score had decreased to 2, however, the patient continued to have daily headaches. After failing acetaminophen, the patient was started on topiramate 50mg twice daily for symptomatic management.

Setting: Sports medicine clinic.

Results or Clinical Course: At twelve-weeks, the patient continued to have headaches interfering with school and preventing a full return to sport. The decision was made to treat the patient with an intranasal SPG block. After the SPG block, the patient was symptom free and able to return to school and football. At the 6-month follow-up, the patient remained symptom free.

Discussion: Post-traumatic headaches (PTHs) are headaches that develop within 7 days of a head injury, and in cases that persists for more than 3 months the headache is classified as chronic. Therapeutic options for PTHs are often the same as for their non-traumatic counterparts. In cases refractory to standard treatment, the SPG has been described as a therapeutic target in various headache disorders, including cluster headaches, migraine headaches, and tension-type headaches. Here we present the first report of successful treatment of PTHs after a sport-related concussion.

Conclusion: Intranasal SPG block is a safe and effective treatment for refractory chronic PTHs after a sport-related concussion.

**Poster 324**
Paget-Schroetter Disease in a College Student after Weight-Lifting: A Case Report

Louis Graham, MD (University of Missouri, Columbia, MO, United States), Mohammad Agha, MD

Disclosures: L. Graham: I Have No Relevant Financial Relationships To Disclose.

Case Description: Patient: 19-year-old male referred by student health for suspected left pectoralis major tear.

Case Description: The patient presented with one-week history of left arm and chest wall pain, denying pain below the elbow. He noticed swelling in the left arm after performing shoulder, then chest workouts on consecutive days. He reported asymmetric engorgement of left arm veins, and had not exercised in the last 7 days. Vitals revealed hypertension at 153/94, but normal oxygen saturation and heart rate. Examination revealed prominent venous engorgement over the left pectoralis major and clavicle and 2+ bilateral radial pulses. There were no strength or neurologic deficits.

Setting: Physical Medicine and Rehabilitation Clinic.

Results or Clinical Course: Venous Duplex Doppler of the left arm revealed Deep Vein Thrombosis (DVT) in the subclavian, axillary, cephalic and basilic veins. He was referred to the Emergency Department for a chest CT scan, which showed bilateral pulmonary emboli. He was admitted to observation and started on enoxaparin with bridge to warfarin. Antiphospholipid antibody, antithrombin 3, factor V, protein C&S were negative. He was discharged home on anticoagulation and saw cardiothoracic surgery one week later in clinic. Thrombolysis was not recommended because of non-acute onset and risks outweighed benefits. Repeat ultrasound one month later showed resolution of occlusive thrombus, and he continued warfarin for 6 months with plan for lifetime aspirin.

Discussion: Literature review indicated catheter directed thrombolysis is the optimal treatment of acute effort induced DVTs within 10-14 days. Anticoagulation alone is the minimal treatment. There is no clear answer on benefit of anatomic decompression of the subclavian vein by first rib resection or scalenectomy. Literature favors more conservative treatment of subacute/chronic DVTs.

Conclusion: Although rare, effort induced DVT should be considered in young athletes with arm pain. Further, treatment of acute DVTs with thrombolysis provides for best outcome.

**Poster 325**
Cavus Feet as a Cause of Anterior Groin Pain: A Case Report

Phuong Le, DO (Montefiore Hospital Medical Center, Bronx, NY, United States), Dennis D. Kim, MD

Disclosures: P. Le: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 41-year-old healthy man referred for groin pain for 1 year. He also reported pain in the left 5th metatarsal for 10 years. He noticed worsening anterior groin pain, left more than right, after wearing custom-made foot orthoses for his cavus feet. He denied numbness, tingling or weakness in lower extremities. Examination revealed tenderness along the inguinal ligaments. Hip internal rotation was limited. There was severe tenderness at the styloid process of the left 5th metatarsal. There was a marked degree of cavus feet and lateral foot weightbearing. The foot posture score was -5 on the left and -6 on the right. He also exhibited tight heel cords and a rigid subtalar joint. The existing orthoses have high and stiff arches. Hip MRI did not reveal femoral acetabular impingement or soft tissue injuries.

Setting: Outpatient foot clinic of an academic institution.

Results or Clinical Course: Our treatment began with stopping the use of existing orthoses. We recommended soft roomy sneakers with removable insoles and $\frac{1}{4}$ inch heel lift to accommodate the gastrocnemius tightness and hindfoot lateral wedges to prevent further weightbearing on the lateral feet and physical therapy to promote pronation response, and gastrocnemius and hip internal rotator lengthening exercises. Three months after the initial visit, the patient reported significant pain relief.

Discussion: The pes cavus feet are likely congenital and promote weightbearing on lateral feet, especially at the 5th metatarsals which may explain the left foot pain. The tight gastrocnemius promotes hypersupination of the rigid subtalar joint. The supination response causes stretching of the inguinal ligaments resulting in compensatory tightening of the hip internal rotators. The high arch and stiff orthoses may aggravate his groin pain by promoting further supination response and worsen the already tightened hip internal rotators.

Conclusion: Because pathologies of the hip were ruled out and the patient’s improvement, we propose that the groin pain is secondary to compensatory mechanisms due to his congenital cavus feet worsened by stiff and high arch orthoses. With a strong knowledge of lower extremity biomechanics and the use of simple in-office footwear modifications, a physiatrist can significantly alleviate a patient’s proximal pain caused by a distal deformity.

**Poster 326**
Synovial Chondromatosis of the Knee: A Case Report

Yasin Demir (Turkish Armed Forces Rehabilitation Center, Ankara, Turkey), Umut Güzelk üçük, MD, Ayca Uran, Resident, Evren Yasar, MD, Arif K. Tan, Professor
Disclosures: Y. Demir: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 36-year-old man was admitted to our department with pain of the right knee. He specified that his pain had started eight months ago and the pain had been occurring while running and bending the knee. He was diagnosed with chondromalacia patella before. Medical treatment and exercise training program were prescribed according to this diagnosis but his symptoms didn’t regress after the treatment. On physical examination, right knee joint ranges of motion and muscle strength were normal. Popliteal fossa was tender on palpation.

Setting: Tertiary care hospital.

Results or Clinical Course: Routine laboratory tests and X-ray evaluation were normal. Magnetic resonance imaging (MRI) revealed synovial chondromatosis in the popliteal fossa. Surgical resection was performed and his symptoms regressed after the surgery.

Conclusion: Synovial chondromatosis is a rare clinical disorder which consists of metaplastic cartilage formation. Clinicians should take into consideration this pathology in patients who have tenderness in popliteal fossa. The MRI should be done to confirm the diagnosis.

Poster 327
Role of Ultrasonography in the Detection of Biceps Tendon Dislocation: A Case Report

Yasin Demir (Turkish Armed Forces Rehabilitation Center, Ankara, Turkey), Berke Aras, MD, Koray Aydemir, Arif K. Tan, Professor

Disclosures: Y. Demir: I Have No Relevant Financial Relationships To Disclose.

Case Description: 25-year-old man was admitted to our clinic with shoulder pain. In his medical history, he had a traffic accident 3 months ago, forced closed shoulder reduction was applied about 20 minutes but when this procedure failed, the reduction applied under anesthesia and after reduction the pain started. The patient received 15 sessions of physical therapy but minimal reduction in pain was observed. In physical examination, minimal swelling in the front of the shoulder and tenderness with palpation was revealed, the speed test was positive. Two cm reduction in circumference was present on the right arm. Muscle strength of right elbow flexion and forearm supination was 4+/5.

Setting: Tertiary care hospital.

Results or Clinical Course: Shoulder range of motion and laboratory findings was normal. Shoulder USG showed that the long head of biceps tendon was localized at medial of the bicipital groove and edema surrounded the tendon. The pathology was confirmed with magnetic resonance imaging. The patient was referred to an orthopedic service for surgery.

Conclusion: Dislocation of the long head of the biceps tendon (DLHBT) should be kept in mind in patients with a history of shoulder subluxation and closed shoulder reduction. DLHBT can be diagnosed with USG that is widely used in clinical practice.

Poster 328
Successful Treatment of Knee Pain Secondary to Steroid Induced Avascular Necrosis with Alendronate: A Case Report

Angie Lastra, MD (Department of PM&R, Miller School of Medicine at the University of Miami, Miami, FL, United States), Lauren Lerner, MD, Andrew L. Sherman, MD, Ly Vu, Medical Student

Disclosures: A. Lastra: I Have No Relevant Financial Relationships To Disclose.

Case Description: 37-year-old woman suffered a complicated respiratory infection that required admission to the intensive care unit, intubation, prolonged hospitalization, and a course of high-dose corticosteroids. She presented two years later to us with history of atraumatic bilateral knee pain that worsened with weight bearing and movement. The pain was debilitating and interfering with even basic weightbearing ADL’s that resulted in reduced ambulation to under 1 block. Physical examination findings included antalgic slow gait, bilateral knee crepitus, quadriceps femoris muscle atrophy, right knee valgus deformity, decreased range of motion (ROM), diffuse tenderness, and weakness in the quadriceps. Magnetic resonance imaging studies revealed knee, distal femur and proximal tibia avascular necrosis (AVN) bilaterally. Surgery was rejected by the Orthopedics because of the extension of the AVN to the adjacent long bones. Previous treatment with NSAIDs, analgesics and physical therapy were all ineffective.

Program Description: Physical Medicine and Rehabilitation Residency Program.

Setting: Ambulatory clinic academic medical center.

Results or Clinical Course: The patient was started on alendronate 70mg oral once weekly for 4 weeks. After 4 weeks she had significant improvement in pain, functional status, and physical examination findings. Improvement began within 2-4 days of starting the medication. With a pain score assessment scale from 0-10, pre-treatment pain score was 10, and post-treatment pain score was 0. Patient was able to ambulate without difficulty and had no pain ROM or palpation of the knee.

Discussion: Prior studies and a few case reports have shown a possible beneficial effect and pain relief of bisphosphonates in AVN of the knee. To our knowledge there are no case reports that discuss the use of Alendronate in steroid-induced knee AVN. This case demonstrates the potential application of alendronate, as a therapeutic regimen for knee pain secondary to AVN.

Conclusion: This case illustrates the potential for bisphosphonates, specifically alendronate, to be used as a management option for pain and functional improvement associated with AVN of the knee. While further continuation of alendronate therapy and subsequent follow up is warranted in this patient, recognition of this management option is notable for patients who cannot undergo surgical intervention.

Poster 329
Long-Distance Runner with Buttock Pain and Radiological Evidence of Hypertrophied Piriformis: A Case Report

Holly A. Pajor, DO (Schwab Rehabilitation, Chicago, IL, United States), Zainab A. Najaf, MD, Amir El Shami, MD

Disclosures: H. A. Pajor: I Have No Relevant Financial Relationships To Disclose.

Case Description: A previously healthy, 21-year-old female runner who averages running over 90 miles per week presented with 5 weeks of worsening left buttock pain. She described her pain as tight and achy in quality. Her pain was worsened with putting on her shoes, walking at an incline and stretching her buttocks. Physical examination was significant for severe tenderness to palpation of the piriformis and pain with left hip flexion and external rotation. Gait analysis was significant for increased clockwise torque of her body with running. MRI demonstrated asymmetry of the piriformis with the left being substantially larger than the right.

Setting: Outpatient sports medicine clinic.

Results or Clinical Course: The patient was given two trigger point injections over one month into the piriformis muscle and referred to an exercise physiologist for a comprehensive gait analysis and strengthening program to correct the asymmetries in her gait. She eventually started a walk-to-run program and within three months her pain improved and she was running over 50 miles per week.

Discussion: Piriformis syndrome is a controversial diagnosis with a lack of definitive diagnostic criteria. Literature review on clinical features suggests that the four most common features of piriformis...
The patient's history of smoking, lung pulmonary malignancy. Scheduled so as to further investigate the possibility of a recurrent these findings and a positron emission tomography (PET) scan was osteoarthropathy was more likely than rheumatoid arthritis. The This constellation of findings suggested that hypertrophic pulmonary reaction involving the bilateral radius, ulna, and metacarpal bones. Indicate bilateral periarticular osteopenia and a chronic periosteal wrist X-rays were negative for the presence of erosions but did were obtained and all were within normal limits. Bilateral hand and ESR, CRP, and RF labs, as well as cyclic citrullinated peptide (CCP), earlier, now status post chemotherapy. While still inpatient, repeat pack year smoking history and lung cancer diagnosed 1.5 years normal limits. Her past medical history was also significant for a 50 to a fall. She carried a pre-morbid diagnosis of rheumatoid arthritis that had been diagnosed 2-3 years prior to admission. The patient described a 2-3 year history of persistent bilateral wrist and hand pain despite treatment. She had been seen by 5 different rheumatologists in the outpatient setting and was being treated with methotrexate and prednisone. Outpatient records were obtained and indicated that her erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and rheumatoid factor (RF) were all within normal limits. Her past medical history was also significant for a 50 pack year smoking history and lung cancer diagnosed 1.5 years earlier, now status post chemotherapy. While still inpatient, repeat ESR, CRP, and RF labs, as well as cyclic citrullinated peptide (CCP), were obtained and all were within normal limits. Bilateral hand and wrist X-rays were negative for the presence of erosions but did indicate bilateral periaricular osteopenia and a chronic periosteal reaction involving the bilateral radius, ulna, and metacarpal bones. This constellation of findings suggested that hypertrophic pulmonary osteoarthropathy was more likely than rheumatoid arthritis. The patient’s hematologist/oncologist was contacted and informed of these findings and a positron emission tomography (PET) scan was scheduled so as to further investigate the possibility of a recurrent pulmonary malignancy.

Case Description: A 65-year-old woman was admitted to inpatient rehabilitation after suffering a subarachnoid hemorrhage secondary to a fall. She carried a pre-morbid diagnosis of rheumatoid arthritis that had been diagnosed 2-3 years prior to admission. The patient described a 2-3 year history of persistent bilateral wrist and hand pain despite treatment. She had been seen by 5 different rheumatologists in the outpatient setting and was being treated with methotrexate and prednisone. Outpatient records were obtained and indicated that her erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and rheumatoid factor (RF) were all within normal limits. Her past medical history was also significant for a 50 pack year smoking history and lung cancer diagnosed 1.5 years earlier, now status post chemotherapy. While still inpatient, repeat ESR, CRP, and RF labs, as well as cyclic citrullinated peptide (CCP), were obtained and all were within normal limits. Bilateral hand and wrist X-rays were negative for the presence of erosions but did indicate bilateral periaricular osteopenia and a chronic periosteal reaction involving the bilateral radius, ulna, and metacarpal bones.

Conclusion: In a patient with a history of malignancy, hypertrophic pulmonary osteoarthropathy should be kept in the differential diagnosis of new-onset arthritis.

Case Description: A 21-year-old female collegiate volleyball player presented to our clinic with left ankle pain and swelling with activity since an eversion injury to the left ankle during practice 2 months earlier. Immediately after injury she was unable to bear weight. Hours later she experienced severe swelling and limited mobility. She was managed conservatively. Seven weeks after injury she was evaluated in our clinic. Physical examination shows left ankle edema, tenderness at deltoid ligament, medial and lateral malleoli, anterior talofibular ligament (ATFL) and talar dome. Talar tilt for deltoid ligament and squeeze tests were positive. She could not perform a single leg stance or squat. Plain films show no fractures and normal mortise. MRI shows a high grade lesion of deltoid ligament (deep layer), hypertrophy of ATFL, hypertrophy of calcaneofibular ligament (CFL) and altered signal of the syndesmosis along the anterior inferior tibiofibular ligament (AITFL).

Setting: Outpatient sports medicine clinic
Results or Clinical Course: Thirteen weeks post-injury and after intensive rehabilitation, she returned to practice. At one year, she reported pain only with full dorsiflexion. She could jump, run and squat although with some limitations in proprioception and balance.
Discussion: A syndesmosis sprain without mortise widening should be highly suspected in patients with eversion injuries and resultant inability to walk, hop or with positive squeeze test. This is also an unusual case of a concurrent sprain of the medial and lateral ankle. Eversion of her ankle was the original injury, however it was superimposed by an inversion injury causing a lateral ankle sprain as well.
Conclusion: Syndesmosis sprains, can be difficult to diagnosis. Negative radiographs in the setting of a mechanism of injury and positive findings on physical examination should raise your clinical suspicion to confirm the diagnosis with CT scan or MRI. Physical examination and mechanism of injury are also significantly important to identify concomitant eversion and inversion injuries that can result in long term comorbidities in young athletes.

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Conclusion: Syndesmosis sprains, can be difficult to diagnosis. Negative radiographs in the setting of a mechanism of injury and positive findings on physical examination should raise your clinical suspicion to confirm the diagnosis with CT scan or MRI. Physical examination and mechanism of injury are also significantly important to identify concomitant eversion and inversion injuries that can result in long term comorbidities in young athletes.
Objective: To quantify the activity limitation (AL) of individuals with chronic lower extremity injury (LEI) and chronic pain (CP), and to investigate the correlation between the AL status and scores from clinician-derived Performance-Based Assessment tests (PBA).

Design: Retrospective cross-sectional study.

Setting: Comprehensive Outpatient Rehabilitation Facility.

Participants: 100 subjects completed the Self-Administered Co-morbidity Questionnaire, and 26 were determined to have LEI and CP.

Interventions: Not applicable.

Main Outcome Measures: The Lower Limb Questionnaire v2.0 (LLQ), from the American Academy of Orthopedic Surgeon’s (AAOS) toolbox and recommended by the AMA Guides 6th Ed., was designated as the patient-reported outcome (PRO) to describe activity limitation. LLQ scoring for comparative purposes was done via computation of a standardized (score 0 is MOST disability and 100 is LEAST disability) and normative score (mean set at 50, standard deviation 10). The 6-Minute Walk Test (6MWT), Berg Balance Scale (BBS), Dynamic Gait Index (DGI), Sit-to-Stand test (STS), and 50-Feet Walk Fastest (FWF) were used as clinician-derived PBAs also to describe activity limitation.

Results or Clinical Course: We used Pearson’s correlation coefficient to examine associations between LLQ and PBA results, which did not differ in terms of significance from Spearman’s rank correlation in this case. There were strong correlations between LLQ scores and the BBS ($r = .404$; $p = .040$) and 6MWT metabolic equivalents METS ($r = .371$; $p = .062$) scores. There were no demonstrable differences between genders.

Conclusion: The self-reported activity limitation of individuals with LEI had a statistically significant correlation with the clinician-derived physical performance test scores (specifically the balance and exercise capacity) of these individuals. These findings suggest that the LLQ is a suitable indicator of functional outcome status of individuals with LEI and would be valuable as an alternative to PBAs in a busy clinical practice. Further research should be conducted on the relationship of this activity limitation measure with measures of body function and of participation restriction.

Conclusion: Viscosupplementation injections to the knee joint appear to be effective in those with osteoarthritis. Most appear to be effective by injection #2 of 3 in a series. Any sub-groups, i.e. those with post-traumatic osteoarthritis, may need to be further stratified in future studies. However, positive predictive factors in reducing VNS scores may include ligamentous involvement moreso than meniscal tear.

Poster 333
Activity Limitation of Individuals with Chronic Lower Extremity Injury
Armando Miciano, MD (Nevada Rehabilitation Institute, Las Vegas, NV, United States), Chad Cross, PhD, PStat(R)

Disclosures: A. Miciano: I Have No Relevant Financial Relationships To Disclose.

Objective: To examine associations between LLQ and PBA results, which did not differ in terms of significance from Spearman’s rank correlation in this case. There were strong correlations between LLQ scores and the BBS ($r = .371$; $p = .404$) and 6MWT metabolic equivalents METS ($r = .404$; $p = .371$) scores. There were no demonstrable differences between genders.

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Poster 334
Unique Presentation of a Morel-Lavallee Injury of the Knee: A Case Report
Hans Knopp, DO (Tufts Medical Center, Boston, MA, United States), Julio Martinez-Silvestrini, MD

Disclosures: H. Knopp: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient, a 17-year-old male high school wrestler, initially came to our clinic for lateral knee pain s/p knee injury during wrestling. He failed NSAID and knee immobilizer treatment. A previous MRI, done 2 weeks prior to procedure, had shown extensive edema in the subcutaneous fat extending between the subcutaneous fat and muscular fascia typical of a Morel-Lavallee lesion. Aspiration of this edema revealed 21 mL of blood. Aspiration was followed with steroid injection and local anesthetic at the site. This injection consisted of 1 mL of a solution containing Kenalog 10 mL and lidocaine 1% 4 mL. A 22 gauge 1.5” needle used for the procedure. Following the procedure, a tight compressive garment was applied for 24 hours with an ace bandage to be applied upon afterwards.

Setting: Outpatient sports medicine practice.

Results or Clinical Course: The patient had knee pain for two to three weeks prior to visiting our sports medicine clinic. On post injection day #3 the patient came back to clinic complaining of increased pain on the anterior knee. This was found to be patellofemoral in nature and was treated with diclofenac sodium along with a consideration for physical therapy in the future. By post injection day #6 the patient had improved symptoms of patellofemoral syndrome. At 3 weeks post injection, the patient was back to participating in wrestling practice followed by a regional wrestling meet.

Discussion: To date, degloving injuries, such as Morel-Lavallee injuries, when found in the knee have been described at the anterior aspect. This particular injury, in a high school wrestler, was found to be at the anterolateral aspect of the knee, over the vastus lateralis and iliotibial band, not over the patella. This is unique presentation for a degloving injury not typically found in medical literature. The proposed mechanism for this injury was friction against the mat or opponent during wrestling competition.

Conclusion: Despite the unusual location for this Morel-Lavallee lesion, traditional treatments improved this patient’s condition and he was able to return back to competition.

Poster 335
Inter-Rater Reliability and Precision of Measurements of the Piriformis Muscle Using Ultrasound: An Observational Cross Sectional Study
Joshua Rothenberg, DO (Miller School of Medicine at the University of Miami, Miami, FL, United States), Usker Naqvi, MD, Douglas Johnson-Greene, PhD, Jose Perez, BA, Spencer Summers, BA, Alexander Harrington, BS, MBA, Ricardo J. Vasquez-Duarte, MD, Clifton Page, MD

Disclosures: J. Rothenberg: I Have No Relevant Financial Relationships To Disclose.

Objective: To test the hypothesis that in healthy controls where no clinical suspicion of piriformis syndrome exists, more reliable ultrasound measurements will be obtained following education with a standard protocol and use of the same ultrasound equipment across providers on the same day, enhanced group (G2), compared to measurements obtained by providers who have only baseline ultrasound knowledge of the piriformis alone, baseline group (G1).

Design: Cross-sectional intervention study.

Setting: Ultrasound suite at a tertiary care academic medical center.

Participants: 15 volunteer subjects, with an age range of 21-29 years old, were assigned to Group 1 (n=6) or Group 2 (n=9).

Interventions: Volunteer subjects in the G1 group underwent piriformis ultrasound in phase I of the study by two independent sports medicine fellowship trained physicians with general ultrasound knowledge using two different ultrasound machines at different time periods. Following education in the use of a standard protocol on piriformis ultrasound, and having watched an associated video, volunteer subjects in the G2 group underwent piriformis ultrasound in phase II of the study by the same two independent sports medicine fellowship trained physicians using the same ultrasound machine on the same day.

Main Outcome Measures: Inter-rater reliability of piriformis ultrasound measurements.

Results or Clinical Course: Cohen’s Kappa coefficients were computed for group 1 baseline group and for group 2 enhanced group ultrasound measurements. Group 1 coefficients were well
below acceptable levels (kappa = .15), suggesting very poor reliability of measurements. In contrast, following the interventions, the enhanced group 2 coefficient kappa increased to an acceptable level (kappa = .83).

Conclusion: The results of this study suggest that in ultrasound measurements of the piriformis muscle in healthy controls, that reliability of measurement can be improved using additional education with a standard protocol, use of the same ultrasound machine, and completing measurements on the same day. These findings provide significant methodological considerations for studies involving ultrasound measurements.

Poster 336
Exercise-Associated Hyponatremic Encephalopathy in a Lactating Woman: A Case Report
Zachary Ballowitz (Tucson Hospitals Medical Education Program, Tucson, AZ, United States), Vu Q. Nguyen, MD, Raymond Grams, DO
Case Description: Patient was a 34-year-old woman who presented to the ED with altered mental status. She initially came in for severe headache, but had a seizure in the waiting room. After her seizure she remained altered, combative, had slurred speech, and was unable to follow commands. Laboratory evaluation revealed a serum sodium concentration of 126 mg/dL. After speaking with her family, it was discovered that the patient had been involved in a high-intensity exercise program earlier that day, and had consumed roughly 3L of water in order to stay hydrated. She was also lactating for an exclusively breast-fed 3-month-old, and had been drinking extra fluids to facilitate milk production.
Setting: Tertiary care hospital.
Results or Clinical Course: The patient was corrected with hypertonic (3%) saline for 1 day, and then was maintained on normal (0.9%) saline for the subsequent 2 days. After 3 days in the hospital, her serum sodium returned to normal. During her time in the hospital, she received physical, occupational, and speech therapy, and her mental status slowly improved. On hospital day 4, she was discharged at her baseline mentation without any residual neurologic deficits.
Discussion: High-intensity and long-duration exercise programs are becoming more and more prevalent, and many women resume exercising shortly after pregnancy for its many health benefits. Exercise should be encouraged in moderation in these patients, however caution should be advised when it comes to overhydration during both exercise and lactation. Utilizing PubMed and Ovid with the search terms “exercise associated hyponatremia lactation,” “lactating female hyponatremia,” and “lactation hyponatremia,” a review of the literature revealed that this is the first reported case of exercise-associated hyponatremic encephalopathy (EAHE) in a lactating female.
Conclusion: The combination of intense exercise and lactation, both of which necessitate additional rehydration, may increase the risk of hyponatremic encephalopathy and seizure. Recommendations according to the Wilderness Medicine Society Guidelines should be made to exercising females regarding the dangers of EAHE and proper rehydration techniques to prevent it. These guidelines include monitoring body weight and rehydrating only to thirst.

Case Description: A 59-year-old woman with a history of osteoporosis and bisphosphonate treatment presented with one year of progressively worsening lower back pain radiating to the bilateral buttock and anterior thigh without antecedent trauma. Her symptoms occurred only with ambulation. Physical examination was unremarkable except for tenderness over the sacroiliac joints (SIJ). Magnetic resonance imaging (MRI) of her lumbar spine showed mild disc bulge at L4-L5. Plain film radiographs of the pelvis and bilateral hips were unremarkable. Electrodagnostic testing of the bilateral lower limbs was normal. She underwent a diagnostic and therapeutic SIJ injection, which improved her low back and buttock pain, but not her anterior thigh pain. Ankle brachial indices were normal. A bone scan showed focally increased uptake involving the lateral cortex of the bilateral femora.
Setting: Outpatient musculoskeletal clinic.
Results or Clinical Course: MRI of the bilateral femora confirmed focal areas of cortical thickening laterally at each femoral shaft, indicating incomplete, atypical stress fractures. The patient underwent prophylactic intramedullary nail fixation and a postoperative outpatient physical therapy program. Subsequently, her symptoms entirely resolved.
Discussion: There is debate as to whether bisphosphonate fractures are a clinical entity. Although the association of long-term bisphosphonate use with atypical femur fractures is questionable, certain case reports suggest a link. Some authors suggest that patients with risk factors should be questioned about thigh or leg pain. Our patient had an atypical presentation of femoral stress fractures, as most patients have prodromal pain in the thigh or leg. Here, the presenting symptoms strongly suggested neurogenic claudication or sacroiliitis.
Conclusion: Physicians should consider back and/or radicular pain as possible symptoms of femoral stress fracture. Failure to do so could lead to delayed diagnosis and a missed opportunity for prophylactic surgical intervention.

Poster 338
Dynamic Point-of-Care Ultrasonography in the Diagnosis and Management of Anterior Ankle Impingement Syndrome: A Case Report
Robert Diaz, MD (Spaulding Rehabilitation Hospital/Harvard Medical School, Boston, MA, United States), Anne H. Johnson, MD, Minna Kohler, MD
Disclosures: R. Diaz: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 20-year-old female dancer presented with a 1-year history of right anterolateral ankle pain due to increased dance intensity. Mechanical instability on clinical examination and MRI revealing anterior talofibular ligament deficiency led to a lateral ankle ligament reconstruction. Four months postoperatively, she had persistent anterior-lateral gutter pain. Palpation-guided corticosteroid injection to this area provided no relief. Given unclear etiology of ankle pain, dynamic ultrasonography (US) of the anterior tibiotalar joint and lateral ankle was performed.
Setting: Tertiary center outpatient clinic.
Results or Clinical Course: Static US views revealed grade 2 synovial thickening within the anterior tibiotalar joint recess at the region of pain. Dynamic views with dorsiflexion visualized the lateral tibiotalar joint and synovial tissue impingement with a corresponding audible “click.” US-guided corticosteroid injection to the thickened right lateral tibiotalar joint was provided. One month post-injection, patient had significant improvement in walking distance and gradual return to dancing without limitations of pain.
Discussion: Chronic ankle pain is a common condition that can have a wide differential diagnosis. Anterior ankle impingement syndrome (AAIS) is a common cause of chronic anterior ankle pain and is frequently seen in athletes who participate in sports.
insulting repetitive forced dorsiflexion of the ankle. This condition can lead to significant dysfunction, especially in the elite athlete and younger population. This case provides an example of how dynamic US can be used to reveal AAIS and direct clinical management.

Conclusion: Dynamic US may be used to demonstrate AAIS and potentially differentiate between soft-tissue and bony impingement. US-guided injection can be targeted to area of soft tissue impingement. Further studies are needed to investigate the utility of dynamic US in the detection of AAIS.

Poster 339
Rifle Stabilizing Device for a One-Armed Hunter

Everett C. Hills, MD (Penn State University, Hummelstown, PA, United States), Jeffrey Britton, BS, Sean O’Hagan, BS, Alyssa Myers, BS, Talal Al Qahtani, BS, Quinn Yodens, BS, Nancy Lokey, RN, CRRN, CBIS, Everett C. Hills, MD (Penn State University, Hummelstown, PA, United States), James F. Wyss, MD, PT


Objective: Design, build, and test a prototype lightweight rifle stabilization system for a one-armed hunter allowing him to safely mount the firearm on a stand, bring his weapon to the firing position quietly, minimize fatigue to his arm/shoulder during lull periods, and permit easy disassembly.

Design: The hunter’s needs were gathered through face-to-face meetings with this man (who survived a traumatic brachial plexus injury to his non-dominant limb), the engineering students, an occupational therapist, and a physiatrist. Human factors were analyzed using an analytic hierarchy process to determine the most important needs given the intended design specifications. Patent searches for existing products revealed a bipod device closely mimicking the hunter’s needs but requiring two hands. A sling system was developed incorporating a shoulder harness that also supported the rifle butt when the hunter is not actively shooting.

Setting: Community setting for user/team discussions. Computer design of parts and machining performed in the machine shop at the College of Engineering. Face-to-face meetings and a shooting range allowed testing of the initial prototypes and feedback from the hunter which was incorporated into each new modification.

Participants: A hunter with brachial plexopathy, 5 senior mechanical engineering students, occupational therapist, nurse with specialty training in rehabilitation medicine, and a physiatrist.

Interventions: The hunter provided the gun stocks for the stabilizer mount and sling attachment. SolidWorks was used to model the selected design concept and provide the instructions for the machining steps. All parts for the swivel attachment were fabricated from aluminum.

Results or Clinical Course: The engineering team succeeded in redesigning a bipod rifle support that was quiet, lightweight, and fully operational with one hand to the satisfaction of the hunter.

Conclusion: The product design was a modification of an existing device with a more ergonomic trigger and a secure weapon mount that can be totally and safely operated with only one hand. The final design accounted for the importance of mitigating unnecessary stress to his remaining healthy shoulder thereby helping to prevent accelerated joint degeneration. The potential use of this device for sportmen and hunters who are stroke survivors or amputees is under investigation.

Poster 340
Insidious Bilateral Intramuscular Rectus Femoris Tears in a Division I Female Soccer Player: A Case Report

Nasim Chowdhury, MD (New York Presbyterian- Columbia and Cornell, New York, NY, United States), James F. Wyss, MD, PT

Disclosures: N. Chowdhury: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 20-year-old, Caucasian, female, Division I soccer player presented with bilateral leg pain that began insidiously four weeks prior to her evaluation. It was described as “pulled,” and exacerbated by stretching and fast movements with pain alleviation with rest. Associated lower back pain resulted in an unremarkable lumbar spine magnetic resonance imaging (MRI). Examination revealed quadriceps dominant lower extremities with pain limited straight leg raise and knee extension, right worse than left. Ely’s test was pain limited with decreased quadriceps flexibility noted again right worse than left. There was tenderness to palpation of the bilateral rectus femoris muscles. Hip MRI revealed partial intra-muscular tears bilaterally, greater on the right than the left. Management included rest, followed by rehabilitation with trainers at her college and active release therapy with marked improvement in pain, flexibility, and strength.

Setting: Large orthopedic hospital’s rehabilitation clinic.

Results or Clinical Course: Diagnosed bilateral intramuscular rectus femoris muscle tears. Initially we advised rest with no return to play. Two weeks later, we recommended stationary cycling. At eight weeks, we recommended active release therapy with instructions to resume conditioning/agility drills and plyometrics but wasn’t cleared for full practice. Six weeks after that she returned to full play.

Discussion: Literature review revealed only one other similar case (21 year old female greek rower); no clear return to play protocol was found. This case report bears similarities in demographics with only one other case in the medical literature. This raises an interesting question of potential risk factors for this injury but no clear conclusion can be made until larger studies are done.

Conclusion: Bilateral intramuscular quadriceps tears are an exceedingly rare diagnosis with no clear return to play protocols or studies of risk factors such as inflexible quads or muscle imbalance. This represents an avenue for future research.

Poster 341
Mesenchymal Stem Cell Therapy for the Treatment of a Chronic Repetitive Meniscal Tear in an Air Force Academy Candidate: A Case Report

Gerard Malanga, MD, Eric K. Holder, MD (Sidney Kimmel Medical College/ Thomas Jefferson University Hospital, Philadelphia, PA, United States), David Surrey, MD


Case Description: A 21-year-old male Air Force Academy candidate presented with severe pain along medial aspect of his left knee associated with stiffness and swelling. His past medical history was notable for recurrent left knee meniscal tears status post surgical repair x 2, partial meniscal resections x 3 and 3 prior corticosteroid injections without relief. His examination demonstrated tenderness along the medial left knee joint without significant deformity, swelling, effusion or range of motion deficits. Negative Provocative testing. MRI imaging revealed a meniscal tear. We implemented a treatment course that included: mesenchymal stem cells, adipose tissue and Platelet rich plasma (PRP) combination of super concentrated platelets and platelet lysate injection, followed by a PRP post-injection over 3 week period.

Setting: Outpatient medical office.

Results or Clinical Course: At 5th week post treatment, pain significantly improved, rated mild and 2-3/10 on Numeric Pain Scale. Pain was exacerbated by hyper-flexion and he still experienced intermittent clicking. Examination demonstrated slight tenderness along the left posteromedial joint line. Sonographic imaging revealed normal meniscal tissue with a questionable hypechoic area and a very small cyst at the mid-posterior aspect of the meniscus. At 11th week post treatment, complete resolution of pain even with high intensity biking. Per patient left knee clicking persisted in the morning.
Examination demonstrated no tenderness along the left knee joint lines and full active/passive ROM without pain or clicking. At 16th week post treatment, repeat MRI revealed intrasubstance signal in the posterior horn with extension into the inferior articular surface, compatible with meniscal repair.

Discussion: This is a 21-year-old man with a history of repetitive left knee medial meniscal tears refractory to multiple surgical interventions resulting in 6 years of left knee pain and functional limitations. Within 11 weeks of receiving mesenchymal stem cells, adipose tissue, and PRP injection therapy the patient’s pain resolved.

Conclusion: Autologous bone marrow mesenchymal stem cell therapy maybe a viable alternative in patients with meniscal tears. Further studies are warranted before this can be recommended as a standard of care, however this case demonstrates the potential efficacy of this novel treatment modality.

Poster 342
Utility of Posture Education on Medical Students’ Knowledge of and Comfort with Ergonomic Concepts
Patricia Zheng (Stanford Hospital and Clinics, Redwood City, CA, United States), Paige Wolsencroft, BS, Christine Nguyen, BS, David J. Kennedy, MD


Objective: To assess the impact of a posture education outreach on knowledge and comfort with ergonomic concepts among medical students.

Design: A pre-post study analyzing the effectiveness of our intervention.

Setting: Medical school in the United States.

Participants: 30 medical students.

Interventions: An hour long posture education outreach, led by a physiatrist, physical therapist, orthist, and ergonomics expert covering basic ergonomic concepts.

Main Outcome Measures: A survey of medical students’ postural habits along with a pre and post test consisting 9 knowledge and 5 self-reported comfort level questions on a 5 point scale.

Results or Clinical Course: Average age was 23 (SD 1.75); 16 were female; 17 were first year, 12 were second year, and 1 was a fourth year student(s). The majority were Asian (21 vs 5 White, 4 other) and of normal BMI (22.03, SD 2.53). Half of the students reported that they sat for more than 7 hours daily with 23 spending more than 5 hours daily in front of a computer. Knowledge scores improved after the session (2.50 vs 4.80, p=.96-08). Comfort level with postural concepts also increased, with students reporting more confidence in their abilities to improve their own workplace ergonomics (1.10 vs 2.88, p=.18E-12) and to advise patients in basic posture principles (0.77 vs 2.32, p=.77E-08). All students surveyed agreed that physicians should talk to patients regarding posture and reported they would benefit from more postural outreachs.

Conclusion: Physicians report high rates of occupational related musculoskeletal discomfort and are often asked by patients for ergonomic counseling. However, medical students report low comfort levels with improving their own workplace setup and advising patients in basic ergonomic principles. We showed here that a brief posture education outreach can be effective in increasing knowledge and comfort levels among medical students.

Poster 343
Analysis of Muscle Activities of the Knee Joint in Severe Varus Osteoarthritis of the Knee
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Objective: To understand muscle activities in the knee joint with osteoarthritis (OA), we measured the activities of the extensor and flexor muscles of the knee joint by using electromyography and analyzed the muscle co-contraction.

Design: Cross-sectional observational study.

Setting: College hospital.

Participants: Nine patients with severe varus knee OA (11 knees, average age 72.1 ± 8.9 years) and 6 healthy control subjects (12 knees, average age 24.6 ± 0.9 years) were examined.

Interventions: Not applicable.

Main Outcome Measures: We measured the activities of the vastus medialis (VM) and semitendinosus (ST) muscles at the medial aspect, as well as the vastus lateralis (VL) and biceps femoris (BF) muscles at the lateral aspect, during walking with comfortable gait speed. We calculated the co-contraction index (CCI) of the extensor and flexor muscles of the knee joint: the CCI at the medial aspect of the knee was calculated by using the VM and ST data, and CCI at the lateral aspect was calculated by using the VL and BF data. Loading rate was calculated from the vertical ground reaction force in early stance at stance.

Results or Clinical Course: In severe knee OA patients, the muscle activities of the VM and VL and the loading rate decreased in the weight-acceptance phase compared with those in the healthy subjects. In OA patients, co-contractions of both VM-ST at the medial aspect of the knee and VL-BF at the lateral aspect increased in midstance phase, compared with those of the healthy controls.

Conclusion: The results suggest that the changes of CCI and the decreased loading rate in knee OA patients is affected by mal-alignment of the knee, or that these patients change their knee muscle activities to control their knee pain.

Poster 344
Injury in Ultramarathon Runners and its Association with Foot Strike Pattern and Gait Characteristics
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Disclosures: J. Soo Hoo: I Have No Relevant Financial Relationships To Disclose.

Objective: To characterize the foot strike and gait pattern of ultramarathon runners and its association with injury.

Design: Observational cohort study

Setting: 2013 Racing the Planet Iceland 7-day, multi-staged 250 km ultramarathon.

Participants: 202 athletes (134 male, 68 female)

Interventions: Participants were captured by video recording at stage I of the race. Video was analyzed for foot strike pattern, gait characteristics, and lower limb kinematics. Participants reported data on demographics, running characteristics, and presence and type of injury through a survey.

Main Outcome Measures: Presence of injury at the end of race, and type and location of injury.

Results or Clinical Course: 49.5% of all runners had an injury, with more women (62%) being injured than men (43%). There were 292 total injuries with 48% blisters, 33% tendinitis, and 7% skin abrasion, and most common locations being 35% toes, 22% ankles, 17% heels, and 11% knees. 82% of all runners observed had rear foot strike pattern (82% for males and 81% for females). Presence of injury was analyzed by logistic regressions separately for men and women. Age and BMI were always entered in the models, and then stride length, cadence, and foot strike were entered if statistically significant. For males, only age was significant (p=.01), with decreasing probability of injury with
increasing age. For females, only stride length were statistically significant (p<.01), with increasing probability of injury with longer stride lengths.

Conclusion: This is the first study that characterizes foot strike and injury rates of ultramarathon runners in a competitive race. Our data suggests that foot strike might not be associated with injuries, while stride length may be a factor influencing injury in females.

Poster 345
Cubitus Valgus - An Uncommon Etiology for Ulnar Neuropathy: A Case Report

David Rustom, MD (Wayne State University/Rehabilitation Institute of Michigan/Detroit Medical Center, Detroit, MI, United States), Syed R. Ahmed, DO


Case Description: A 35-year-old woman presented with ongoing bilateral hand paresthesias that was worse during sleep and in the seated position. She had seen multiple providers who presumptively diagnosed her with carpal tunnel syndrome. She wore bilateral wrist splints for approximately two years, and received multiple carpal tunnel corticosteroid injections. She slept on her back with the arms abducted and forearms supinated. This position exacerbated paresthesias in digits 3-5. On physical examination she had atrophy of the hypothenar and intrinsic hand muscles, along with 4/5 hand grip strength. The patient had decreased two point discrimination in the hypothenar and intrinsic hand muscles, along with 4/5 hand grip strength. The patient had decreased two point discrimination in the distribution of the dorsal and palmar ulnar cutaneous nerves. Further examination revealed +10 degree extension in bilateral elbows, and mild cubitus valgus deformity. Bilateral cubital tunnel Tinel’s sign was positive. Froment’s sign was more prominent on the Right. The literature has not described ulnar neuropathy due to cubitus valgus, it has been attributed more commonly to varus deformities. Turner and Noonan syndromes along with supracondylar fractures are most commonly associated. Incidentally, our patient presented with bilateral deformities despite no congenital or traumatic history. Cubitus valgus has a prevalence of 3% and can be overlooked. Elbow hypermobility and prolonged extension/flexion positioning can exacerbate symptoms.

Conclusion: Cubitus valgus is an uncommon, yet treatable cause of ulnar neuropathy at the elbow.

Poster 346
The Effect of a Musculoskeletal Ultrasound Course on the Accuracy of Joint Palpation in Physical Medicine and Rehabilitation Residents

Samuel K. Chu, MD (Northwestern Feinberg School of Medicine/Rehabilitation Institute of Chicago, Chicago, IL, United States), Steven A. Makovitch, DO, Maria E. Reese, MD, Christine M. Gagnon, PhD, Monica Rho, MD


Objective: To determine the effectiveness of a 1-day musculoskeletal ultrasound course on the accuracy of lateral knee and acromioclavicular (AC) joint line palpation in Physical Medicine and Rehabilitation (PM&R) residents using ultrasound verification.

Design: Cohort Study.

Setting: PM&R residency program at an academic institution.

Participants: Twenty-one PM&R residents participating in a musculoskeletal ultrasound course (8 PGY-2, 5 PGY-3, and 8 PGY-4 residents).

Interventions: 1-day musculoskeletal ultrasound course utilizing direct ultrasound feedback on musculoskeletal physical examination maneuvers.

Main Outcome Measures: Pre-course and post-course ultrasound verification of correct needle placement over the lateral knee and AC joint lines on a male and female physical examination model. Participants were asked to place the needle parallel to the joint line based on their palpatory exam.

Results or Clinical Course: McNemar’s test was performed to compare pre-course and post-course results. Overall AC joint palpation accuracy improved from 33.3% on pre-course assessment to 52.4% on post-course assessment (P=.115). Overall knee lateral joint palpation accuracy improved significantly from 57.1% on pre-course assessment to 83.3% on post-course assessment (P=.007). For the knee lateral joint line, there was also a statistically significant improvement in palpation accuracy on the female physical examination model from 33.3% to 81.0% (P=.006), while there was no statistically significant improvement on the male physical examination model (81.0% to 85.7%). Based on the resident level of education, there were no statistically significant differences in the accuracy of joint line palpation.

Conclusion: Joint line palpation accuracy of the AC and lateral knee joint line in PM&R residents is low, despite prior traditional education of musculoskeletal physical examination without utilizing musculoskeletal ultrasound. A musculoskeletal ultrasound course directed at providing residents feedback on the accuracy of their palpation skills improved palpation accuracy of the AC and knee lateral joint lines. The educational use of musculoskeletal ultrasound may be an effective method of teaching musculoskeletal physical examination for medical trainees.

Poster 347
The Effectiveness of Musculoskeletal Ultrasound for Teaching Joint Palpation to Medical Students

Samuel K. Chu, MD (Northwestern Feinberg School of Medicine/Rehabilitation Institute of Chicago, Chicago, IL, United States), Christine M. Gagnon, PhD, Monica Rho, MD


Objective: To determine the effectiveness of a 2-hour musculoskeletal (MSK) ultrasound and physical examination class on the accuracy of knee and acromioclavicular (AC) joint line palpation in first-year medical students using ultrasound verification.

Design: Cohort study

Setting: Medical school at an academic institution.

Participants: Thirty first-year medical students.

Interventions: A 2-hour hands-on MSK physical examination class with direct feedback using ultrasound.

Main Outcome Measures: Pre-class and post-class ultrasound verification of correct needle placement over the lateral knee and AC joint lines on a physical examination model. Pre-class testing was done 1 week after the traditional medical school MSK physical examination curriculum that did not use ultrasound. Post-class testing was done 1 week after the 2-hour MSK ultrasound class was given. Participants were asked to place the needle parallel to the joint line based on their palpatory exam, and placement was verified by the MSK class instructor using ultrasound.

Results or Clinical Course: McNemar’s test was performed to compare pre-class and post-class results. Overall AC joint palpation
accuracy improved significantly from 30.8% on pre-class assessment to 65.4% on post-class assessment (P=0.022). Overall knee lateral joint line palpation accuracy improved from 50.0% on pre-class assessment to 65.4% on post-class assessment (P=0.344).

**Conclusion:** Joint line palpation accuracy of the AC and lateral knee joint line in first-year medical students is low after conventional MSK physical examination education. A 2-hour physical examination class using MSK ultrasound to provide direct feedback to medical students on the accuracy of their palpation skills improved palpation accuracy of the AC and knee lateral joint lines 1 week later. The utilization of MSK ultrasound is a novel and effective method of teaching the MSK physical examination to medical trainees.

**Poster 348**
**Diabetic Cheiroarthropathy: A Musculoskeletal Complication of Diabetes Mellitus: A Case Report**

Roman Zolotoy (Tufts Medical Center, Boston, MA, United States)

**Disclosures:** R. Zolotoy: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 52-year-old woman with a 15-year history of type 2 diabetes mellitus presented to an outpatient clinic complaining of significant joint stiffness and skin thickening over bilateral hands and fingers which has been present for 2 years. Skin tightness persisted throughout the day. Stiffness was worse at night. She denied any skin color changes of her fingers in cold weather. Patient stated that she finally decided to seek treatment due to emotional distress caused by increased difficulty with grasping the steering wheel especially on the way home from work. Examination revealed reduced range of motion (ROM) over both hands, most notably over bilateral proximal interphalangeal (PIP) and metacarpophalangeal (MCP) joints. She was found to have decreased grip strength and a positive Prayer sign. Upper extremity distal pulses and sensation were intact bilaterally. Bloodwork was unremarkable outside of an elevated glucose and hemoglobin A1C levels.

**Discussion:** The patient presented with hallmark symptoms of diabetic cheiroarthropathy (DC). She presented with thickened and hyperpigmented skin with loss of normal skin creases. DC can be mistaken for other reactive arthritis and it presents as focal pain seen most commonly in females who have a history of medial tibial stress syndrome (MTSS). Alike MTSS, the etiology of stress fractures is often multifactorial. Intrinsic risk factors include: increased foot pronation, BMI > 21 and increased hip internal/external ROM. Furthermore, inexperienced runners, change in exercise intensity and footwear play a role in its development. In a closed kinetic chain, hyperpronation of the subtalar joint causes calcaneal eversion, forefoot abduction and tibial internal rotation, which predisposes the tibia to altered mechanical forces that may affect cortical integrity.

**Conclusion:** This is a unique case of bilateral tibial stress fractures seen in identical twins. Also highlights the significant role of foot hyperpronation in the development of MTSS and its clinical continuum leading to potential stress fractures.

**Poster 350**
**Verification of Platelet and Other Cells using PEAK™ Platelet Rich Plasma System**

Ha Seon Yun (New Jersey Institute of Regenerative Medicine, Cedar Knolls, NJ, United States), Gerard Malanga, MD, Greg Hill, Undergraduate

**Disclosures:** H. Yun: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To verify the manufacturer’s claim that PEAK™ Platelet Rich Plasma (PRP) System produces PRP in three minutes with ease and consistency of cell concentrations.

**Design:** Basic research.

**Setting:** Medical laboratory.

**Participants:** 1 blood donor.

**Interventions:** 27 ml of blood was obtained twice from a donor and processed as per the manufacturers of the PEAK system’s instructions to create a 3ml PRP product. The platelets, Red Blood Cells (RBCs) and White Blood Cells (WBCs) were counted at baseline and after processing using the Cellometer X2™ Image Cytometer.

**Main Outcome Measures:** Average number of Platelet, RBCs and WBCs per mL in PEAK™ product, and fold change of cells compared to baseline.

**Results or Clinical Course:** The PEAK™ system increased platelet concentrations by a fold of 4.345 or a percentage increase of 316% resulted in an average platelet count of 1.425x10⁹ cells/mL. The RBCs and WBCs counts were noted to be on average 1.415x10⁹ and 5.355x10⁷ cells/mL, respectively. The final product resulted in a WBC concentration fold increase of 2.56 or a percentage increase of 60.97% and a RBC concentration decrease of a fold of 4.35 or a decrease of 76.6%. The final PEAK™ PRP products contains on average a total of 3.585x10⁹ platelet cells, 4.245x10⁹ RBCs and 1.607x10⁸ WBCs.
Conclusion: The PEAK™ Platelet Rich Plasma System produces a PRP product that reflects the manufacturer’s specifications in terms of platelet, RBC and WBC concentrations; however, the final product contained a large number of RBCs and WBCs. It should be noted that the final PRP product contained as many RBCs as platelets in a ratio of 1.18 RBCs: 1 platelet. While the study confirms the manufacturer’s data, and thereby the reliability of the device, further research is required to verify the concentrations of the various cell types. Literature suggests that PRP with significant concentrations of RBCs could be detrimental when injected, especially within any joint space. These findings are of particular interest to physicians using this device to help treat their patients.

Poster 351
The Risk of Degeneration and Instability and Its Relation to Patient’s Function Late after Lumbar Disk Surgery
Gerald Ebenbichler, MD (Vienna Medical University, Vienna, Austria), Juergen Leitgeb, MD, Gabriele Amtmann, Klaus Friedrich, MD, Franz Köng, PhD, Karl Ludwig Resch, MD, Melanie Schernthaner, Dr, Franz Rainberger
Disclosures: G. Ebenbichler: I Have No Relevant Financial Relationships To Disclose.
Objective: To evaluate the risk of degeneration and segmental instability in operated segments following lumbar disk surgery in patients with pre-surgically stable segments.
Design: Retrospective analysis of the long term follow-up of a RCT.
Setting: Outpatient department of PM&R.
Participants: Of 120 patients following first-time, uncomplicated lumbar disk surgery who participated in the original study, 78 (65%) completed a 12 years follow-up examination and 69 patients also underwent functional X-rays of their lumbar spine.
Interventions: Not applicable
Main Outcome Measures: Presence of degeneration in the lumbar spinal segments (Lane score) and occurrence of segmental instability in the lumbar spine as assessed by functional X-rays that had been evaluated by two independent radiologists; low Back Pain Rating Score (LBP-RS).
Results or Clinical Course: At 12 years after lumbar disk surgery, degenerative changes as well as segmental instability occurred significantly more frequently in the operated than non-operated lumbar segments, but there was no association between increased degeneration and segmental instability rates. The risk for acquiring segmental instability after surgery as assessed by Odds ratios was 6.5. Subsequent analyses that considered the LBP-RS sub-scores revealed a clear association between segmental instability and physical function but not with pain or activities of daily life.
Conclusion: Lumbar disk surgery seems associated with an increased risk of degeneration and segmental instability. As segmental instability was related to patients’ impaired functioning, special care should be taken if considering surgical interventions to cure lumbar disk herniation.

Case Description: A 34-year-old athletic woman presented with right anterior-lateral hip pain. The patient described a throbbing achy pain, exacerbated by walking as well as by lying on the affected side, improved by rest, and refractory to NSAIDs. Examination revealed tenderness over the greater trochanter and anterior hip at the level of the anterior inferior iliac spine (AIS). Pain persisted despite a course of physical therapy and home exercises. Magnetic resonance imaging of the hip revealed a partial thickness tear of the right rectus femoris tendon with underlying calcific tendinosis and associated fibrocartilaginous cyst of the AIS.
Setting: Out-patient rehabilitation at a tertiary care hospital.
Results or Clinical Course: Subsequent diagnostic ultrasound examination of the direct head of the rectus femoris displayed marked thickening and intratendinous calcification with through transmission consistent with calcific tendinosis in the soft phase of formation as well as hyperemia within the tendon. Under ultrasound guidance lavage of the calcific deposit was performed. Kenalog plus Lidocaine was then injected between the iliopsoas and rectus femoris. Immediate relief was achieved post-procedurally. At 2 week follow-up the patient’s pain was resolved.
Discussion: Calcific tendinosis of the rectus femoris is rare. This case is unique because to our knowledge it is the only documented case of rectus femoris calcific tendinosis treated via ultrasound-guided percutaneous lavage. Previous studies have used fluoroscopic guidance or CT guidance to perform aspiration and corticosteroid injection, extracorporeal shock wave therapy, or surgery to treat.
Conclusion: Calcific rectus femoris tendinosis is a rare entity that physiatrists should be aware of in patients who present with hip pain. This case study demonstrates that ultrasound-guided percutaneous lavage is a viable treatment option for this pathology. This is significant because ultrasound is more cost effective and more readily available than other imaging modalities and provides no ionizing radiation.

Poster 352
Ultrasound-Guided Percutaneous Lavage of Calcific Rectus Femoris Tendinosis: A Case Report
Ali Valimahomed, MD (New York Presbyterian Hospital - Columbia University and Weill Cornell Medical College, New York, NY, United States), Jesuel Padra-Guzman, MD, Alfred C. Geilhorn, MD
Disclosures: A. Valimahomed: I Have No Relevant Financial Relationships To Disclose.
Objective: The purpose of this study was to clarify the relationship of initial radiologic and biomechanical parameter (resting calcaneal stance position angle, RCSPA) in children with flexible flatfoot at first clinical visit and to define the effectiveness of modified insole through the change of RCSPA following insole fitting in children with flatfoot. In addition, we differentiated the natural developmental process and the effects of modified insole about the change of RCSPA following insole fitting in children with flatfoot.
Design: Retrospective, cohort, clinical study.
Setting: University hospital, pediatric foot clinic.
Participants: The children aged less than 13 years old with flexible flatfoot. The children divided into 5 subgroups; aged 1~2, 3~4, 5~6, 7~9, 10~12. They underwent insole fitting the final PRP product contained as many RBCs as platelets in a ratio of 1.18 RBCs: 1 platelet. While the study confirms the manufacturer’s data, and thereby the reliability of the device, further research is required to verify the concentrations of the various cell types. Literature suggests that PRP with significant concentrations of RBCs could be detrimental when injected, especially within any joint space. These findings are of particular interest to physicians using this device to help treat their patients.

Case Description: A 34-year-old athletic woman presented with right anterior-lateral hip pain. The patient described a throbbing achy pain, exacerbated by walking as well as by lying on the affected side, improved by rest, and refractory to NSAIDs. Examination revealed tenderness over the greater trochanter and anterior hip at the level of the anterior inferior iliac spine (AIS). Pain persisted despite a course of physical therapy and home exercises. Magnetic resonance imaging of the hip revealed a partial thickness tear of the right rectus femoris tendon with underlying calcific tendinosis and associated fibrocartilaginous cyst of the AIS.
Setting: Out-patient rehabilitation at a tertiary care hospital.
Results or Clinical Course: Subsequent diagnostic ultrasound examination of the direct head of the rectus femoris displayed marked thickening and intratendinous calcification with through transmission consistent with calcific tendinosis in the soft phase of formation as well as hyperemia within the tendon. Under ultrasound guidance lavage of the calcific deposit was performed. Kenalog plus Lidocaine was then injected between the iliopsoas and rectus femoris. Immediate relief was achieved post-procedurally. At 2 week follow-up the patient’s pain was resolved.
Discussion: Calcific tendinosis of the rectus femoris is rare. This case is unique because to our knowledge it is the only documented case of rectus femoris calcific tendinosis treated via ultrasound-guided percutaneous lavage. Previous studies have used fluoroscopic guidance or CT guidance to perform aspiration and corticosteroid injection, extracorporeal shock wave therapy, or surgery to treat.
Conclusion: Calcific rectus femoris tendinosis is a rare entity that physiatrists should be aware of in patients who present with hip pain. This case study demonstrates that ultrasound-guided percutaneous lavage is a viable treatment option for this pathology. This is significant because ultrasound is more cost effective and more readily available than other imaging modalities and provides no ionizing radiation.

Poster 353
Changes of a Biomechanical Parameter Following Insole Fitting in Children with Flexible Flatfoot
Myeong Ok Kim (Inha Univ. Hospital, Incheon, Korea (the Republic of)), Eui Chang Lee, Dr, Hyo Sang Kim, Dr
Disclosures: M. Kim: I Have No Relevant Financial Relationships To Disclose.
Objective: The purpose of this study was to clarify the relationship of initial radiologic and biomechanical parameter (resting calcaneal stance position angle, RCSPA) in children with flexible flatfoot at first clinical visit and to define the effectiveness of modified insole through the change of RCSPA following insole fitting in children with flatfoot. In addition, we differentiated the natural developmental process and the effects of modified insole about the change of RCSPA following insole fitting.
Design: Retrospective, cohort, clinical study.
Setting: University hospital, pediatric foot clinic.
Participants: The children aged less than 13 years old with flexible flatfoot were enrolled. The total number of subjects was 66 children (33 boys).
Interventions: The subjects were divided into 5 subgroups; aged 1~2, 3~4, 5~6, 7~9, 10~12. They underwent insole fitting the following radiologic study at first clinical visit, and serially examined RCSPA by one professional physician. The mean period of initial & final radiologic check of RCSPA was 24 months. Radiography was used to quantify deformity by measuring angles, which were talometatarsal, metatarsal, and calcaneal pitch angle.
Main Outcome Measures: Resting calcaneal stance position angle (RCSPA)
Results or Clinical Course: Among angles measured on radiographs, only talometatarsal angle showed statistically significant correlation
with initial RCSPA (r = .578, Lr = .524). Mean RCSPA was found to improve in all subgroups of subjects following insole fitting. Moreover, in children younger than 7 years, RCSPA improved greatly from the insole fitting compared to the children aged 7 years old and older. This indicates that the younger the children are, the more prominent the effectiveness of the insole is. Moreover, it was found that the initial RCSPA increased with increasing age of children.

**Conclusion:** The insole has proven to be effective in all population aged younger than 13. However, there may be a hidden effect of normal structural pedal alignment during growth accompanied by bony maturation and developmental process. Controversy still exists whether the treatment of flexible flatfoot is necessary in the vast majority of cases or simple observation and advice to parents is sufficient. Further study might be performed to compare subjects with insole fitting and without and to see what is going to happen between two groups.

**Poster 354**
Lumbar Multifidus Muscles are More Vulnerable to Muscle Fatigue Than Thoracic Erector Spinae in Continuous Stooped Posture

Hee-won Park (Kangwon National University Hospital, Chuncheon, Korea (the Republic of)), Sora Baek, MD, PhD, Hong Young Kim, MS

**Disclosures:** H. Park: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To test hypothesis that lumbar multifidus muscles are more vulnerable to physiological muscle fatigue than thoracic erector spinae muscles in the continuous stooped posture at work place.

**Design:** Quasi-experiment

**Setting:** Biomechanics laboratory with wireless surface electromyography (EMG) monitoring system.

**Participants:** Eighteen male subjects, 18-32 years of age.

**Interventions:** We performed static tests to subjects keeping continuous stooped posture for 10 minutes. Each subject was asked to bend forward while maintaining straight legs. Their flexion angle of T12-S1 vertebra was controlled at 40 degree. Wireless surface EMG data were recorded from bilateral lumbar multifidus and thoracic erector spinae muscles from each subject during the whole task.

**Main Outcome Measures:** Mean frequency (MNF) of surface EMG data was calculated by the sum of product of the EMG power spectrum and the frequency divided by the total sum of the power spectrum. The decline of MNF was analyzed by linear regression. Visual analog scale (VAS) on back pain was recorded at task discontinuation.

**Results or Clinical Course:** Sixteen of 18 subjects discontinued stooping task before 10 minutes due to excessive back pain and fatigue. Mean VAS score was 7.3(range, 6-9) points. Mean and minimum task duration was 385 and 224 seconds respectively. We analyzed EMG data during initial 224 seconds from 16 subjects who has fulfilled quality criteria. Consistent decline of MNF values was demonstrated only in lumbar multifidus muscles. The coefficients of determination from linear regression model were above 0.5 in 7 subjects. In thoracic erector spinae muscles, there is no tendency of MNF decline.

**Conclusion:** In the stooped posture both lumbar multifidus and thoracic erector spinae muscles were activated, but there is a tendency of earlier fatigability in lumbar multifidus. Endurance of lumbar multifidus may be a limiting factor for maintenance of stooped posture.

**Poster 355**
Acute Calcific Tendonitis of the Longus Colli Muscle in a Patient with Neck Pain and Stiffness: A Case Report

Monika Desai, MD (Montefiore Medical Center, New York, NY, United States), David Turk, MD, Yuxi Chen, MD

**Disclosures:** M. Desai: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** An otherwise healthy 37-year-old male patient presented with a 3-day history of acute-onset neck stiffness with bilateral sharp, non-radiating, severe neck pain upon movement. He denied history of fever, headache, neurological symptoms, or trauma. His history was otherwise unremarkable, and his examination was notable for limited active and passive cervical range of motion, as well as diffuse tenderness along the cervical paraspinal muscles. His symptoms were attributed to muscle spasms and course of relative rest, heat packs, oral NSAIDs, and a muscle relaxant were recommended. Two days later, the patient presented to the emergency department with progression of pain and stiffness. The patient remained afebrile, labs including CBC, chemistry panel, and ESR were unremarkable. MRI of the cervical spine was notable for marked pre-vertebral edema vs abscess extending from C1 to C6 levels with possible calcifications in the longus colli muscle at C1 and C2 levels.

Contrast-enhanced cervical spine CT ruled out retropharyngeal abscess and confirmed the presence of calcifications in the longus colli muscle at C1 and C2 levels. He was diagnosed with acute calcific tendonitis of the longus colli muscle and discharged home with conservative management (relaxant and two-week course of oral NSAIDs).

**Setting:** Primary care hospital.

**Results or Clinical Course:** At two-week follow-up, the patient reported complete resolution of pain and stiffness and had regained full cervical range of motion after completion of course of NSAIDs. Follow-up imaging (MRI cervical spine) five weeks later revealed complete resolution of the prevertebral edema.

**Discussion:** Acute calcific tendonitis of the longus colli muscle is an inflammatory condition that is caused by calcium hydroxyapatite deposition in the superior oblique tendon fibers of the longus colli muscle. This condition is generally self-limiting and resolves within 1-3 weeks with conservative management. This condition should be a part of the differential diagnosis for acute-onset neck pain and stiffness in the absence of neurological findings.

**Conclusion:** Increased physiatrist awareness of acute calcific tendonitis of the longus colli muscle may assist with prompt diagnosis and help avoid unnecessary, invasive interventions and treatments such as lumbar puncture or retropharyngeal drainage.

**Poster 356**
Posterior Tibial Tendon Dysfunction After Toe Shoe Use in a Young Male Runner: A Case Report

Cynthia C. Hung, MD (Icahn School of Medicine at Mount Sinai, New York, NY, United States), Svetlana Ilizarov, MD

**Disclosures:** C. C. Hung: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 22-year-old man who developed posterior tibial tendon dysfunction after toe shoe use. The clinical presentation was consistent with posterior tibial tendon dysfunction (PTTD). Magnetic resonance imaging of the left ankle showed tendinopathy of the distal PTT. Ultrasound of the bilateral PTT showed pertendinous fluid. Treatment included ankle orthotic, non-steroidal anti-inflammatory medications, physical therapy, and activity modifications.

**Discussion:** This is the first reported case, to our knowledge, of PTTD after toe shoe running. Our patient switched to toe shoes without...
proper gradual transition time and tried to exercise through pain until it interfered with regular daily activities which is a common problem in runners. High arches with stiffer foot landing especially on hard surfaces may predispose to PTT injuries as well. Recently, toe shoe running has been widely advertised, comparing it to barefoot running and preventing injury. It is important for musculoskeletal specialists to educate the public regarding potential injuries and multifactorial risks (patient’s anatomy, running mechanics, transition time, terrains, proprioception difference in minimalist shoes compared to barefoot) prior to considering new products and techniques.

**Conclusion:** Transition to toe shoe running could lead to PTTD, and if not diagnosed early, with the common noncompliance in runners with activity modification, could become a serious complication.

**Poster 357**

**Median Nerve Snapping at the Forearm in a Clarinetist: A Case Report**

Claire Gross, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Aaron Gilbert, MD

**Disclosures:** C. Gross: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 25-year-old man presents with a 1-year history of right upper extremity (RUE) tingling. He is a music performance and education major in college. His primary instrument is clarinet, secondary is piano, tertiary is baritone saxophone. He practices about 6 hours per day, mostly clarinet. He denies recent changes in teachers or repertoire. He notes an insidious onset of tingling in his RUE, primarily over the ulnar side of the hand and forearm, palmar and dorsal, occasionally up to the elbow and radiating to the radial side. The tingling is intermittent, most prominent after playing clarinet for about 20 minutes. He also complains of occasional neck pain after playing and morning stiffness in his right hand. On exam, no evidence of muscle wasting. 5/5 strength throughout, 2+ reflexes throughout, sensation intact to light touch and pinprick throughout. Negative Finkelstein’s, negative Tinel’s. Negative Spurling’s.

**Setting:** Academic center outpatient clinic.

**Results or Clinical Course:** Electrodiagnostic study without evidence of carpal tunnel syndrome or ulnar nerve entrapment. Musculoskeletal (MSK) ultrasound showed normal median and ulnar nerves. Ultrasound while playing clarinet showed the median nerve snapping over one of the superficial flexor tendons approximately 4 cm proximal to the palmar wrist crease. He completed a course of occupational therapy with focus on nerve glides, finger flexor stretching, and postural training with playing. At 2-month follow-up, patient was able to play for up to 1 hour before onset of symptoms, which were relieved with nerve glides and stretching.

**Discussion:** This case demonstrates median nerve irritation due to mechanical snapping at the forearm in a clarinetist, diagnosed by dynamic ultrasound in the context of a normal electrodiagnostic study.

**Conclusion:** Dynamic MSK ultrasound can be utilized to observe nerves dynamically during specific symptom-provoking maneuvers, including playing musical instruments. Identification of the site of nerve compression or irritation can allow future therapy inventions to be more specific.

**Poster 358**

**Osteoporosis and Risk of Hip Fracture. The Role of Calcium and Vitamin D in Post-menopausal Women and Older Men**

Michael K. Christakos, DO (Indiana University, Indianapolis, IN, United States), Shashank J. Dave, DO

**Disclosures:** M. K. Christakos: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To investigate current literature for the efficacy of calcium and vitamin D in preventing hip fractures in post-menopausal women and older men.

**Design:** PubMed® literature search of articles from 1966-2013 with key words: “osteoporosis,” “fracture,” “calcium,” and “vitamin D.” Only metaanalyses of randomized control trials were included.

**Setting:** Both community and institutionalized settings.

**Participants:** Post menopausal women and men over age 65.

**Interventions:** Calcium alone, vitamin D alone or calcium plus vitamin D [versus placebo or no treatment].

**Main Outcome Measures:** Risk of hip fracture.

**Results or Clinical Courses:** 29 studies total were found with over 35,000 participants. There was no statistically significant risk reduction in hip fracture in the community dwelling participants receiving either calcium alone, vitamin D alone, or the combination of the two compared to controls. There was a small but statistically significant reduction in risk of hip fracture in institutionalized participants receiving calcium plus vitamin D supplementation. Additionally, several of these studies showed trends towards adverse outcomes in the groups containing calcium, including myocardial infarction and stroke.

**Conclusion:** There is evidence that the use of calcium and/or vitamin D supplementation has little role in the reduction of hip or other fractures in the post menopausal and men over 65 community dwelling population. There is small but significant evidence that calcium plus vitamin D supplementation reduces the risk of hip fracture in institutionalized populations (specifically elderly women and men). Considering this evidence, providers may want to rethink recommending calcium and/or vitamin D supplementation in the community population. As for the institutionalized population, providers need to balance the modest benefit with supplementation on hip fracture reduction, especially in high risk cardiovascular disease patient populations.

**Poster 359**

**Successful Outpatient Rehab Course in a Patient with Extensive Bilateral Quadriceps Tears without Surgical Intervention: A Case Report**

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**Disclosures:** G. P. Burkard: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient is a 62-year-old obese man who was referred to the rehabilitation clinic with bilateral (b/l) knee pain after a fall from a chair. He was unable to walk with crutches and b/l knee immobilizers, and required maximal assistance for transfers. Active knee extension of right lacked 45 degrees to neutral and the left lacked 30 degrees to neutral. Strength in knee extensors was 2/5 b/l. MRI of both knees showed complete full-thickness tears of the distal right rectus femoris and vastus intermedius tendons and near full-thickness tear of the distal left rectus femoris tendon, with retraction of up to 1.5 cm b/l. Orthopedics recommended surgery, but the patient refused due to fear of surgery and lack of guarantee of functional recovery.

**Setting:** Outpatient musculoskeletal clinic.

**Results or Clinical Course:** The patient completed two months of outpatient physical therapy primarily focusing on quadriceps strengthening and gait training with b/l hinged post-op knee braces and variable assistive devices. He continued to improve in strength and active range of motion as seen with multiple follow ups. Active knee extension improved to 35 degrees to neutral on right and 20 degrees to neutral on left. In addition, quadriceps strength improved to 5-5 b/l within limited range. For household ambulation and distances up to 100ft, the patient was able to progress using b/l hinged knee braces with axillary crutches, to rolling walker to eventually loftstrand crutches.
**Poster 360**

Ultrasound Guided EMG of an Isolated Supinator Muscle Injury: A Case Report

Herbie Yung, MD (University of Pittsburgh Medical Center, Pittsburgh, PA, United States), Michael C. Munin, MD

**Disclosures:** H. Yung: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** This is a case of a 20-year-old left handed male college pitcher with left medial elbow pain that began during warm ups. He was referred for massage, stretching, PT and shut down from pitching. After 1 month, he was unable to throw more than 75 feet without pain. MRI revealed thickened, scarred UCL. There was mild atrophy of the supinator and denervation edema. The radial nerve was visualized with no edema. The patient presented for EMG 2 months after onset of symptoms. NCS and non-ultrasound guided EMG unre- markable. Due to concern for supinator denervation, EMG was re-or- dered with ultrasound 3 months later. The patient still had pain throwing more than 75 feet. Strength in the left arm was intact except for 4+/5 strength on digit 3 extension and forearm supination with elbow extended. There was tenderness at the medial elbow and common extensor tendon origin. EMG demonstrated 1+ fibs and PSWs in the supinator only and not other PIN innervated muscles. Patient declined radial tunnel exploration.

**Setting:** University hospital.

**Results or Clinical Course:** 1st EMG: NCS normal. Non-ultrasound guided EMG of supinator, EDC, EIP, ECRL were normal. 2nd EMG: NCS normal. Using a 12 MHz linear array transducer the PIN was followed into the Arcade of Frohse with a normal circumference of 1.56 mm². The supinator was identified on the dorsum of the forearm as a hypoechoic structure with thin thickness. A 37 mm concentric needle was guided using in plane technique. 1+ Fibs and PSWs were in multiple fields. With activation, there was rapid recruitment and mean amplitudes of 4100 µV. Remaining examination of the BR, ECRL, ECU, EDC, ADM, PT and biceps were normal.

**Discussion:** This case demonstrates the utility of ultrasound in needle placement in a small muscle and a case of isolated supinator injury. In a cadaver study, ultrasound guided EMG needle placement was 96% accurate compared to 39% when blind. In 2 cadaver studies of PIN branches, one found an average of 4.25 branches to the supinator, while another found an average of 2.3. A study of pitchers with injured UCLs demonstrated increased supinator activity in the acceleration phase of pitching and 6/10 athletes had supinator denervation. A study of pitchers with injured PIN branches, one found an average of 4.25 branches to the supinator, a cadaver study, ultrasound guided EMG needle placement was 96% accurate. In a small muscle and a case of isolated supinator injury. In a cadaver study, ultrasound guided EMG needle placement was 96% accurate compared to 39% when blind. In 2 cadaver studies of PIN branches, one found an average of 4.25 branches to the supinator, while another found an average of 2.3. A study of pitchers with injured UCLs demonstrated increased supinator activity in the acceleration phase of pitching and 6/10 athletes had supinator denervation. A study of pitchers with injured PIN branches, one found an average of 4.25 branches to the supinator, a cadaver study, ultrasound guided EMG needle placement was 96% accurate.

**Conclusion:** Ultrasound guided EMG is an accurate diagnostic tool for the supinator.

**Poster 361**

Ultrasound-Guided Injection Technique in a Patient with Xiphoidalgia: A Case Report

Enrique Galang, MD (Cleveland Clinic, Cleveland, OH, United States), Michael P. Schaefer, MD

**Disclosures:** E. Galang: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** Patient was a 39-year-old Caucasian female with a history of chest pain for approximately 4 years. The pain was char- acterized as sharp and localized over her xiphoid process with circumferential radiation around the xiphoid process. She had under- gone an extensive medical investigation including but not limited to cardiovascular, gastrointestinal, and rheumatologic work-ups. She denied any history of trauma to her chest in the past. Radiological imaging revealed an anteriorly flexed xiphoid process. She was ulti- mately diagnosed with xiphoid syndrome and referred to our clinic for an ultrasound-guided injection of the xiphoid process.

**Setting:** Multidisciplinary musculoskeletal medicine outpatient clinic.

**Results or Clinical Course:** Musculoskeletal ultrasound was used to identify the xiphoid process; and edema was noted when scanning the area. Once the xiphoid process and surrounding area was thoroughly scanned, a 22 gauge, 1.5 inch needle was introduced and advanced into the xiphoid-sternal junction. This was performed in-plane trans- versely. Following negative aspiration, a mixture of 4cc of 1% lidocaine and 1cc of triamcinolone acetonide (10mg/ml) was distributed along the xipho-sternal junction starting distally at the end of the xiphoid and walking the needle more proximally up to 1cm proximal to the level of the distal sternum. The patient had immediate relief. Further developments will be discussed.

**Discussion:** The prevalence of xiphoidalgia is not well established, and there is limited literature of this rare condition. Furthermore, this is the first reported case to the authors’ knowledge on the use of musculoskeletal ultrasound for injection guidance in this region.

**Conclusion:** Ultrasound guided injection targeted at the xiphoid process and surrounding soft tissues areas may be an effective diag- nostic modality and therapeutic intervention for patients with xiphoidalgia.

**Poster 362**

Age and Gender Related Neuromuscular Changes in Trunk Flexion-Extension

Thomas Kienbacher, MD (Karl Landsteiner Institute of Outpatient Rehabilitation Research, Vienna, Austria), Patrick Mair, PhD, Gerold Ebenbichler, MD

**Disclosures:** T. Kienbacher: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To comprehensively investigate the activity of lumbar extensor muscles at key positions during trunk flexion and extension task and the spine and hip ranges of motion from standing to maximum flexion in healthy older individuals and to compare these measure- ments to those from younger individuals.

**Design:** Cross sectional study.

**Setting:** Outpatient rehabilitation center.

**Participants:** Twenty five older (13 females, 60–90 years) and 24 younger (12 females, 18–40 years) healthy individuals performed trunk flexion-extension testing by holding static positions at half- flexion way and full range of motion from standing and maximum trunk flexion.

**Interventions:** Not applicable.

**Main Outcome Measures:** Root mean square (RMS) surface electro- myographic (SEMG) amplitude of lumbar extensor muscles at standing, half, and maximum flexion position, the respective activity ratio be- tween the half and maximum flexion position [half flexion relaxation ratio (HFR)], the RMS SEMG activity changes between the positions, and the task specific hip, lumbar, and gross trunk ranges of motion.

**Results or Clinical Course:** The HFR was significantly smaller in older males when compared with younger males. Moreover, measurements revealed smaller activity changes from standing to the half and from half to the maximum flexion position in older compared to younger individuals. Older males displayed smaller gross trunk range of motion from standing to maximum flexion than any other group.

**Conclusion:** Gender and normal aging significantly affect both the activation patterns of the lumbar extensor muscles and the kinematics.
of the trunk during a standardized trunk flexion-extension task. Measurement results from healthy young and middle age individuals should not be used for the assessment of individuals older than 60 years of age.

Poster 363
Suprascapular Neuraprathy in a Swimmer: A Case Report
Preeti Panchang (University of Louisville, Louisville, KY, United States), Michael D. Weaver, DO, MS
Disclosures: P. Panchang: I Have No Relevant Financial Relationships To Disclose.
Case Description: 20-year-old M athlete presents with pain and weakness in the left shoulder, which began about three weeks ago during swimming practice. The pain initially began in the superior-posterior left shoulder over the trapezius and supraspinatus region. Pain improved over time but the weakness persisted. Specifically seen with external rotation of the L shoulder. Denied paresthesias in the upper extremities. No issues with the R UE. Electrodiagnosis study showed evidence of left Suprascapular neuropathy with findings suggestive of possible entrapment the left spinoglenoid notch. MRI revealed a paraclaval ganglion cyst in the left spinoglenoid notch/ infraspinatus fossa.
Setting: Academic sports medicine clinic.
Results or Clinical Course: Patient underwent aspiration of the paralabral cyst with ultrasound guidance, however only insignificant amount of clotted blood was extracted. He was then treated with Russian stimulation over the infraspinatus and Thera band exercises. Strength and endurance are improving with therapy and he continues to swim competitively. We will continue to monitor him and may consider surgery if symptoms worsen.
Discussion: The Suprascapular nerve is a mixed motor and sensory nerve arising from the upper trunk of the brachial plexus. Suprascapular neuropathy is an uncommon injury typically caused by compression or traction at the suprascapular notch or spinoglenoid notch. Differentials include upper trunk brachial plexopathy, C5-C6 radiculopathy and rotator cuff impingement. Treatment options for Suprascapular neuropathy include Physical Therapy, anesthetic/corticosteroid injection, ultrasound guided aspiration of the paralabral cyst and surgery.
Conclusion: Suprascapular neuropathy should be considered in athletes with vague posterior shoulder pain. Patients may present with weakness and decreased endurance in performing overhead, sport specific activities. Management remains controversial and mostly depends on the cause, duration, severity of symptoms and patient preference. Aspiration of the paralabral cyst is an acceptable alternative to surgery although it is not definitive and majority of the cysts do recur.

Poster 364
Anterior Iliac Crest Stress Fracture as an Unusual Etiology for Hip Pain in a Young Female Runner: A Case Report
Samuel T. Dona, MD (Rush University Medical Center, Chicago, IL, United States), Craig Best, DO, Kathleen M. Weber, MD
Case Description: A 29-year-old female runner presented with a 3-month history of right hip pain of acute onset without trauma or known inciting event. The patient’s hip pain was primarily located anteriorly with radiation to the groin, buttock, and occasionally distally to the knee. The patient’s hip pain caused her to decrease the volume of her running by greater than fifty percent. Physical examination revealed decreased flexibility of bilateral hip flexors and iliotibial bands as well as tenderness with palpation of the right pubic ram, piriformis, and sacrum. Pain reproduction occurred with passive external rotation.
Setting: Tertiary care hospital.
Results or Clinical Course: Plain radiographs of the pelvis and bilateral hips were unremarkable. Magnetic resonance imaging (MRI) without contrast of the right hip revealed asymmetric increased signal intensity within the right anterior iliac crest likely representing a stress fracture. Immediate cessation of running was recommended given the MRI findings of the stress fracture and the patient was referred to physical therapy and massage therapy for management of the patient’s concomitant piriformis syndrome.
Discussion: There have been few cases of iliac stress fractures described in the young athletic population. The first described a 35-year-old female runner who presented with over two months of left lateral hip pain noted during training for and subsequent running of a marathon. Another case described at 17-year-old male collegiate track athlete who presented with a two-month history of left gluteal and sacral pain with associated right groin tightness. Most recently, a 16-year-old male basketball player presented with right iliac pain that was exacerbated by jumping and running and progressed to be continuous even at rest.
**Conclusion:** Consistent clinical features of iliac stress fractures appear to be pain over the iliac bone that may also be noted over the lateral hip or gluteal region, tenderness along the affected area, and elicitation of pain with flexion of the affected hip. MRI of the pelvis will demonstrate the stress fracture whereas plain radiography is typically negative. A period of relative rest for approximately one month followed by a gradual return to play management strategy has allowed previously affected patients to resume their activity successfully.

**Poster 366**

**Hypokalemia-Induced Rhabdomyolysis in a 61-year-old Woman: A Case Report**

Kunj G. Patel, MD (University of Maryland Medical Center - Midtown, Baltimore, MD, United States), Gopal Aggarwal, MD, Benista Owusu, MD, Patrick Chinedu, MD, Jorawar Singh, MD

**Disclosures:** K. G. Patel: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 61-year-old woman presented to the emergency room with first time onset of bilateral lower extremity weakness. Her only medical history was hypertension, asthma, and recently evaluated chronic back pain. Her medications were lisinopril and HCTZ, the latter of which she had not taken in two months. Physical examination was significant for proximal muscle strength of 2/5 in the shoulders and hip flexors, and 3/5 in all other distal muscle groups, with otherwise normal neurologic exam. Early labwork showed a potassium of 1.8, whereby she was given 50mEq of IV potassium, 320mEq of oral potassium, and lisinopril 40mg. Despite repeat potassium repletions, the patient continued to have K values of 1.8, 2.1, 2.2, and the patient further reported drinking and voiding frequently and severe pain in her legs, which was not responsive to gabapentin or opioids. She began to complain of pain in her legs, and was found to have a CK of 15,212, upon which a high rate of maintenance fluids was started. CK value climbed to 61,546, and urine was positive for myoglobin (332). CBC was unremarkable, CRP was not elevated at 0.5, and other routine tests for causes of muscle injury, ANA, SSA antibody, RF, TSH, Utox were all negative.

**Setting:** Inpatient hospital.

**Results or Clinical Course:** With appropriate fluid replacement and potassium repletion continued over a week, the patient’s potassium and CK values normalized and weakness and pain improved.

**Discussion:** The patient had no history of trauma, cocaine, burn, or prolonged immobility, which are typical risk factors for rhabdomyolysis. Furthermore, her case was associated with hypokalemia rather than hyperkalemia. An accepted, but unusual cause of rhabdomyolysis is severe hypokalemia. The mechanism of this disease occurs by the effect of extracellular potassium on blood vessels—which causes vaso-dilatation during muscle activity. This vasodilation normally increases the regional blood flow. Hypokalemia, however, causes relative ischemia in the active muscle leading to muscle cramps, and if severe, muscle necrosis and rhabdomyolysis.

**Conclusion:** Severe hypokalemia is an important cause of muscle weakness and rhabdomyolysis that must be corrected aggressively.

**Poster 367**

**Ultrasound Guidance for Botox Injections to Avoid Vascular Malformations: A Novel Use for Targeted Therapy. A Case Report**

Mark Caramore (University of Virginia, Charlottesville, VA, United States)

**Disclosures:** M. Caramore: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** The patient is a 31-year-old woman with a history of Blue Rubber Bleb Nevus Syndrome who suffered a Pontine cavernoma tumor rupture in the distant past requiring surgical intervention, which resulted in right spastic hemiparesis. Her spasticity has been managed by a combination of Baclofen 20mg PO TID as well as Botox injections every 3 months for chemodenervation. The patient is known to have venous malformations throughout her body. In order to avoid disrupting venous malformations in and around the muscular targets of the Botox, the right gastrocnemius was examined using ultrasonography to visualize pertinent anatomy and to determine a safe needle path. Multiple venous malformations were visualized using Doppler ultrasound and appropriate sites free of malformations were then marked for injection. Doppler imaging pre-injection and ultrasound guidance were later used to avoid venous malformations while injecting the right tibialis posterior and extensor hallucis longus muscles. Post-procedure ultrasound scanning of the injection sites confirmed that there were no associated hematomas.

**Setting:** University Hospital-Associated Outpatient Clinic.

**Results or Clinical Course:** Patient tolerated the injections well and suffered no bleeding complication, which was confirmed with ultrasound scanning post-injections.

**Discussion:** This is the first reported case, to our knowledge, of use of musculoskeletal ultrasound to improve safety for chemodenervation procedures in the context of adjacent vascular malformations. In patients with known risk factors for vascular malformations, ultrasonography with Doppler prior to injection may decrease the risk of bleeding complication.

**Conclusion:** Ultrasonography offers improved visualization of chemodenervation target sites as well as potentially hazardous vascular malformations in this patient with Blue Rubber Bleb Nevus Syndrome.

**Poster 368**

**Missed Fibular Shaft Fracture in United States Navy Seaman: A Case Report**

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**Disclosures:** A. J. Susmarski: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 21-year-old female United States Navy Seaman with right lateral leg pain during a group run. She was seen earlier in the day at another facility and was diagnosed with a lateral ankle sprain. She presented in clinic requesting documentation of activity and job restrictions. Her examination was notable for mild swelling along the lateral malleolus, antalgic gait, tenderness to palpation at the posterior lateral malleolus, and tenderness to palpation along distal third of fibula. Radiographic examination included a lateral, AP and oblique view of the right ankle demonstrating a non-displaced hairline fracture 5.5 centimeters proximal to the tip of the lateral malleolus at the distal metaphyseal/diaphyseal region of the fibula at both the syndesmoses between the tibia and fibula which was only clearly visualized in the oblique view.

**Setting:** Outpatient clinic.

**Results or Clinical Course:** Initial treatment included, ice, elevation, and a CAM walker boot with weight bearing as tolerated for 4-6 weeks. At week 5 she was asymptomatic with ambulation and eager to return to activity. Repeat imaging showed interval healing and callus formation. At this time she was permitted to begin phasic progression to return to full duty beginning with low impact cardiovascular, core and strength training with gradual progression to full activities as tolerated. She ultimately returned to full duty, completed training, and moved on to her first Naval duty station.

**Discussion:** Fibula shaft fractures are typically the result of direct trauma; however, there is also a stress component as the fibula is responsible for 6-17% of forces with weight bearing. In military recruits these stress related injuries are often located at the metaphyseal/diaphyseal junction. Fractures of the foot and ankle can be overlooked
on standard ankle radiographs (AP and lateral) in the acute setting and have been shown to have an error rate of 4.2% including missed fractures and improper classifications of old injuries as acute. **Conclusion:** The astute physician should never abandon a detailed and thorough history and physical examination. A high index of suspicion and avoidance of the pitfall of being swayed by prior reports or testing should be maintained when examining orthopedic injuries.

**Poster 369**
Concussion in an Athlete with Incidental Arnold Chiari Type I Malformation: A Contraindication to Return to Play? A Case Report

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Case Description: A 13-year-old boy who presented to clinic with an acute concussion after a kick to the head during a soccer match. He denied LOC and did not return to play. Post injury symptoms (sx) included persistent bifrontal headaches (HA). Brain MRI showed low-lying cerebellar tonsils, just below the foramen magnum, suggestive of Arnold Chiari type I malformation (AC-IM).

Setting: PM&R concussion clinic

Results or Clinical Course: Work-up revealed delayed processing speed, but no evidence of vestibular, oculomotor or cervical dysfunction. He was referred to neurosurgery who advised against performing ultrasound of the right elbow, which occurred eight months after the initial injury.

Discussion: An injury to the deep motor branch of the radial nerve is a possible complication after surgical biceps tendon repair. This is the first case, to our knowledge, where ultrasonography is used to successfully locate the site of PIN injury and also aid in the decision to perform nerve exploration and release.

Conclusion: Diagnostic ultrasound could be considered early in the management of suspected radial nerve injuries after distal biceps repair, in order to aid with the appropriate diagnosis and location of injury and to avoid a delay in definitive treatment.

**Poster 370**
Deep Motor Branch Radial Neuropathy after a Distal Biceps Repair: A Case Report

Anish A. Mirchandani, DO (New York-Presbyterian Hospital, New York, NY, United States), Ethan Rand, MD, Carolyn Thompson, DO, Christopher J. Visco, MD

Disclosures: A. A. Mirchandani: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 38-year-old man developed a complete avulsion of the distal biceps tendon while lifting furniture and underwent a distal biceps tendon repair with cortical button fixation. Two weeks post-operatively the patient developed severe right wrist and hand weakness, without pain or numbness. On physical examination the patient had weakness with wrist and finger extension, and intact sensation. He was diagnosed with posterior interosseous nerve (PIN) injury and managed conservatively with extensive occupational therapy and bracing. The patient’s symptoms did not improve over the next several months and he received serial electrodiagnostic testing, which initially demonstrated a radial nerve injury, and later more specifically PIN injury. Part of his evaluation included a diagnostic ultrasound of the right elbow, which occurred eight months after the initial injury.

Setting: Tertiary care academic medical center.

Results or Clinical Course: The diagnostic ultrasound demonstrated the deep portion of the radial nerve taking an altered course, descending toward the hardware. There was discreet evidence of nerve entrapment at the "button" of the hardware, which is positioned just deep to the supinator. Proximal to the hardware, there was a thickened, fascicular prominence and enlarged architecture of the radial nerve in the space between the superficial and deep supinator. Distally, the nerve appeared intact, with a normal diameter. With this information the patient underwent a right radial nerve exploration and surgical release. Post-operatively he began occupational therapy. At one month post-operatively, he returned to light-duty work but reported no improvement in strength. He has a three month follow-up planned to evaluate neurologic recovery.

Discussion: An injury to the deep motor branch of the radial nerve is a possible complication after surgical biceps tendon repair. This is the first case, to our knowledge, where ultrasonography is used to successfully locate the site of PIN injury and also aid in the decision to perform nerve exploration and release.

Conclusion: Diagnostic ultrasound could be considered early in the management of suspected radial nerve injuries after distal biceps repair, in order to aid with the appropriate diagnosis and location of injury and to avoid a delay in definitive treatment.

**Poster 371**
Achilles Tendon-Soleus Interface Musculotendinous Tear Diagnosed With Ultrasound: A Case Report

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Disclosures: P. Jayaram: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 40-year-old active female runner with two month history of right Achilles pain. Diagnostic ultrasound of the posterior compartment revealed a right Achilles tendon-soleus interface musculotendinous tear.

Setting: Outpatient MSK clinic

Results or Clinical Course: Patient presented with two month history of right Achilles pain. Onset of pain began during a run several months prior to her presenting to the clinic. At the time of her presentation to clinic she refrained from running for four weeks. She continued to have soreness and tightness with everyday walking despite relative rest. She stated that her pain was better in the mornings, and improves with wearing flat shoes. Physical examination was pertinent for pronated feet. Heel rise reproduced pain in her right Achilles tendon. The Achilles tendon was grossly larger on the right compared to the left. Palpation revealed fullness in the mid substance of the tendon. Ultrasound examination revealed right Achilles tendon-soleus interface musculotendinous tear.

Discussion: Calf pain is common among runners. Achilles tendinopathy, in particular, is one of the the most common pathologies. The sudden onset of pain, tenderness localized to the musculotendinous junction of the medial head of the gastrocnemius, and a palpable...
defect in the medial belly of the gastrocnemius just above the musculotendinous junction are pathognomonic for a gastrocnemius tear. There are many other clinical entities associated with calf pain in runners thus making a specific clinical diagnosis challenging. Musculotendinous tears of the soleus are unusual; making it more difficult for the practitioner to formulate a correct diagnosis on history and examination alone. The patient could not accurately determine at what point in her running pattern she developed pain. Based on soleus function and our knowledge of gait cycle; it is most likely that this occurred during early to mid stance phase when the soles is acting eccentrically.

Conclusion: Ultrasound examination is augmentative to history and physical examination in diagnosing the cause of calf pain in runners and ultimately result in more accurate treatment recommendations.

Poster 372
Activity Related Knee Pain Relieved with Nifedipine: A Case Report
Brian W. Toedebusch (University of Missouri-Columbia, Columbia, MO, United States), Mohammad Agha, MD

Disclosures: B. W. Toedebusch: I Have No Relevant Financial Relationships To Disclose.

Case Description: The patient is a 22-year-old Caucasian woman with a medical history of Raynaud’s who was involved in a motor vehicle accident, injuring her left knee. She was originally treated by orthopedic surgery and underwent left knee arthroscopy. She subsequently developed recurrent pain and discoloration of the medial aspect of her left knee associated with increased activity. Two years later, she was referred to a physical medicine and rehabilitation outpatient clinic for pain management after failing multiple additional treatment options, including: physical therapy, multiple oral pain medications, topical anti-inflammatory compounds, and intra-articular corticosteroid injections. She described her pain as a deep burning sensation with a 9/10 intensity, which increased with exercise and prolonged knee bending. Physical examination revealed medial joint space tenderness and reddish discoloration of the medial portion of her knee, which were exacerbated with jogging. All provocative tests were unremarkable. An MRI showed only tendinosis at the insertion of the medial head of the gastrocnemius, with structurally intact ligaments and meniscus. Her examination and imaging were inconsistent with mechanical etiology and given her medical history we considered vascular etiology. She was started on 30mg of extended release nifedipine for possible arterial vasospasm of the left knee.

Program Description: Academic medical center.
Setting: Physical Medicine and Rehabilitation Clinic.

Results or Clinical Course: At one month follow-up, her pain and discoloration had resolved she had no activity limitations. However, when she stopped taking nifedipine her symptoms returned.

Discussion: This case documents a rare cause of activity related knee pain, arterial vasospasms in a patient with Raynaud’s and previous traumatic knee injury. No other cases of arterial vasospasm associated with activity related knee pain were found in a literature search.

Conclusion: Atypical etiologies of musculoskeletal pain, including collagen vascular disease, should be considered in patients without history or examination consistent for mechanical nature.

Poster 373
Acute Flank Pain with Eventual Hip Flexor Paresis Due to Retroperitoneal Hematoma: A Case Report
Anirudh Kadambi, MD (University of Toledo Medical Center, Toledo, OH, United States)

Disclosures: A. Kadambi: I Have No Relevant Financial Relationships To Disclose.

Case Description: 65-year-old man with a history of mitral valve repair and CHF was admitted to the acute inpatient rehabilitation floor after a CHF exacerbation. He was placed on Coumadin therapy with a heparin drip for bridging due to a subtherapeutic INR. The heparin drip was continued for 4 days as his INR slowly reached to a level of 2.2. At this time, patient reported some acute left flank pain with some point tenderness in the LLQ of the abdomen. He had no hip flexor weakness at this time during examination and he rated his pain at a 2/10. No pain medication was given and the patient continued with his therapy sessions for the day. 4 hours later, while trying to get up out of bed, the therapist noted that patient was unable to turn to his left side due to extreme pain. At this time, patient was reexamined and found to have 4/5 strength with hip flexors and point tenderness on deep palpation in the LLQ of the abdomen. A stat CT scan without contrast of the abdomen and pelvis was ordered.

Setting: Acute inpatient rehabilitation medical center.

Results or Clinical Course: The CT scan revealed a retroperitoneal hematoma measuring 11.7 by 4.5 cm extending from the left splenic artery to the external iliac arteries. With the patient’s vital signs and hemoglobin stable, the heparin drip was stopped and he was transferred back to the acute hospital setting with serial HbH monitoring. The patient was started on intravenous fluids, Vitamin K was administered, and monitored closely with telemetry and pulse oximetry. Unfortunately, the patient expired 4 hours later due to a possible STEMI.

Discussion: This was a unique presentation of a retroperitoneal hematoma due to the initial physical examination revealing no weakness, very minimal flank pain, and no palpable masses. Also, the weakness and pain intensified rather rapidly within 3-4 hours. From the literature, majority of retroperitoneal hematomas present with abdominal or flank pain with a palpable mass or ecchymoses in the groin or periumbilical area. Paresis is present in only 20-27% of cases.

Conclusion: With any anticoagulated patient, the clinical suspicion of retroperitoneal hematoma needs to be high when abdominal or flank pain is reported with paresis due to the 20% mortality rate reported in literature.

Poster 374
Altered Side-to-Side Muscle Activity of the Lower Extremities during Double-Leg Squat in Femoroacetabular Impingement
Monica Rho, MD (Rehabilitation Institute of Chicago, Chicago, IL, United States), Franz Ngly, MS, Peter J. Hurh, MD, Yasin Dhaher, PhD

Disclosures: M. Rho: I Have No Relevant Financial Relationships To Disclose.

Objective: Femoroacetabular impingement (FAI) is a bony abnormality defined by a femoral head-neck deformity that is believed to develop into osteoarthritis. The neuromuscular control of the hip joint with FAI is unknown. Surface electromyography (EMG) recordings of muscle was used as a proxy to determine the motor strategy during a double leg squat. The objective of this study was to examine the differences in subjects with FAI compared to controls in their side-to-side surface EMG activity in their lower extremity muscles during a double-leg squat.

Design: Cohort study
Setting: Neuromechanics Gait Lab.
Participants: 14 volunteer subjects: 7 FAI (4F:3M), 7 healthy controls (3F:4M).

Interventions: Surface EMG was placed bilaterally on 12 lower extremity muscles. All subjects performed 5 double-leg squats.

Main Outcome Measures: Surface EMG amplitude for each muscle on each side was averaged over the duration of the squat and normalized to baseline standing amplitude.
Results or Clinical Course: A Spearman’s correlation was run to determine the side-to-side relationship of EMG activity for each lower extremity muscle tested during the double leg squat in FAI and control groups. Bonferroni correction was used to determine the P value equal to .004. The two groups demonstrated different patterns of correlated side-to-side EMG activity in 4 muscles. Control group had statistically significantly correlation in tibialis anterior (r=0.5597, P=.0001) and FAI group did not (r=0.1749, P=.3224). Whereas FAI group had statistically significant side-to-side correlation with gluteus medius, soleus and medial/lateral gastroc (r=0.6608, P=0.0000; r=0.8151, P=0.0000; r=0.4129, P=0.0123; r=0.6330, P=.0000) and the control group did not. (r=0.2811, P=.0968; r=0.4129, P=0.0123; r=0.2952, P=0.8040; r=0.1498, P=.3832)

Conclusion: Individuals with FAI appear to utilize different motor control strategies than healthy controls when asked to perform a double leg squat.

Poster 375
Distention Capsulography for the Treatment of Adhesive Capsulitis
Jonathan S. Kirchner, MD, Eric Leung, Lauren M. Terranova, DO (Icahn School of Medicine at Mount Sinai, Fort Lee, NJ, United States), David Spinner, DO
Objective: To determine whether distention capsulography is of benefit for the treatment of adhesive capsulitis of the shoulder, by evaluating its effect on patient-reported pain and shoulder range of motion.
Design: Retrospective chart review.
Setting: Tertiary care center.
Participants: 7 patients with a mean age of 59.71 years with adhesive capsulitis and treated with distention capsulography. All patients had symptoms for at least 6 weeks, and failed conservative treatment.
Interventions: A retrospective review was done for patients who were diagnosed with adhesive capsulitis of the shoulder and underwent distention capsulography under fluoroscopic guidance during July 2010 to July 2014. In all patients the procedure was done using an anterior approach. An arthrogram was obtained and an injectate was administered. The average volume of injectate used was 40.78mL (range 25-70mL). Immediately following, passive range of motion by the treating physician was done and most patients participated in physical therapy within 1-2 hours post procedure. After treatment all patients were also encouraged to continue to participate in an outpatient physical therapy program.
Main Outcome Measures: Range of motion of the affected shoulder and patient-reported average pain level or reported visual analog scale were evaluated before and after procedure.
Results or Clinical Course: Following distention capsulography, all patients received immediate improvement of their shoulder’s range of motion in flexion, abduction, internal and external rotation. Pain relief and improvement of range of motion was sustained at the clinical follow up visit, approximately one month following the procedure. On average, the 7 patients had an 81% improvement of pain, 58 degrees improvement of shoulder flexion, 61 degrees of shoulder abduction, 15 degrees of internal rotation and 34 degrees of external rotation.
Conclusion: Adhesive capsulitis is a common cause of shoulder pain. It is associated with pain, limited motion of the shoulder and may have a protracted course. The optimal treatment for this condition remains controversial. Some studies have shown some support for distention capsulography, although further studies are needed to determine its true efficacy and best procedural technique. We have demonstrated successful treatment of adhesive capsulitis with distention capsulography in seven patients.

Poster 376
Ultrasound-Guided Aspiration and Lavage Treatment for Rotator Cuff Calcific Tendinitis: A Literature Review
Trung Ha (Baylor College of Medicine, Houston, TX, United States), Siddharth Aranke, MD, William M. Jones, MD
Disclosures: T. Ha: I Have No Relevant Financial Relationships To Disclose.
Objective: To evaluate the efficacy of ultrasound-guided aspiration and lavage in treating rotator cuff calcific tendinitis (RCCT).
Setting: Academic and clinical settings.
Participants: Adults with rotator cuff calcific tendinitis (RCCT) related shoulder pain.
Interventions: Decompression of symptomatic rotator cuff calcific tendinitis using various ultrasound-guided barbotage techniques

Main Outcome Measures: Visual Analog Scale (VAS), Constant Shoulder Scores (CS), American Shoulder and Elbow Surgeon Scores (ASES), Western Ontario Rotator Cuff Index (WORC), Disabilities of the Arm, Shoulder and Hand questionnaire (DASH), and radiographic evaluation of calcification size.

Results or Clinical Course: Four studies were selected for critical review. Bas de Witte et al (2013) compared barbotage combined with subacromial injection (SAI) (N=23) to SAI alone (N=25) for the treatment of RCCT. At 1 year, both groups displayed a statistically significant improvement in mean CS (P=.05). The barbotage group (mean CS-86; 95% CI, 80.3-91.6) had a statistically better outcome over the non-barbotage group (mean CS-73.9; 95% CI, 67.7-80.1) (P=.0005). Serfínini et al (2009) compared double needle lavage technique (N=219) to those without treatment (N=68) for RCCT. At 1 year, double needle lavage patients fared better than non-treated patients (P<.001). At 5 years and 10 years their CS and VAS were similar (P>.795 and P>.413 respectively). Yoo et al (2010) looked at US-guided needle decompression with SAI in 35 shoulders in 35 patients with no comparison group. At 6 months post-procedure, 25/35 (71%) shoulders had significantly improved ASES and CS scores (P<.01). Mean calcific deposit size reduced in those patients from 13.6 to 5.6mm (P<.01). De Conti et al (2010) treated 123 patients with long standing RCCT symptoms with US lavage. Fifty-five percent (68/123) of the patients required one treatment where as 45% (55/123) required two or more treatments. Post-treatment CS was better in all patients (P<.01 in both groups).
Conclusion: US-guided needle aspiration and lavage for treatment of rotator cuff calcific tendinitis appears to be effective, safe and cost friendly.

Poster 377
Two Rare Complications of CCP+ RF + Rheumatoid Arthritis While on Anti-TNF Therapy
Sharon David, MD (MedStar National Rehabilitation Network, Washington, DC, United States), Robert D. Bunning, MD, Stephen F. Gunther, MD
Disclosures: S. David: I Have No Relevant Financial Relationships To Disclose.
Case Description: A 56-year-old woman diagnosed with rheumatoid arthritis (RA) in 1996 was treated with methotrexate, leflunomide, and prednisone, with anti-TNF therapy added in 1998. In 2011, she was diagnosed with hepatitis C. Purified protein derivative converted to
Upper Extremity DVT in Softball Pitcher: A Case Report

Tad P. DeWald, MD, MPH (Wayne State- Oakwood, Taylor, MI, United States), Parag Shah, Paul Withers, MD, Ashish Deshpande, MD, Parmod Mukhi, MD


Case Description: 19-year-old female softball pitcher who presented to sports medicine clinic with a 2 week history of vague right arm pain. No reported trauma or inciting event. She came to clinic for evaluation after a week of physical therapy did not alleviate the symptoms. X-ray/MRI of the right arm did not demonstrate any abnormality. She continued to have symptoms and was held out of competition. No focal numbness, swelling, atrophy or weakness.

Results or Clinical Course: Venous Doppler initially showed DVT in right axillary vein. Patient was held from competition and for the season and started on Coumadin. She followed up with both her PCP and on therapeutic coumadin for 6 months. Full coagulation work up ruled out rare causes of inherited thrombophilia. Repeat Doppler showed resolution of her DVT and her PCP discontinued the Coumadin. She returned to competition the following season without incident.

Discussion: Upper extremity DVT is a rare condition that can cause significant morbidity or mortality. The syndrome in healthy young athletes who repeatedly use their upper extremities in sport is referred to as effort thrombosis or Paget-Schroetter Syndrome. The heavy use of the arms can cause micro trauma and can lead to the activation of the coagulation cascade.

Conclusion: Upper extremity DVT is a rare condition that needs to be placed on the differential diagnostic list for healthy young athletes who repeatedly use their upper extremities for sports. It is a potentially serious condition that needs to be ruled out for athlete safety.

Poster 379
Clenched Fist Syndrome: Treatment with Local Injection under Ultrasound Guidance. A Case Report

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Disclosures: A. Bhargava: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 42-year-old African American woman injured her left hand at work. MRI done 3 months later showed soft tissue lesion within the interdigital space of the second and third digits, with imaging characteristics most suggestive of a foreign body granuloma. Six months later, biopsy taken during surgery suggested actinomycosis. The patient developed clenched fist syndrome with the medial 3 fingers being affected. Fingers were held at 30 degrees, 90 degrees, and 40 degrees flexion at metacarpophalangeal joint, proximal interphalangeal joint, and distal interphalangeal joint respectively. Passive range of motion was trace. Thumb and index finger had complete range of motion. 6 months after the surgery, she was medically cleared by infectious disease specialist for local injection. Patient was injected with 1 ml of 1% Lidocaine at A1 pulley area of the middle finger, at the site of surgery. Immediately on injection with the needle still in place, the patient could extend all three fingers. After the injection, patient had full range of motion but pain at the injection site persisted. Approximately 4 months after the first injection, 20 mg of methylprednisolone, with 0.5 ml of 1% Xylocaine was injected at the A1 pulley under ultrasound guidance. The pain subsided completely and had full range of motion.

Setting: Sports & spine center.

Result or Clinical Course: At six months follow up after the second injection, she had complete resolution of pain and full range of motion of all fingers. She returned to work.

Discussion: This is the first reported case, to our knowledge, which supports the option of a local injection of lidocaine and or steroids under ultrasound guidance at the inciting site to treat Clenched Fist Syndrome.

Conclusion: A local injection under ultrasound guidance is a simple and safe treatment option for a devastating condition like clenched fist syndrome.

Poster 380
Ultrasound-Guided Interspinous Ligament Steroid Injection for Symptomatic Interspinous Ligament Edema in Two Young Athletes with Back Pain: A Case Series

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Disclosures: A. A. Mirchandani: I Have No Relevant Financial Relationships To Disclose.

Case Description: Patient VH is a 26-year-old female athlete who presented with midline low back pain radiating into the left gluteal region that started after a wakeboarding injury. Physical examination was significant for hyperlordosis and pain with lumbar flexion and lumbar extension. Pain was reproduced with palpation over the midline L4-L5 region. MRI lumbar spine was notable for L3-L4 and L4-L5 interspinous ligament edema. Patient CR is a 15-year-old female soccer and lacrosse player who presented with 1 year of midline aching low back pain. Physical examination was significant for hyperlordosis, and pain with lumbar extension. Pain was reproduced with palpation over requiring INH. Methotrexate was stopped; anti-TNF therapy with entanercept and hydroxychloroquine were given. Wrist x-rays were normal. 3 years later she presented unable to extend her right fourth and fifth fingers. Physical examination showed distal ulnar tenderness, boutonniere deformity, and synovial bursas at the base of the metacarpals with flexion contractures at the proximal interphalangeal joints. X-rays showed bone on bone arthritis between the radius and scaphoid and ulnar impaction. She underwent urgent tendon transfers, resection of the distal ulna, and limited carpal fusion of the radius to the lunate bone. One month later she developed right eye pain, vision loss, and extrusion of fluid. Treatment for scleral perforation with corneal glue and prednisolone was given. She was switched from anti-TNF to rituximab therapy.

Setting: Outpatient clinic.

Results or Clinical Course: Vision has returned to reading newsprint with a healed scleral ulcer. Extension of the right fingers returned with good function.

Discussion: RA is a systemic inflammatory polyarthritis. While thought of as a benign musculoskeletal disorder, it can cause medical emergencies in numerous organ systems. Ocular complications are rare but require immediate attention. Keratoconjunctivitis sicca can lead to decreased corneal protection and perforation. Extensor tendon ruptures present additional complications needing immediate attention to avoid ischemic necrosis, progression of further tendon ruptures, and increased retraction, all of which increase difficulty of repair.

Conclusion: RA potentiates medical emergencies in numerous organ systems, even on biologic therapy. Periodic monitoring for ophthalmoplegia, dry sensation, finger extensor weakness, and exams for sclerotic or tendon rupture are indicated.
the midline L2-L4 region. MRI lumbar spine showed L3-L4 and L4-L5 interspinous ligament edema.

**Setting:** Tertiary care academic medical center.

**Results or Clinical Course:** Both patients were treated conservatively with rest, oral NSAIDs and a course of physical therapy with no improvement. Decision was made to perform interspinous ligament steroid injections to address ligament edema as a source of pain. Under ultrasound-guidance, betamethasone with 1% lidocaine was injected into bilateral L3-4 and L4-5 interspinous ligaments. Both patients reported significant improvement in symptoms and were able to resume their previous level of athletics.

**Discussion:** To our knowledge, this is the first description of ultrasound-guided steroid injection to the interspinous ligament for the treatment of interspinous ligament injury in young female athletes. Interspinous ligament steroid injection, most often fluoroscopically guided, has been reported as a possible treatment for Baastrup's disease. In these two cases, neither had findings of Baastrup's disease, but their extension based pain could not be explained by any other radiographic findings. Of note, the spinous processes and high resistance interspinous ligaments restrict lumbar extension along with other soft tissue, facet joints and to some extent intervertebral discs. It is possible that an extension based mechanism of injury resulted in interspinous ligament edema and pain. Additionally, ultrasonography offered these young women a radiation free, diagnostic and therapeutic option.

**Conclusion:** Ultrasound-guided steroid injection may be effective in treating young female athletes for interspinous ligament edema mediated back pain.

**Poster 381**

**Pubic Body Stress Fracture in Pregnancy: A Case Report**

Sarah Hwang, MD, Megan Clark, MD (University of Missouri, Columbia, MO, United States)

**Disclosures:** M. Clark: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 27-year-old G2 P0 woman, 25 weeks pregnant at the time of initial evaluation, who presented with a 2 week history of left hip and leg pain. She described pain with walking, turning in bed, and getting up from a seated position. Her pain improved slightly with rest and sitting. She noted that her leg would "give out" on her resulting in near falls. Physical examination was significant for an antalgic gait with tenderness to palpation of the left hip flexors, iliobial band, and left greater trochanteric bursa. She had restricted internal and external rotation of the left hip, with increased pain with external rotation. Scours positive for pain in the left hip. Faber's positive for left hip pain. Hop test was positive on the left.

**Setting:** Women’s Health Rehabilitation Clinic.

**Results or Clinical Course:** MRI of the pelvis was obtained and demonstrated findings typical of a left pubic body stress fracture. It was recommended that she use a walker for protected weight bearing, but the patient preferred to try crutches. Physical therapy was continued for core stabilization, soft tissue mobilization, flexibility, and use of assistive device for ambulation.

**Discussion:** Pelvic stress fractures are typically seen in female runners and military recruits. Cases of pelvic stress fractures have been reported following pregnancy with excessive weight bearing activities without good pelvic and core stability, weakness of the pelvic stabilizers, or poor flexibility. To our knowledge there has only been one other report of pubic body fracture during pregnancy. The authors of that particular paper hypothesized an imbalance of the dorsal and abdominal muscles in conjunction with ligament laxity leading to stress fracture of the body of the pubis, however other etiologies such as transient osteoporosis of pregnancy have never been discussed. Treatment for this type of fracture in the peripartum period includes pain control, cold therapy to the area, rest, and weight bearing restrictions/avoidance. Physical therapy can be utilized for soft tissue massage, joint mobilization, core stability, improved flexibility and proper use of walking aids. In this particular case, further workup for transient osteoporosis of pregnancy will be pursued postpartum.

**Conclusion:** Stress fracture of the pubic body during pregnancy is a rare cause for hip pain.

**Poster 382**

**Heterotopic Ossification of the Quadriceps Muscle Complicating Distal Femoral Traction with Pins: A Case Report**

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**Disclosures:** R. Ben-Youssef: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 59-year-old man status post auto vs. bike accident. He sustained closed head injury with subarachnoid hemorrhage, cervical and thoracic vertebral column injuries, pubic symphysis diastasis, right sacrum fracture, and left tibia open fracture. He was admitted to the ICU, developed ARDS and was on a ventilator for many weeks and had multiple pelvic and abdominal surgeries. His left tibia fracture was initially managed with 2 large-diameter traction pins inserted into the distal segment of the femur above the knee; he then had open reduction and internal fixation.

**Setting:** Acute Inpatient rehabilitation unit (ARU).

**Results or Clinical Course:** The patient was admitted to ARU 2 months after trauma. He complained of pain is his left quadriceps muscle with limited knee range of motion. Clinical examination showed normal skin without inflammatory signs and found 2 non-tender solid masses 3x2 cm each at the distal anterior third of the left thigh with limited knee flexion (75 degrees). X-rays showed heterotopic ossification (HO) along and above the tracts of the traction pins.

**Discussion:** Large-diameter pins inserted into the distal segment of the femur are frequently used for temporary skeletal traction in fractures of the lower leg when internal fixation has to be delayed. HO at the site of femoral traction pins is rarely reported. It is not clear if it is really rare, or it is frequently undiagnosed, particularly in the absence of pain and inflammatory signs. Our patient had pain and he was thin which facilitated the clinical diagnosis.

**Conclusion:** HO complicating skeletal traction with large pins could potentially jeopardize function and quality of life. The diagnosis is crucial, and diligent care during pin placement and pharmacologic prophylaxis with indomethacin in high risk trauma patients may lower the risk of HO.
reports that her most recent ankle sprain occurred approximately 3 weeks prior to her initial visit. Musculoskeletal ultrasound was used to evaluate the ATF ligaments bilaterally. The patient returned to clinic two weeks after her initial visit to have platelet rich plasma injected in to the area of interest using MSK ultrasound guidance. She was also given a CAM boot for which to wear for ambulation while out of bed and followed up 2 weeks, 4 weeks, and 3 months later.

**Setting:** Outpatient Sports Clinic at Mount Sinai Hospital.

**Results or Clinical Course:** After PRP was injected MSK ultrasound was used to evaluate the ATFLL, it was found that the ligament not only regained its fibular texture but also became shorter decreasing anterior translocation during anterior drawer.

**Discussion:** PRP is derived from autologous blood and plays a major role in the natural healing process of the body. In this case the ATFLL showed increased laxity which likely contributed to the recurrent nature of the patient’s injury. PRP contains granules that stimulate angiogenesis, cell replication, and a variety of other processes needed to heal soft tissue injuries. This form of treatment appears to aid in the healing of chronic ligamentous injuries as evidenced by the return of the fibular texture of the ligament as well as the decreased length and laxity of the ligament seen on musculoskeletal ultrasound.

**Conclusion:** Platelet rich plasma could play a vital role in the treatment of chronic and recurrent ligament injuries and should be further studied using similar techniques.

**Poster 384**

Unilateral Femoral Neuropathy after Childbirth in the Context of an Undiagnosed Underlying Peripheral Polyneuropathy: A Case Report

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**Disclosures:** J. Pan: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 30-year-old female professional scuba diver presented with sudden-onset left leg weakness of three months duration, beginning immediately after midwife-assisted birth of her first child. The patient presented for electrodiagnostic testing (EMG/NCS), referred from sports medicine clinic. Her symptoms were left leg weakness and numbness of the anteromedial thigh and leg. Her positioning for childbirth included four hours lying on her left side with hips flexed and externally rotated. Examination revealed 4/5 left hip flexion and knee extension, decreased sensation in a left femoral/saphenous nerve distribution, and a decreased left patellar reflex. MRI indicated muscle edema in the distribution of the left femoral nerve anterior division. EMG/NCS revealed subacute femoral neuropathy with > 50% axon loss and denervation on needle exam. In addition, there was evidence for an underlying predominately demyelinating sensorimotor peripheral polyneuropathy affecting all limbs. Laboratory workup for her polyneuropathy was unremarkable, including protein electrophoresis (serum and urine), hemoglobin A1c, TSH, ESR, RPR, arsenic, lead, and mercury.

**Setting:** Quaternary-care academic hospital clinic.

**Results or Clinical Course:** After ten months of physical therapy, the patient tolerated lifting sixty pounds on a ladder, simulating climbing with diving equipment. EMG/NCS performed eleven months after the initial injury demonstrated significant reinnervation of the muscles supplied by the left femoral nerve.

**Discussion:** Postpartum femoral neuropathy is a rare phenomenon. The mechanism of injury may be compression near the inguinal ligament with hip flexion, external rotation, and abduction. Risk factors include primiparity and prolonged second stage of labor. Symptoms resolve in > 90% of patients, typically within 2-6 months.

**Conclusion:** Positioning may be a modifiable risk factor for postpartum femoral neuropathy, especially in prolonged labor. The underlying polyneuropathy in this patient may have predisposed her to nerve injury.

Fortunately, even with significant axonal loss on initial electrodiagnostic testing, prognosis for return to full function is favorable.

**PEDIATRICS**

**Poster 385**

Use of Calcitonin as Treatment for Osteochondritis Dissecans of the Elbow: A Case Report

Kevin M. Berry, MD (Rutgers-NJMS/Kessler, Newark, NJ, United States), Jeffrey L. Cole, MD

**Disclosures:** K. M. Berry: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 15-yr-old girl developed lateral right elbow pain following a tumbling injury. Initial physical examination findings showed mild-to-moderate pain and limited extension in her right elbow. Strength was 4/5 in right elbow extension, but otherwise 5/5 in upper and lower extremities. There was intact sensation and reflexes in all four extremities. The patient was diagnosed with osteochondritis dissecans of her right elbow, grade II, which was subsequently confirmed with MRI. She was started on daily ibuprofen and calcitonin for inflammatory and osseal pains, respectively, and on a physical therapy program of increasing intensity, which she continued for several months.

**Setting:** Outpatient PM&R clinic.

**Results or Clinical Course:** Subsequent outpatient visits demonstrated a decrease in her elbow pain and increase in her right elbow extension strength from 4/5 to 5/5. Repeat x-ray/MRI revealed fusion of her capitellum and previously separate osteochondral fragment, an improvement from grade II to grade Iib.

**Discussion:** Conservative management of osteochondritis dissecans has been controversial to date and most patients with unstable lesions advance to surgery. To our knowledge, there have been no previously published cases of calcitonin as treatment for osteochondritis of the elbow.

**Conclusion:** Calcitonin can be used as an effective nonoperative treatment for osteochondritis dissecans of the elbow.

**Poster 386**

Neurologic Manifestations of Mycoplasma Pneumoniae Infection in a Child: A Case Report

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**Disclosures:** K. Sabapathy: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** A 23-month-old girl presented to the ED with two weeks history of upper respiratory infection. The mother reported that two days prior to admission, the patient fell out of bed, was unable to hold her bottle because of wrist weakness and was unable to walk without tripping. Upon evaluation, the patient was noted to have cough, mild wheezing, a slightly elevated temperature and mild neurologic deficits involving bilateral arms and the left lower extremity. Work up including a C-spine, MRI brain and lumbar puncture was negative. PCR for Rhinovirus and Enterovirus was negative, but positive for Mycoplasma pneumonia. Rehabilitation was consulted to determine if she was an appropriate candidate for acute interdisciplinary rehab. A more thorough neurologic examination was difficult to conduct due to the patient’s age/poor compliance, but did reveal a bilateral wrist drop and a foot drop on the left. Hoffman’s and Babinski signs were negative and reflexes were intact, except for triceps bilaterally.

**Setting:** UCI Medical Center.

**Results or Clinical Course:** During her hospitalization the patient received occupational and physical therapy as part of her overall medical treatment. Her strength, endurance and coordination all improved rapidly and she was discharged home with a regimen for outpatient PT and OT.

**Discussion:** There is very scant literature on children presenting with neurologic manifestations of M. pneumoniae infections. This case
demonstrates an atypical presentation that is relatively rare in the witnessed patient population. She presented with a preceding URI and neurologic deficits of M. pneumoniae without the characteristic optic neuritis, extrapyramidal symptoms, and seizures.

**Conclusion:** Rehabilitation for rare pathologies including neurologic manifestations of M. pneumoniae infections requires a multidisciplinary approach to best aid the patient. Awareness of this potential disease, and its broader/atypical presentations, in ostensibly unlikely patient populations is key to favorable prognosis and outcomes after post-infectious complications.

**Poster 387**

**Three-Dimensional Glenohumeral Deformity In Obstetrical Brachial Plexus Palsy**

**Katherine E. Alter, MD, Frances T. Sheehan, PhD (National Institutes of Health, Bethesda, MD, United States), Joseph Monzingo, N/A, Sylvain Brochard, MD, PhD**

**Disclosures:** F. T. Sheehan: I Have No Relevant Financial Relationships To Disclose.

**Objective:** Treating the sequelae of obstetrical brachial plexus palsy (OBPP) often require long-term rehabilitation, invasive interventions, or surgery. Evaluation/treatment is currently based on the clinical examination and limited two-dimensional (2D) axial plane imaging. For optimal treatment planning the three-dimensional (3D) glenohumeral deformations associated with OBPP must be quantified. The objective of this study was to evaluate the complete 3D glenohumeral deformity in children/adolescents with OBPP.

**Design:** Case-control study

**Setting:** Clinical research hospital.

**Participants:** Thirteen children/adolescents with unilateral OBPP (a sample of convenience) were enrolled in this IRB approved study. (9M/5F, Mallet score=15.1±3.0, age=11.8±3.3 years).

**Interventions:** Not applicable

**Main Outcome Measures:** A 3D magnetic resonance image set was acquired for both shoulders. Measuring 3D glenoid version and humeral head migration (HHM) began with creating 3D glenoid and humeral models, based on image segmentation. The average surface normative vector of the entire glenoid surface model was used to calculate the anterior-posterior and superior-inferior glenoid version in the scapular coordinate system (SCS). The 3D HHM was defined as distance from the glenoid surface center to the humeral head center in the SCS. Comparisons between the impaired and non-impaired shoulders were tested using a paired-Wilcoxon signed rank test.

**Results or Clinical Course:** Compared to the uninvolved side, the glenoid was more retroverted (8°, P=.003) and oriented inferiorly (7°, P=.009). The humeral head was migrated more posteriorly (5.5mm, P=.007), inferiorly (-4.0mm, P=.013), and medially (-3.6mm, P=.002).

**Conclusion:** The novel 3D quantification of glenohumeral deformities in children with OBPP has immediate implications for interventional planning. The inferior glenoid version and humeral subluxation are new findings, which implicate a potential key role of the latissimus dorsi in glenohumeral deformity genesis. The ability to more completely describe glenohumeral deformation in OBPP will likely improve treatment planning and follow-up. Further, surgical outcomes will likely improve as our focus shifts from 2D axial deformities to a more complete 3D picture.

**Poster 388**

**Shoulder Muscle Atrophy and its Relationship to Weakness in Children with Unilateral Obstetrical Brachial Plexus Birth Palsy**

**Katharine E. Alter, MD, Frances T. Sheehan, PhD (National Institutes of Health, Bethesda, MD, United States), Sylvain Brochard, MD, PhD, Christelle Pons-Becmeur, MS, MD, Hyun Soo Im, MS**

**Disclosures:** F. T. Sheehan: I Have No Relevant Financial Relationships To Disclose.

**Objective:** To quantify shoulder muscle atrophy and its relationship to weakness in children with unilateral obstetrical brachial plexus palsy (OBPP).

**Design:** Case control

**Setting:** Clinical research hospital.

**Participants:** Twelve children/adolescents (sample of convenience) were enrolled in this IRB approved study (8M/4F, 12.4±3.3 years, 155.9±21.7cm, 52.6±18.4kg).

**Interventions:** Not Applicable

**Main Outcome Measures:** Three-dimensional (3D) magnetic resonance (MR) images of both shoulders were acquired. The unimpaired shoulder served as a reference. Individual shoulder muscle volumes were calculated based on 3D muscle models, derived by segmenting the MR images. Maximal isometric torques were collected for flexion/extension, internal/external rotation, and abduction/adduction using a hand-held dynamometer.

**Results or Clinical Course:** In the impaired shoulder, all muscles studied were atrophied, with varying degrees of severity, inducing a 3D imbalance in agonist/antagonist strength balance around the affected shoulder. Isometric strength was moderately to strongly associated with muscle volume (unimpaired: 0.81<r<0.99 and impaired: 0.69<r<0.92).

**Conclusion:** This study advances our ability to evaluate and treat the sequelae of OBPP by providing the first comprehensive evaluation of muscle volume loss across all the main shoulder muscles in children/adolescents with unilateral OBPP. Rebalancing the internal and external rotation strength is often a primary surgical goal in treating children with OBPP. Yet, surgical decisions require knowledge of individual muscle strength capacities, something that currently cannot be measured. The correlations support the use of muscle volumes to predict individual muscle strength, providing invaluable data when determining which muscles are candidates for transfers, lengthening, or weakening in attempt to rebalance shoulder strength. The limited atrophy (22.1%) in the pectoralis major volume and its correlation with internal rotation strength (r=0.80, impaired side) observed in this study, lends support to weakening this muscle (e.g., botox injection) to reduce internal rotation strength. However, the teres major was the most atrophied muscle (55.1%), bringing into question whether transferring this muscle would increase external rotation strength.

**Poster 389**

**Acute Inpatient Rehabilitation in Children with Recent Posterior Fossa Tumor Resection: A Case Series**

**Nikola Dragojlovic, DO (University of Texas Health Science Center, Houston, Houston, TX, United States), Zachary Wirt, MS, OTR/L, CKTP, Christian Niedzwiecki, DO**

**Disclosures:** N. Dragojlovic: I Have No Relevant Financial Relationships To Disclose.

**Case Description:** Four children (age 5 years to 12 years), with posterior fossa tumors who underwent surgical resection and were admitted to acute inpatient rehabilitation.

**Setting:** Academic, tertiary pediatric hospital.

**Results or Clinical Course:** All patients completed inpatient rehabilitation with three hours of daily physical, occupational, and/or speech therapies and ongoing medical management. Functional status was evaluated using the Functional Independence Measure for Children (WeeFIM) at admission and discharge. Furthermore, week-to-week WeeFIM score changes and WeeFIM efficiency scores were also calculated. All patients reviewed had gains in their functional outcome scores (22-46 points). Despite variations in their presenting and admission symptoms, all patients reviewed had functional outcome efficiency scores (1.38) that were comparable to aggregate scores of patients admitted to the same unit for similar periods of time with other diagnoses (1.34). All patients were discharged home with comprehensive plans for outpatient therapies and school reintegration.
Discussion: Despite similar oncologic diagnoses and tumor site, all patients had variable presentations and functional needs. Further discussion on their presenting symptoms, advanced imaging, treatment challenges, and outcomes will be included in the final poster.

Conclusion: Children with recent posterior fossa tumor resections demonstrate improved functional gains after admission to an acute inpatient rehabilitation unit. Specific criteria should be developed based on presentation, tumor type, and treatment pathway to determine which children would benefit most from inpatient rehabilitation.

Poster 390
Leveraging the Electronic Medical Record to Identify Children with Cerebral Palsy Based on Function

John C. Luce, DO (Children’s Mercy Hospital, Kansas City, MO, United States), Matthew Mayer, MD

Disclosures: J. C. Luce: I Have No Relevant Financial Relationships To Disclose.

Objective: Many countries have established large registries for individuals with cerebral palsy (CP) allowing for large clinical and quality research studies. In 2011 the Cerebral Palsy Research Registry demonstrated a method to create a CP registry in the United States. At our facility, searching ICD-9 diagnostic codes was the only method for identifying patients with CP leaving significant gaps in meaningful patient identification. The aim of this project was to create and implement an electronic medical record (EMR) documentation system for classifying children with CP based on key functional metrics.

Design: Prospective cross-sectional study.

Setting: Tertiary care pediatric hospital rehabilitation medicine clinic.

Participants: Over 22 months a total of 518 unique patients with CP were categorized based on function.

Interventions: An order set was created for the EMR to record information regarding function as well as other characteristics for children with CP. Once orders were placed, the EMR could be used to identify important information pertinent to clinical care and future CP research.

Main Outcome Measures: Gross Motor Function Classification System (GMFCS), Manual Ability Classification System (MACS), and Communication Function Classification System (CFCS).

Results or Clinical Course: 518, 329 and 317 children were categorized based on gross motor (GMFCS), fine motor (MACS) and communication (CFCS) function, respectively. GMFCS for groups I, II, III, IV, and V were 76 (14.6%), 109 (21%), 67 (12.9%), 102 (19.7%) and 164 (31.7%) patients, respectively. MACS breakdown for groups I-V included 59 (17.9%), 75 (22.8%), 52 (15.8%), 46 (14%), and 97 (29.5%), respectively, while CFCS included 83 (26.2%), 52 (16.4%), 28 (8.8%), 44 (13.9%) and 110 (34.7%) patients for groups I-V, respectively.

Conclusion: This EMR documentation system provides a successful way to establish a database for children with CP based on function. This database will serve as a strong foundation for future interventions.

Poster 391
Beauty Isn’t Necessarily Benign: Minocycline-Induced Vasculitic Neuropathy with Central and Peripheral Involvement – A Case Report

Erin M. Conlee, MD (Mayo Clinic - Rochester, Rochester, MN, United States), Thomas P. Pittelkow, DO, MPH, David L. Nash, MD, Sherilyn W. Driscoll, MD

Disclosures: E. M. Conlee: I Have No Relevant Financial Relationships To Disclose.

Case Description: A 17-year-old girl developed peripheral neuropathy and medullary infarct secondary to minocycline-induced vasculitic neuropathy. While taking minocycline for acne, the patient experienced acute onset of pain and numbness in a left ulnar distribution, worsened after nerve transposition, as well as leg sensory alterations. Laboratory testing, imaging, and nerve conduction studies (NCS) with electromyography (EMG) were normal. Secondary evaluation revealed abnormal autonomic testing with quantitative sensation loss in left extremities. Acute onset of new dizziness prompted admission with head MRI which showed a right medullary infarction. She displayed left arm weakness in multiple peripheral nerves with diminished reflexes, left leg weakness with gait instability, and left sensory alterations. Brachial plexus MRI and repeat NCS/EMG suggested inflammation and nerve biopsy revealed arteriolar necrotizing vasculitis. The central infarct combined with peripheral nerve histologic findings were strongly suggestive of minocycline-induced vasculitis.

Setting: Academic quaternary care medical institution.

Results or Clinical Course: The patient underwent inpatient rehabilitation with neuromuscular reeducation, focusing on fine motor activities and activities of daily living. A left hand splint was employed to prevent flexion contracture. Her Functional Independence Measure score improved from 95 to 108 upon dismissal. Follow up NCS/EMG after rituximab maintenance showed persistent demyelination of the left hand. Brain MRI remained unchanged. There was no recurrent vasculitis at 18 month follow up, though her mild spastic gait and left forearm wasting persisted.

Discussion: Minocycline is an oral antibiotic frequently used in the treatment of acne. It is implicated in autoimmune processes such as lupus. A recent review found 14 cases of biopsy proven vasculitis, the majority confined to skin manifestations. There were 3 reports of peripheral neuropathy. Our case appears to be the first documented case of both peripheral and central nervous system involvement.

Conclusion: While not often prescribing minocycline, rehabilitation providers should recognize the vasculitic nature of symptoms that may impair function and require rehabilitation.

Poster 392
Quetiapine for the Management of Agitation in Anti-NMDA Receptor Encephalitis in a Pediatric Brain Injury Unit: A Case Report

Arum Kim, MD (New York Presbyterian - Uni Hosp of Columbia & Cornell, New York, NY, United States), Saylee Dhamdhere, Xiaofang Wei, MD


Case Description: The patient is a 7-year-old boy with a history of autism who presented with gait impairment, altered mental status, and witnessed seizures. Work-up revealed a positive anti-NMDA (N-methyl-D-aspartate) receptor antibody, and negative paraneoplastic and viral panels. He was diagnosed with anti-NMDA receptor encephalitis and treated with steroids, intravenous immunoglobulin, and rituximab. He was in a minimally conscious state upon admission to the pediatric brain injury unit. The patient underwent inpatient rehabilitation with neuromuscular reeducation, focusing on fine and gross motor activities and activities of daily living. A left hand splint was employed to prevent flexion contracture. Her Functional Independence Measure score improved from 95 to 108 upon dismissal. Follow up NCS/EMG after rituximab maintenance showed persistent demyelination of the left hand. Brain MRI remained unchanged. There was no recurrent vasculitis at 18 month follow up, though her mild spastic gait and left forearm wasting persisted.

Discussion: Minocycline is an oral antibiotic frequently used in the treatment of acne. It is implicated in autoimmune processes such as lupus. A recent review found 14 cases of biopsy proven vasculitis, the majority confined to skin manifestations. There were 3 reports of peripheral neuropathy. Our case appears to be the first documented case of both peripheral and central nervous system involvement.

Conclusion: While not often prescribing minocycline, rehabilitation providers should recognize the vasculitic nature of symptoms that may impair function and require rehabilitation.
Discussion: Anti-NMDA (N-methyl-D-aspartate) receptor encephalitis is an uncommon autoimmune disorder with distinct clinical phases of illness as in this patient’s case. Behavioral manifestations, such as agitation, can be challenging to manage as these patients emerge from suppressed levels of consciousness, especially when confounded by pre-morbid conditions, such as autism in this case. The favorable outcomes, as measured by the Agitated Behavior Scale, highlight the possible role for quetiapine in the management of acute agitation in this disorder. Additionally, this study supports the use of the Agitated Behavior Scale, typically used in adult populations, to standardize the clinical assessment of agitation in the pediatric patient population.

Conclusion: This study illustrates the efficacy of quetiapine for agitation in a pediatric patient with acquired brain injury secondary to anti-NMDA receptor encephalitis. Additionally, it demonstrates the role for the Agitated Behavior Scale as a standardized assessment tool in not only adult populations, but also in pediatric rehabilitation.

Poster 393
Functional and Motor Recovery in Febrile Infection Related Epilepsy Syndrome: A Report of 3 Cases
Amanda H. Price, MD (University of Arkansas for Medical Sciences, Little Rock, AR, United States), Ashlee Goldsmith, MD, Laura J. Hobart-Porter, DO


Case Description: Febrile Infection-Related Epilepsy Syndrome (FIRES) has been described as an encephalitis-like event occurring in previously healthy children. FIRES is characterized by 3 phases: initial, acute, and chronic, each consisting of preceding febrile infection, highly recurrent seizures progressing to status epilepticus, and drug resistant epilepsy and neuropsychological impairment. Previously reported cases describe symptom onset 1-2 weeks typically following upper respiratory infections. Patients are treated with numerous anti-epileptic drugs with few positive responses. These three cases focus not only on treatment, but short and long-term functional outcomes, which has not previously been reported.

Setting: Inpatient rehabilitation hospitals.

Results or Clinical Course: Three patients with FIRES syndrome presenting to their respective hospitals between February and August 2014 are described. All three cases were previously healthy females with a mean age of onset of 6.3 years (range 3-10). Two cases were preceded by increasing fatigue, vague fever complaints, and altered mental status. The third case was preceded by an upper respiratory infection treated with antibiotics. In all three cases, the acute phase included multiple anti-epileptic drugs (AEDs), immune therapy, burst suppression, and failed ketogenic diet. Two patients had IVIG with no improvement, and two patients underwent plasma exchange. Initial MRI was normal with repeat imaging showing diffuse atrophy. Although on multiple AEDs, all patients continued to have intermittent seizures throughout their respective rehabilitation stays. All patients were discharged home. Prior functional status was normal for developmental age. The consistent outcome in these cases is moderate to severe cognitive impairment, deficits in working memory, gait instability with ataxia, and impaired speech.

Discussion: While much of the literature describes treatments in FIRES, few detail functional recovery outcomes. Two patients are ambulatory, but with severe ataxia and assistance for balance. The third patient requires maximum assistance with transfers and sitting balance.
tricyclic antidepressants and patient had been taking ondansetron and an unknown herbal medication from India. Workup included magnetic resonance imaging (MRI) showing T2 flare hyperintensity in the basal ganglia and sparing of the globus pallidus; electroencephalogram, which was negative for seizures; and a lumbar puncture, which was normal. Repeat MRI was consistent with hypoxic, ischemic encephalopathy. Based on diagnosis of hypoxic, ischemic encephalopathy patient was admitted to the brain injury unit of the pediatric IRU. On admission, the patient had generalized weakness, dystonia, dysphagia, and limited cognitive processing abilities. Urinary incontinence, poor appetite, and poor word articulation were also noted. Unexpectedly, his rehabilitation course was complicated by hyponatremia, hypokalemia and hypotension. Signs of adrenal dysfunction in the setting of neurological decline prompted suspicion of adrenoleukodystrophy. VLCFA assay was ordered, therapies were discontinued, and the patient was transferred back to an acute pediatric hospital for further workup and management.

**Setting**: Pediatric Acute inpatient rehabilitation hospital.

**Results or Clinical Course**: Workup confirmed adrenal insufficiency. Symptoms improved with hydrocortisone. VLCFA levels were elevated, leading to a new diagnosis of childhood onset adrenoleukodystrophy. After continued treatment with corticosteroids, the patient was able to continue therapy with ambulation goals set to close supervision with no assistive device.

**Discussion**: Frequent functional as well as medical reassessment is of utmost importance in patients admitted to the pediatric IRU. Medical reassessment should include formation of a differential admission diagnosis as it may evolve with new findings in the IRU.

**Conclusion**: An accurate diagnosis for cause of disability can help tailor treatment and therapies for the best functional outcomes.

**Poster 396**

**An Adolescent with Spastic Paraplegia from Neurolathyrism: A Case Report**

Jessica Pruente, MD (University of Colorado, Aurora, CO, United States), Pamela E. Wilson, MD

**Disclosures**: J. Pruente: I Have No Relevant Financial Relationships To Disclose.

**Case Description**: The patient was a 12-year-old boy recently adopted from Ethiopia who presented to a rehabilitation clinic with an abnormal gait. He was born at full term without complications and developed normally until 3 years of age. At that time he contracted an unknown illness and developed difficulty with ambulation. His neurologic condition remained stable over the next 9 years. On initial examination he was noted to have hyperreflexia and increased tone in his lower extremities. His sensation and motor strength were intact. He had a spastic gait, with a toe-toe initial contact, scissoring, and some posturing of the left upper extremity.

**Setting**: Tertiary care pediatric hospital.

**Results or Clinical Course**: A diagnostic work up was initiated; MRI scans of his brain and spinal cord were normal. Laboratory tests for hepatitis, HIV, HTLV, lead poisoning, thyroid hormone, and RPR were all negative.

**Discussion**: Reports from his previous provider in Ethiopia suggested that the spastic paraparesis was likely from ingestion of "native grass" which can lead to the condition of neurolathyrism. Neurolathyrism is a motor neuron disease occurring after ingestion of lathyrus sativus, or grass pea. The mechanism involves L-ODAP (β-N-oxalyl-l-α-diamino propionic acid) a neurotoxic amino acid that results in accumulation of calcium within primary motor neurons leading to cell death. While there is no cure for this condition, the patient responded well to a combination of baclofen, Botox injections, and therapy improving his functional status.

**Conclusion**: Neurolathyrism is an irreversible neurologic disorder; however, good functional outcomes can be obtained with appropriate spasticity management and therapy programs.

**Poster 397**

**Intrathecal Baclofen Resulting in Apnea: A Case Report**

Danish Ali, DO (UT-Austin Dell Medical School, Spring, TX, United States), Edward Wright, MD

**Disclosures**: D. Ali: I Have No Relevant Financial Relationships To Disclose.

**Case Description**: A 12-year-old child with autism suffered cardiopulmonary arrest after choking on a tortilla resulting in hypoxic ischemic encephalopathy. Within the first months, dystonia led to the development of scoliosis and extremity contractures. At 6 weeks following injury, he received an Intrathecal Baclofen (ITB) pump with the catheter tip at C2 level. Shortly after, patient developed Central Apnea requiring BiPAP initially at nighttime but progressed to daytime as the dose was escalated. After multiple trials and adjustments, the catheter tip was lowered to T3 and the daytime apnea resolved and pt had occasional nighttime apnea. Unfortunately, a few months later, the patient developed an infection at the catheter insertion site and required the removal of the ITB pump. Once this was removed, the patient’s apnea resolved.

**Setting**: Tertiary care pediatric hospital.

**Results or Clinical Course**: By placing ITB catheter tip in the cervical region, there is presumably a greater concentration of baclofen in the rostral CSF exerting GABAergic effects which suppresses respirations by depressing the central ventilator drive in the brainstem. We hypothesize that this is the cause of apnea in our patient. Once the ITB pump came out, the apnea resolved and the patient no longer required the use of the BiPAP.

**Discussion**: This is the first reported case, to our knowledge, of apnea associated with intrathecal baclofen use.

**Conclusion**: The results in this case suggest that a rostral catheter placement may increase risk for central apnea. Our patient highlights an important phenomenon that clinicians should be aware of and discuss with their patients. The exact mechanism by which ITB contributed to central apnea in this patient is unknown, however we can speculate that a catheter tip in the cervical spine may cause respiratory depression through GABA-B acting on the brainstem. Of note, the second author has experienced a similar central apnea in another hypoxic encephalopathy (near drowning) patient whose opisthotonus during dose escalation likely contributed to catheter migration through the foramen magnum and triggered central apnea that resolved with lowering of the catheter.

**Poster 398**

**Remarkable Recovery of Gross Motor Developmental Delay Following Placement of Bilateral Cochlear Implants: A Case Report**

Antonio Howard, MD (Montefiore Medical Center, Bronx, NY, United States), Yuxi Chen, MD

**Disclosures**: A. Howard: I Have No Relevant Financial Relationships To Disclose.

**Case Description**: A 2-yr-old girl - HS referred for assessment of gait abnormality, seen in the out-patient Pediatric Rehabilitation clinic.

**Program Description**: This 2-yr-old girl was born at 40wks gestation by SVD — normal APGAR’s, no postnatal complications. Early auditory testing revealed diminished responses in the right ear. However, repeat testing at 2wks of age was normal. At her routine two week, six week and three month visits, she was noted to be achieving appropriate developmental milestones. At 6 months of age, her mother expressed concern that HS was not able to hold her head up straight or
to sit up unsupported. These deficits persisted at age 9 mos. However, HS was reportedly responding to her name and improving with fine motor tasks. At age 17 mos, HS remained unable to walk. She had poor balance and there was growing concern that she was not responding to voices except when the speaker was directly in front of her. Repeat audiography and auditory brainstem response testing revealed severe, bilateral sensorineural hearing loss. Imaging, genetic and laboratory workup - including CMV serology, were all unremarkable.

Setting: Outpatient pediatric rehab clinic in a tertiary care institution.

Results or Clinical Course: HS underwent right cochlear implantation (CI) at age 21 months. Two weeks later she was singing, sitting unsatissted and cruising around her home. At age 26 mos, she underwent CI on the left. When reviewed at age 28months, she was able to walk independently, run, jump and climb. Motor strength, range of motion and balance were all normal. No neuromuscular abnormalities were observed.

Conclusion: Observational studies such as this one, have in the past suggested an association between hearing loss and motors skills developmental delay. To date, there is not much research that examines the response of motor development delay to CI. Although no causal relationship can be firmly established, the historical evidence in this case report suggests that early CI may put children with hearing loss on the path to motor skills recovery. The implications for the paediatric physiatrist in the assessment and management of the child with motor skills delay and hearing loss are briefly discussed.

Poster 399
Ischemic Brain Injury in a Patient with Tuberculosis
Meningoencephalitis: A Case Report

Tyler Hedin (University of Utah, Salt Lake City, UT, United States), Michael M. Green, DO

Disclosures: T. Hedin: I Have No Relevant Financial Relationships To Disclose.

Case Description: A previously healthy 3-year-old girl presented with fever and lethargy. A lumbar puncture was concerning for meningitis. Her mental status declined and MRI imaging revealed multiple small vessel territory infarctions within the thalami and basal ganglia. Eventually, mycobacterium tuberculosis was cultured from her CSF. Her hospital course was also complicated by seizures, hydrocephalus, thalamic storming, spasticity, SIADH, respiratory failure, and malnutrition.

Setting: Pediatric inpatient rehabilitation.

Results or Clinical Course: After the diagnosis was confirmed, she was treated with 3 drug anti-TB therapy. A chest CT was negative for pulmonary lesions. She completed a 5 day course of high-dose steroids for cerebral edema and had an external ventricular drain placed. After she was admitted to inpatient rehabilitation, efforts were made to improve her bilateral upper and lower extremity spasticity and encephalopathy. She was treated with baclofen, Botox injections, bilateral thumb/wrist splints, and serial casting for bilateral plantar flexion contractures. She had several episodes of extensor posturing and thalamic storming, which was treated with clonidine. Her seizures were controlled with levetiracetam. Given her persistent neurologic decline, her family decided to transition her to comfort care only. She was discharged home on hospice approximately 2 months after admission and passed away at home.

Discussion: CNS involvement with TB is relatively rare in the United States and is mostly associated with foreign-born patients or a HIV infection. Mortality rates are high and the diagnosis is usually delayed. Survivors almost uniformly have long-term neurologic sequelae. This is the only case, which we are aware of, where an American-born patient presented with tuberculosis meningitis with no preceding respiratory symptoms or known exposures to someone with active TB. Both of her parents had negative tuberculin tests and chest x-rays. Her only risk factor was living on an American compound in Saudi Arabia.

Conclusion: Though less common in the United States, TB meningitis can still occur in low-risk patients and should remain as a differential diagnosis in patients with a suspected CNS infection. With high rates of mortality and morbidity, a high degree of clinical suspicion and prompt treatment are essential.

Poster 400
Association of Executive Functioning with Global Functioning, Community Integration, and Satisfaction with Life in Early Adulthood after Adolescent Traumatic Brain Injury

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Objective: Executive dysfunction is common after adolescent TBI and may lead to decreased functioning across multiple settings. The objective of this study was to determine the influence of executive functioning after adolescent traumatic brain injury (TBI) on global functioning, community integration, and satisfaction with life. We hypothesized that executive dysfunction would be associated with poorer global functioning, community integration, and satisfaction with life.

Design: Cross sectional evaluation of a cohort followed long-term after injury.

Setting: Outpatient research.

Participants: Adolescents (n=37) with complicated mild to severe TBI on average 4.1 years after injury with an average Glasgow Coma Scale (GCS) of 9.3 and mean age of 18.1 years at time of evaluation. 28 were males, 17 had a severe TBI, and 9 were non-white.

Interventions: Not applicable.

Main Outcome Measures: Parent- and self-ratings on the Behavioral Rating Inventory of Executive Function (BRIEF) and Mayo-Portland Adaptability Inventory (MPAI) and self-ratings on the Community Adaptability Inventory (CAI) and satisfaction with Life Scale (SWLS).

Results or Clinical Course: The mean General Executive Composite (GEC) t-scores on the BRIEF were 52.0 (SD=11.8) by child report and 52.6 (SD=12.1) by parent report. Using hierarchical linear regression controlling for age at injury, gender, socioeconomic status, race, and GCS, greater self-reported executive dysfunction was associated with poorer self-reported global functioning on the MPAI (P<.002, ΔR-squared =.14). Greater parent-reported executive dysfunction was also associated with poorer parent-reported global functioning on the MPAI (P<.001, ΔR-squared =.22). Greater parent-, but not self-reported executive dysfunction was associated with lower satisfaction with life on the SWLS (P=.02, ΔR-squared =.13). There was no association between executive function and community integration.

Conclusion: Greater executive dysfunction is associated with poorer global functioning and satisfaction with life after adolescent TBI. Interventions that target improving executive functioning may also improve global functioning and satisfaction with life.